



IP interconnection in the Netherlands: a regulatory assessment

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Summary

i Introduction and background

The Internet has become vitally important for the economy and for social inclusion. What started as a service used by few, has become the main means of communication and entertainment for many worldwide. Consumers, both private and business, increasingly depend on services via the Internet. As the dynamics of the Internet ecosystem prompt players to interact with an ever growing number of actors, in increasingly different roles, the potential for conflict grows accordingly.

Currently, public authorities are reviewing regulatory frameworks that concern telecommunications, media and Internet. At the same time, the Dutch Ministry of Economic Affairs has developed a long term view on telecommunications, media and Internet. IP interconnection, by which networks that form the Internet are interconnected, is an essential aspect of this development. Therefore, the Ministry has requested the Netherlands regulatory and competition authority ACM to investigate the IP interconnection market. Additionally, the Ministry has invited ACM to provide recommendations, should the instruments ACM has at its disposal, be insufficient to deal with possible issues.

ii Competitive analysis

Over the past decades, the Internet prospered under a competitive and unregulated IP interconnection market. Transit is generally available as a default mode for IP interconnection and seems to be efficiently priced. In addition to this, network operators are free to establish peering arrangements from which networks benefit. The vast majority of peering arrangements are closed via a handshake, although various network operators are in the process of formalizing their agreements, due to the increased importance of IP interconnection.

The relative position of the various actors in IP interconnection has shifted over the past decades. Due to a number of trends, this shift is expected to continue. The evolution of the Internet allowed actors to offer new types of services, which disrupt traffic ratios anticipated under existing peering agreements. At the same time, actors are faced with new actors as suppliers, customers and competitors. These actors, simultaneously, consolidate and expand along the value chain, while prices in transit and CDN services decline.

The dynamics in IP interconnection may result in conflicts between actors, causing deteriorated IP interconnections, ultimately leading to decreased service from the end-user's perspective. Most conflicts concern refusals to peer or the conditions under which peering is granted. Importantly, restrictions on peering by one of the parties may be motivated by anti-competitive exploitation or foreclosure objectives as well as legitimate efficiency objectives.



Over the past years, various cases involving IP interconnection were investigated by NRAs and NCAs. Examples are Cogent vs. France Telecom, Netflix vs. Comcast and the merger of Liberty Global and Ziggo. Based on these studies, this report derives two theories of harm. One theory involves the exploitation of a competitive bottleneck, whereas the other comes down to the usage of a competitive bottleneck to foreclose the market for content.

Aside from anti-competitive behaviour, the use of settlement-fees or the refusal to engage in peering can have legitimate efficiency objectives. Efficient contract solutions and harnessing valuable indirect network effects may justify the use of settlement-fees in peering agreements. Additionally, a paid peering agreement may reflect the relative bargaining strength of the parties involved. A possible legitimate justification to refuse peering is the aim to protect an actor's own transit business. ISPs may refuse to upgrade a peering link or demand a settlement-fee because they have spare capacity on other peering links.

In this study, ACM concludes that the likelihood of competition problems in the market for IP interconnection resulting in consumer harm is currently very low in the Netherlands. Four reasons account for this result.

First, the market players and experts interviewed have not revealed significant problems regarding IP interconnection. Even though refusals to peer do sometimes occur in the Netherlands, parties that refuse to peer have so far provided sufficient transit capacity. Second, as transit providers face relatively strong competition, the alternative for peering is also efficiently priced in most cases. Third, settlement-fees for peering seem to be rare in the Dutch market, and if they are present, settlement-fees are not necessarily anti-competitive. Fourth, the assessment of possible theories of harm revealed that competition problems regarding IP Interconnection are most likely to occur when ISPs hold many eye-balls and ISPs face limited competition in the market for Internet access services. On both factors, the Dutch IP interconnection landscape looks favourable. ISPs in the Netherlands hold relatively few eyeballs and face relatively strong competition from each other.

In the event the competent Dutch authorities would have to evaluate IP interconnection conflicts, ACM considers a case-by-case analysis appropriate. Particular economic circumstances are of importance when evaluating IP interconnection conflicts. A key element is whether or not a party refusing to peer offers sufficient transit capacity. As long as a player does so, there are alternative routes available into the player's network, making it less likely that consumer harm will occur. In addition to this, one would have to assess the relevance of the theories of harm and the possible efficiency justifications.

iii Regulatory analysis

To address IP interconnection conflicts, both the Dutch Telecommunications Act (DTA) and the Dutch Competition ACT (DCA) provide relevant norms. Section 24 (1) DCA regarding the abuse of



dominance and Chapter 6a of the DTA that deals with undertakings having significant market power (SMP) on a telecommunications market are general legal instruments, that can be applied to deal with IP interconnection conflicts. However, both of them require a high burden of proof to establish dominance or SMP in a relevant market. In addition, the procedures are lengthy.

A couple of relevant specific legal instruments within the context of the DTA are also applicable with regard to IP interconnection disputes. These are the obligation to interconnect and the option of having a dispute settled by ACM. The net neutrality provisions are not relevant here, as they solely apply to traffic *on* the network of an ISP. The DTA predominantly applies to providers of a public electronic communication service or network (PECS/PECN). This is also the case for all the relevant legal instruments within the context of the DTA in order to address IP interconnection conflicts. At this moment, ISPs and transit providers are classified as providers of PECN or PECS. The classification is generally not clear for the remaining actors. The only relevant provision in the DTA that holds for all relevant actors is Section 12.2 on settling disputes by ACM as long as the dispute can be based on an obligation imposed by or pursuant to the present DTA.

iv Recommendation

The likelihood of competition problems resulting in consumer harm is currently very low in the Netherlands. Problems that do occur, can be dealt with by ACM using Section 24 (1) of the DCA regarding the abuse of dominance. In addition and depending on the classification of the actor in terms of the DTA, the DTA provides ACM relevant norms to address problems in the field of IP interconnection.

Based on these conclusions, ACM considers its current set of instruments sufficient to guarantee a competitive IP interconnection market in the Netherlands. Hence, ACM does not deem it necessary to provide the Ministry recommendations on amendment of the regulatory framework applicable to IP interconnection.

However, the regulatory analysis showed that it's unclear whether or not various actors in the field of IP interconnection are subject to the Dutch Telecommunications Act. As the classification of an actor as a provider of PECN and PECS can imply a variety of norms to which the actor can be subject, ACM recommends the Ministry to provide clarity on this matter and resolve ambiguities.



1 Introduction

1.1 Introduction and context

In the decades the Internet exists, technological developments have shaped the telecommunication and Internet industry. What started as a service used by few, has become the main means of communication and entertainment for many worldwide. Only a few decades ago, taking a telephone call and accessing the worldwide web were activities that were hard to combine. Nowadays, copper, coaxial and fibre networks are all able to provide broadband access, telephony and television, enabling end users to simultaneously stream movies, make videoconference calls with business partners across the globe and make phone calls. As of 2015, broadband speeds up to 1,000 Mbps are available and the overall quality of fixed and mobile connections is constantly improving.

The Internet has become vitally important for the economy and for social inclusion. Consumers, both private and business, increasingly depend on services via the Internet. At the same time, the amount of services that are provided through the Internet grows just as fast. Regulators stimulate competition in Internet access markets. In the Netherlands net neutrality regulation prohibits Internet service providers (ISPs) from blocking and throttling Internet traffic on their networks. But what other markets make up the Internet, and do these markets work sufficiently?

From a high level perspective the networks that form the framework of the Internet are interconnected by means of IP interconnection. This market¹ has developed for several decades without the need for ex ante regulation. As the national regulatory authority of electronic communications, the Netherlands Authority for Consumers and Markets (ACM) has focused on the retail and wholesale Internet access markets for many years. After gaining access to the Internet via an Internet Service Provider (ISP), end users then consume services via the Internet, provided, among others, by so called content and application providers (CAPs). How the ISP itself interconnects with other networks has traditionally not been a focus of electronic communications regulations. Unlike interconnection for telephony, which has traditionally been analysed and regulated in Europe, IP interconnection for Internet traffic has not.

The Body of European Regulators of Electronic Communications (BEREC), in which ACM takes part, published a report in 2012 [BEREC, 2012a] in which it concluded that “the market has developed very well so far without any significant regulatory intervention”. There were few disputes, which were typically solved by market players. Also, the increase and changes in Internet traffic had not been a problem.

¹ When using the term ‘market’ in this report, ACM does not refer to a demarcated relevant market in the formal sense.



However, with the rapid development of the Internet and the possible consequences this might have for end users, things might change for the IP interconnection market. With a dynamic that prompts players in the Internet ecosystem to interact with an ever growing number of actors, in increasingly different roles, the potential for conflict grows accordingly. Players meet each other as clients, suppliers and competitors. There are recent examples of peering conflicts between ISPs and CAPs on the Internet that harm consumers and change relationships, such as Comcast vs. Netflix in 2014.

Meanwhile, public authorities are reviewing regulatory frameworks that concern telecommunications, media and Internet. At the same time, the Dutch Ministry of Economic Affairs has developed a long term view on telecommunications, media and Internet. The IP interconnection market, consisting of several actors involved in the traffic and delivery of data packages, is an essential aspect of this development. Therefore, the Ministry has requested ACM to investigate the IP interconnection market.

1.2 Ongoing research

Development of Internet services, the broader Internet value web and IP interconnection within that, have all become popular research subjects in recent years. Among other studies, the European Commission (EC) has conducted a study into the extent to which the regulatory framework for electronic communications should cover CAPs and Internet Exchange Points (IXPs) [BEREC, 2012a]. Several European regulators have conducted studies or have ongoing research into this matter as well. For example, both the French regulator ARCEP [ARCEP, 2011] and Swedish regulator PTS [PTS, 2009] have conducted studies about IP interconnection within the context of the current regulatory framework.

Next to many existing reports, there is also relevant ongoing research in 2015. BEREC mentions the following in its 2015 work programme and 2015-2017 strategy: “BEREC will focus on safeguarding an open Internet and ensuring a common approach to net neutrality, so that the Internet remains a fertile platform for the development of new innovative services” [BEREC, 2014]. According to BEREC, the most significant regulatory development in the coming years will be the review of the European regulatory framework. The next review should aim to build on these principles and should aim to comprehensively address the challenges facing the sector, taking into account the technological, market and end-user developments since the last review. These developments can be relevant for the question, whether ACM can address potential problems related to IP interconnection in the Netherlands, within the electronic communications regulatory framework.

1.3 Research questions and approach

ACM's study at hand is aimed at gaining insights into the current IP interconnection market, how it has developed over the past decades, and what developments are foreseen in the future. It also includes an analysis of the theories of harm, their likelihood and whether ACM is sufficiently



equipped to deal with potential anti-competitive behaviour in the Netherlands. Should the instruments of ACM be insufficient, ACM provides the Ministry a recommendation of amendments to the regulatory framework. ACM then set the following research questions:

1. What is the IP interconnection market, how does it work and how is it developing?
2. What competition problems may arise?
3. Can ACM address those problems?
4. If so needed, what amendments to the regulatory framework does ACM recommend the Ministry?

ACM's approach to address these research questions is to conduct a literature study, hold stakeholder interviews and consult the (Dutch) market on the draft report. By means of the literature study ACM analysed the actors involved in IP interconnection. Subject of research are the actors involved: ISPs, CAPs, content delivery networks (CDNs), transit providers, and IXPs. To a lesser extent, the position of the end user has been taken into consideration.

To validate the findings from the literature study and to get a better perspective on the specific dynamics in the Netherlands a number of interviews was conducted. For each actor one or two significant players on the Dutch market were interviewed, as well as experts in the field of IP interconnection. Per actor, the interviewees are listed in Table 1.

Actor	Interviewees
ISP	KPN, Liberty Global (Ziggo)
National CAP	NPO, RTL
International CAP	Google, Microsoft, Netflix
IXP	AMS-IX, NL-ix
CDN	Akamai
Data centre	Interxion
Transit provider	Cogent
Independent experts	MIT (Computer Science and Artificial Intelligence Laboratory), OECD

Table 1 Interviewees

1.4 Outline

The report follows the structure of the research questions. Hence, it starts with an overview of IP interconnection in chapter 2. This chapter discusses the various forms of IP interconnection, its actors and the developments in IP interconnection. Additionally, the chapter describes IP interconnection in the Netherlands. Various relevant cases from the perspective of competition, as well as an analysis of theories of harm, are discussed in chapter 3. The chapter concludes with an analysis of the Dutch context and the likelihood of the occurrence of anti-competitive behaviour. Should anti-competitive behaviour occur in the Netherlands, the question arises what instruments ACM has at its disposal. The associated legal framework is the topic of chapter 4. Finally, the report concludes with chapter 5.



2 IP interconnection and its developments

The Internet is made up of a network of networks which interconnect with each other, allowing traffic of data packages to flow from one network to another. The mutual exchange of traffic via adjacent networks is called 'IP interconnection' which, briefly put, refers to the networks physically connecting with each other. Without proper IP interconnections, consumers and companies would not have access to the Internet (or parts thereof) and the services and products it makes available, or only at degraded quality. In this chapter ACM provides an overview of the actors and options for IP interconnection, an economically oriented exposition of IP interconnection, along with a discussion of current trends that are relevant for evaluating IP interconnection conflicts (potential or real).

2.1 Introduction

What once started out as a means for military data exchange has grown into a worldwide network of networks with billions of end users exchanging exabytes (millions of terabytes) of Internet traffic each day. In the mid-1990s, when the Internet was made available to the public, the Internet was a hierarchic tripartite structure. The structure consisted of backbone providers at the top tier, regional providers in the middle tier, and local providers populating the bottom of the hierarchy [Yoo, 2010], see Figure 1. The 'Tier 1' providers made up the Internet core via which (nearly) all traffic of data packages flowed. The regional providers at the second tier interconnected with backbone providers, allowing them to interconnect to the rest of the Internet. Local providers in their turn interconnected with regional providers via which they interconnected to the Internet.

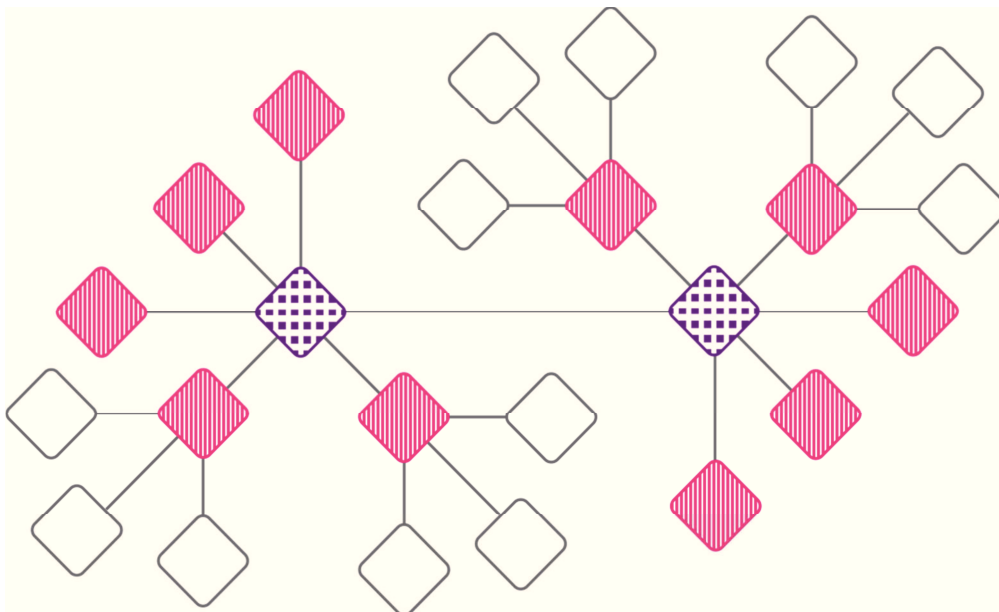


Figure 1 Topology of the Internet in its early days.



This topology of interconnected networks implies that providers lower in the hierarchy depend on a single network via which they access the rest of the Internet. To reduce this dependency, lower-level providers started interconnecting with multiple other providers at various levels in order to create multiple paths for the traffic to flow by. Since the privatization in the 1990s, the number of interconnections between providers has increased such that currently the Internet is independent from a single element in its structure, see Figure 2.

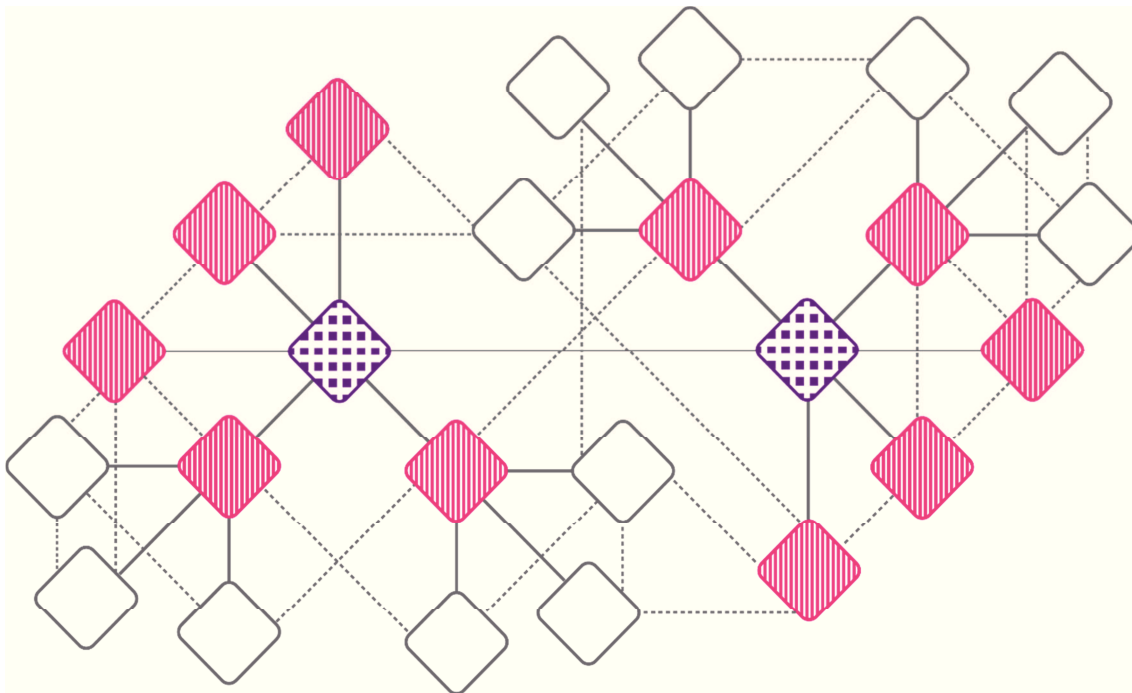


Figure 2 Changes in the topology of the Internet after its early days.

Any network that organizes the flow of data is referred to as an Autonomous System (AS).² It operates independently from other networks [IETF, 2006] and manages or routes pools of IP addresses that either terminate in the network or on a network to which it sells access to the Internet. In the Netherlands, KPN, NPO, RTL, Tele2, Ziggo, the Dutch Tax Administration, the municipality of The Hague and Delft University of Technology are examples of parties operating their own networks.

For both routing traffic through the domain of a network and routing traffic between networks, specific protocols and associated metrics are used. Routing within a network is handled via an Interior Gateway Protocol³. For routing between networks an Exterior Gateway Protocol⁴ is used. Each network is assigned a unique network number (ASN). By means of these protocols and metrics, a network can optimize its internal traffic flow as well as traffic originating from it.

² In the remainder of this report the term 'network' is used to refer to an Autonomous System.

³ Commonly used protocols are iBGP, RIP, OSPF and EIGRP.

⁴ The most common protocol is eBGPv4.



Just like regular end-user broadband subscriptions, the capacity of interconnections between networks is expressed in terms of the amount of data per time unit (e.g. Mbps or Gbps). The capacity also implies a limit to the amount of traffic that can cross an interconnection. When the data rate exceeds the capacity, congestion occurs. From the perspective of the end user, congestion results in missing or stuttering communication or streaming media via the Internet.⁵

2.2 The economics of transit and peering: making or buying connectivity

There are two fundamental commercial models of IP interconnection: peering and transit. Transit entails that one network *buys* from a transit provider connectivity to all other networks that together form the Internet, see Figure 3. Under a transit agreement, the seller (B) accepts the obligation to carry the traffic sent by the buyer (A) to destinations on the Internet it has access to and to deliver to the buyer (A) all traffic the seller (B) receives from third-parties that is destined for the buyer's network (A). Some transit providers need to buy transit themselves to be able to fulfil their obligations to their transit customers. Transit services are typically charged on the basis of capacity which is measured in Mbit/s. Hence the costs of sending and receiving data via transit are mostly variable. As transit is available for virtually every network, it can be considered a default mode of IP interconnection.

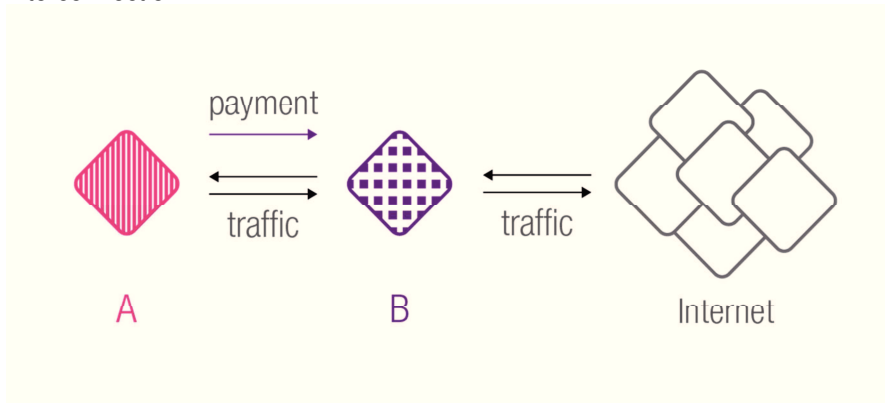


Figure 3 Transit.

Peering entails that two network operators decide to *make* a connection between their networks, see Figure 4. Under a peering agreement, two networks agree to exchange traffic bound for each other's networks. There is no obligation to carry this traffic further, as is the case with transit. Traditionally, peering is settlement-free, that is, parties do not bill each other for accepting and distributing the peer's traffic within their own network. To be able to exchange data, the peers have to set up a physical interconnection between their networks. The costs incurred for this include costs for technical equipment (such as routers and fibre connecting the networks) and costs for the colocation

⁵ [Bauer et al., 2009] discusses various interpretations of the term 'congestion'.



(i.e., the building where the two networks interconnect). The costs of peering are mainly fixed [Van der Berg, 2008].

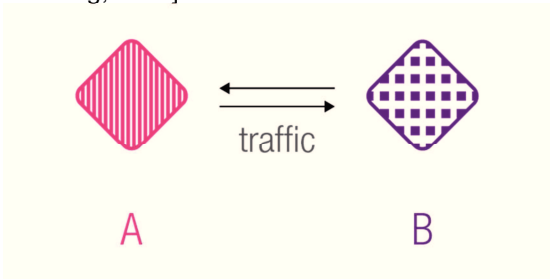


Figure 4 Peering.

When deciding how to interconnect with other networks, each network operator faces the choice of whether to make connectivity with a particular network (peering), or buy connectivity with a particular network from a third-party (transit). Given that the costs of transit increase with the quantity of traffic exchanged and the costs of peering are fixed, it is cheaper for a network to peer with a particular network if the amount of data exchanged is sufficiently large, as illustrated in Figure 5.

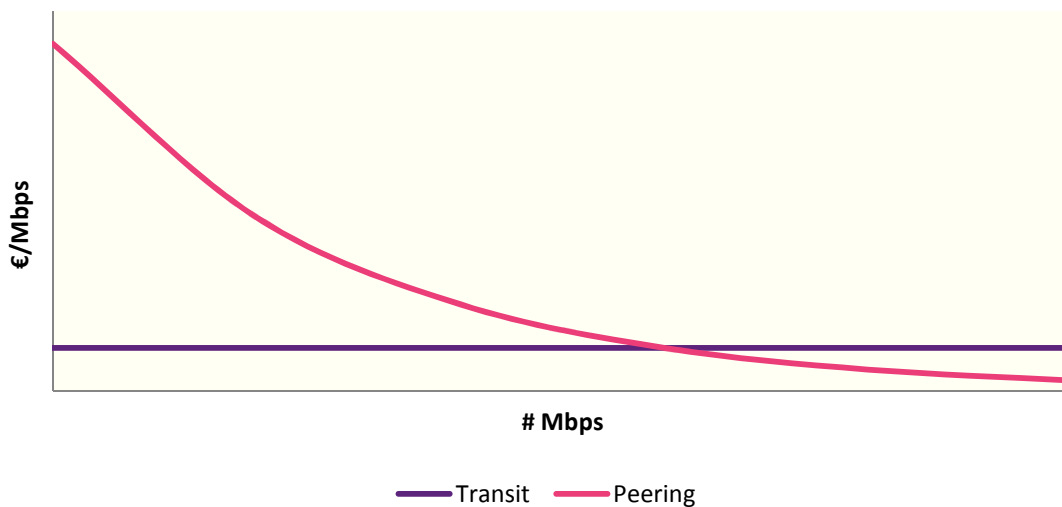


Figure 5 Unit cost of transit and peering.

Besides saving on the per-unit costs of exchanging traffic, two networks may decide to peer for quality reasons. When two networks peer, the data typically has to travel a shorter distance compared with when the services of an intermediate transit provider are used. In addition to this, the traffic has to traverse fewer network routers (so-called 'hops') in the case of peering. Both factors may improve the quality of the interconnection.

2.2.1 Peering: transaction costs and bargaining

From the discussion above, it follows that peering links only occur if some economic value is realized because of it, which can be a saving on the unit-cost of exchanging data or a gain in the end-to-end



quality of service (QoS)⁶. However, this condition is not sufficient for a peering link to exist. Since no network is obliged to enter into a peering agreement with another network, it must also hold that *each* peer finds it in its own interest to peer. Furthermore, networks can bargain over how to split the economic value of their peering link between each other. This implies that peering deals must also respect the relative bargaining strength that the peers have. Hence, a peering deal will only arise if three conditions are met⁷:

1. The peering deal realizes a positive economic value;
2. Each peer prefers to peer rather than using transit;
3. Each peer receives a share of the economic value consistent with its relative bargaining strength.

Closing peering deals is potentially subject to transaction costs. It is conceivable that for each peering deal networks devote time and effort to estimate precisely the value of the peering link, to bargain over the division of economic value, and to formalize the result of their negotiations in a legally binding contract.

Historically, networks have mostly avoided such transaction costs, which becomes clear from the following three observations. First, the large majority of peering deals so far have been closed by a ‘handshake’ [Weller and Woodcock, 2013], which saves time and money spent on formalizing deals in legal contracts. Second, peering deals are traditionally closed on a settlement-free basis. In other words, peering is essentially a barter trade where networks provide each other connectivity to their own network in return for receiving connectivity to the peer’s network. This simplification obviates the need for the peers to bill each other for the traffic exchanged [BEREC, 2012a]. Finally, most networks have a peering policy. Peering policies can be interpreted as rules-of-thumb that on average, ensure that the network’s peering deals are in its interest and yield a division of surplus that is consistent with players’ bargaining strengths. In the following, ACM further discusses some of the typical commercial requirements that networks lay down in their peering policy, or rather, the absence thereof.

One can broadly distinguish three kinds of peering policies [Lodhi, 2014]. *Open* policies impose no conditions on peering and are mostly used by CAPs and relatively small, local ISPs.⁸ On the other side of the spectrum, a *restrictive* policy implies that a network does not peer altogether unless this is necessary to obtain global connectivity. This peering policy is typically used by very large ISPs

⁶ QoS is the overall performance of a network. It typically includes latency and jitter. If a service entails multiple networks, connected via IP interconnection, ACM will refer to this as end-to-end QoS.

⁷ See also [Besen et al., 2001], who apply a bargaining model to peering deals.

⁸ The CAPs interviewed by ACM for the purpose of this study all indicated to us that they apply an open peering policy. Relatively small Dutch ISPs, such as CAIW and Zeelandnet, also apply an open peering policy. See: CAIW - AS15435 (<http://noc.kabelfoon.nl/pp/>); Zeelandnet – ASN15542 (<http://networktools.nl/asinfo/zeelandnet.nl>).



whose main business model is to sell transit services (so-called 'Tier-1 ISPs').⁹ Last, some networks adopt a *selective* peering policy. Selective peering policies are mostly used by ISPs of intermediate size that often are transit customer, peering partner and transit seller simultaneously. To some extent, restrictive and selective peering policies overlap. This is true in the sense that large ISPs that in practice are often restrictive peers, do publish the same requirements as found in selective policies. It is simply the case that not many networks satisfy the requirements laid down in the policy of these large ISPs.

Typical peering requirements are:¹⁰

1. traffic between the potential peers must exceed a minimum level,
2. the peering link must have sufficient interconnection capacity,
3. the potential peer cannot be a transit customer,
4. the in/out traffic ratio between the potential peers must be balanced,
5. the networks of the potential peers must be similar in geographic coverage,
6. the potential peers must have a roughly similar bit-mile product.

The rationale for requirement 1 is straightforward: as explained above, if the quantity of traffic exchanged is sufficiently large, the per-unit costs of peering are lower than the per-unit costs of transit. Requirement 1 is complemented by the requirement to provide sufficient interconnection capacity. Requirement 3 is similarly straightforward. Under a transit agreement, the transit provider charges the potential peer for the traffic exchanged between the two networks (as well as for the potential peer's traffic sent to and received from third-party networks). Transit providers naturally are reluctant to peer since this reduces their transit revenues.

The remaining peering requirements can be understood in light of the fact that peering deals are voluntary transactions where players bargain over the division of surplus, given that networks do not use settlement-fees. [Faratin et al., 2008] explain that, historically, settlement-free peering deals were closed on the assumption that similar networks in terms of number of users and geographic coverage incur roughly the same costs when exchanging a given amount data. If this holds, and it holds that peers roughly send as much traffic as they receive (balanced traffic ratio), it is reasonable to assume that the peers incur roughly the same costs and the same benefits from their peering link. Since there is in general also little reason to assume that bargaining power is unevenly distributed in case networks are largely similar, peering is settlement-free if networks are of the same size and have balanced traffic. Another way to ensure the peers incur roughly similar costs from peering, is to require that the peers have a similar bit-mile product. That is, each network exerts an amount of effort to distribute data within its network that is similar to the effort that is asked from the peer.

⁹ Liberty Global (UPC/Ziggo, AS6830) and the international backbone network of KPN (KPN International, AS268) apply a restrictive peering policy. See for Liberty Global's peering policy: <http://www.libertyglobal.com/oo-bs-settled-peering-policy.html>, and for KPN International's peering policy: <http://www.as286.net/AS286-peering-policy.html>.

¹⁰ See e.g. [Faratin et al., 2008], [WIK, 2008], [Dhamdere et al., 2010], and [Arthur D. Little, 2013].



Finally, it should be noted that, although abstaining from settlement-fees can save transaction costs, settlement-fees can also be helpful in realizing valuable peering deals. Settlement-fees are an effective means to divide the economic value of a peering link between the peers. As such, settlement-fees can simply be a reflection of the fact that one network has a relatively strong bargaining position, and hence is able to appropriate a larger share of the economic value generated by the peering link. In addition to this, a settlement-fee can help make a peering link valuable for one of the peers in the first place. A hypothetical example may illustrate the point, see Figure 6. Suppose that A and B peer, and that C buys transit from B to reach A. Since C is a customer of B, A can use its peering link with B to send traffic to C free of charge. A also receives traffic from C free of charge. In contrast, C pays B both for sending traffic to A and for receiving traffic from A. Now suppose that C wants to peer with A. This would clearly entail a benefit for C, as C would no longer pay transit costs for exchanging data with A. A, however, currently does not pay transit costs for exchanging data with C, which implies that A derives lower benefits from peering with C. Hence, A may require a settlement-fee in order to be willing to peer with C.

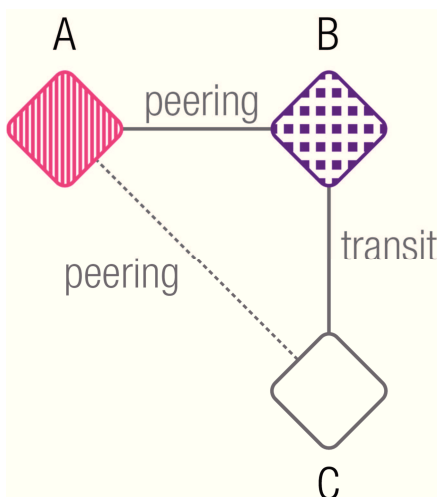


Figure 6 Example related to settlement-fees.

2.2.2 Changes in IP interconnection models and the role of traffic ratios

Peering and transit occupy both ends of the make-or-buy spectrum regarding IP interconnection models. In recent years, a number of intermediate IP interconnection models have developed. One of them is *partial transit* (also referred to as *truncated transit*), where instead of purchasing full access to the rest of the Internet, a network buys connectivity with a subset of networks. Examples of partial transit are cases where a network demands transit only for inbound or outbound traffic [Faratin et al., 2008], or transit only to a specific geographical region. The transit provider may also decide to provide partial transit to a particular network, instead of full transit. For example, a transit provider may decide in a particular transit deal that it will not transport traffic to some network X in order to maintain its peering relation with X. The reason to do so may be to not violate traffic ratios with X.



Yet another IP interconnection model is *settled peering*. Under settled peering, a peer has to pay a price for the share of traffic it sends in excess of a pre-established traffic ratio. Settled peering hence may imply *paid peering*, although this need not be the case.¹¹ In discussions on paid peering, traffic ratios typically play an important role. ACM therefore delves deeper into the importance of traffic ratios next.

For one thing, given the nature of their business, CAPs cannot satisfy the requirement of a balanced traffic ratio with ISPs. Typical traffic ratio requirements mandate a maximum imbalance of 3:1 of in/out traffic. The imbalance of traffic between CAPs and ISPs easily reaches a factor 50:1 because the ISPs' end-users send small requests that generate large responses (i.e., a video). Yet, despite the prominence of the paid peering deal between Netflix and Comcast, in many cases CAPs that peer with ISPs do not pay settlement-fees for these peering links (all CAPs interviewed by ACM for the purpose of this study reported this being the case for all their peering links in the Netherlands). Whether using traffic ratios for establishing free peering is rational from a business perspective is also hotly debated.

ISPs in favour of requiring balanced traffic argue that a CAP takes a free ride on the ISP's network when it sends more traffic than it receives.¹² ISPs consider this an unfair situation. After all, the ISP has to carry more data for the CAP than the CAP does for the ISP. The notion of 'free-riding' is by some also taken to mean that peering leads to a market failure in the sense that it leads to external effects. The alleged externality lies therein that peering CAPs do not take into account the costs to the ISP when they send data into the ISP's network. Therefore, unless the ISP were to impose a traffic ratio, or charge the CAP for traffic exceeding the ratio, the CAP would send an inefficiently high amount of traffic into the ISP's network. CAPs typically respond to these arguments by stating that the ISP's customers request the CAP's data, and so imbalanced traffic is simply an artefact of the current Internet ecosystem, not a negative externality. Moreover, CAPs point out that ISPs are compensated by their customers to deliver the CAP's traffic, which implies that the ISP is compensated for 'doing its job'.¹³

ACM notes that these arguments are often used in conflicts over (paid) peering, but also notes that these arguments are not pivotal. Apparently, there is a substantial amount of unpaid peering links between CAPs and ISPs. This is at least true for the Netherlands, while there is the notable exception of the Netflix-Comcast deal in the US. This exception is described in section 3.2.1. What does seem to be pivotal is whether peering is the more cost-efficient mode of interconnection for the CAP and ISP, and whether the parties can agree on how to split the value of this relationship.

¹¹ Ziggo offers this IP interconnection model, see footnote 9.

¹² See amongst others [Stil and Wood, 2014] and <http://drpeering.net/white-papers/The-Folly-Of-Peering-Ratios.html>.

¹³ See [Netflix, 2014a].



2.3 Actors and stakeholders in IP interconnection

There are several actors involved in the process of traffic delivery from one network to another. The main actors nowadays involved in IP interconnection are ISPs and CAPs. Their interaction is sometimes direct (i.e. they peer privately), but as shown in Figure 7, is often facilitated by three other types of actor: transit providers, IXPs and CDNs [Arthur D Little, 2014]. Transit providers are used by ISPs to exchange traffic with parties with whom they do not interconnect via peering, whereas IXPs are platforms where networks can peer with all other networks present at the IXP. CDNs are used to store the CAP's content in closer geographical proximity to the ISP's end-users. Each of these actors is discussed in the following.

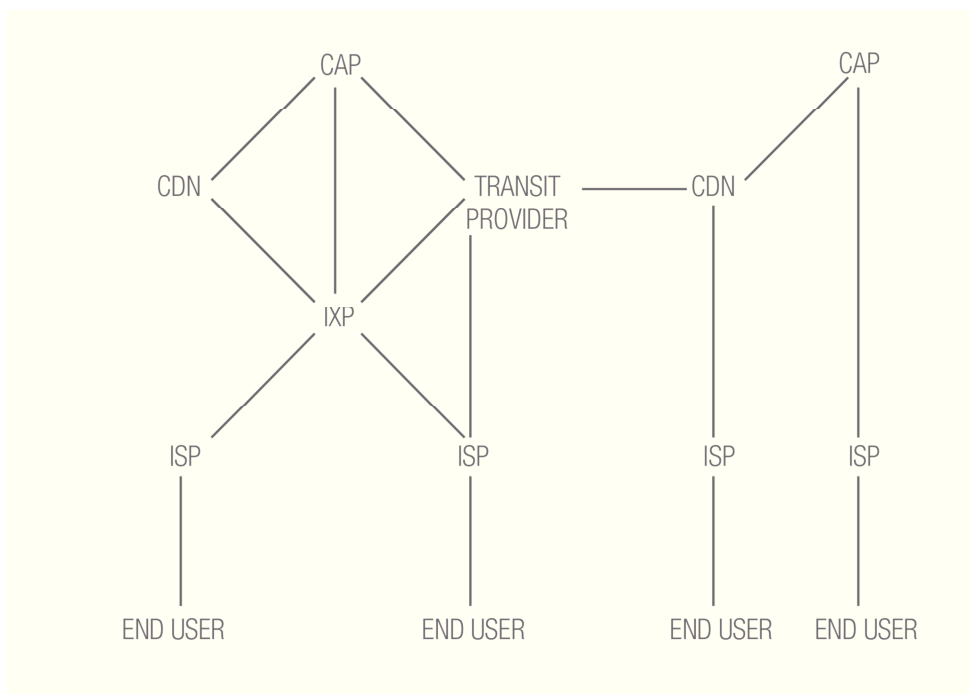


Figure 7 Actors in the IP interconnection market.

2.3.1 Internet service providers

The most common actor in the Internet sphere ecosystem is the ISP, operating the last mile and providing Internet connectivity to end-users at the retail level. ISPs are the parties that make sure end-users can access the Internet for streaming media, online gaming, communicating and such. Due to the nature of their customers, they are characterized by more inbound traffic than outbound traffic and are also known as 'eyeball networks' [BEREC 2012a].

ISPs generate revenue by providing Internet access to end-users as well as via additional services such as pay TV and telephony services. The costs of ISPs incurred for providing Internet access services are mainly the investments in their network and secondary costs due to payments for transit.



In the Netherlands, the largest ISPs are KPN and Ziggo (Liberty Global) with market shares of respectively 40 to 45 percent and 45 to 50 percent at the end of 2014 [ACM, 2015a].

2.3.2 Content and application providers

The increasing technological development of the Internet contributes to the distribution of various types of content via the Internet. Players who specialize in offerings of content are referred to as CAPs or over-the-top (OTT) players. They create or aggregate content such as movies and TV series or they offer applications such as messaging services. Their users are the subscribers of Internet access services of ISPs. In terms of customers, these can be both the users themselves at the retail level and, at the wholesale level, parties paying for advertisements or data (e.g. user profiles).

Aside from Dutch broadcasters such as NPO, RTL and SBS, global players such as Google and Netflix are examples of this type of actor. Other CAPs are platforms like Amazon and Ebay (also owning Marktplaats), social platforms such as Facebook, and news sites.

To provide services to their customers, CAPs require means to distribute their content. These means comprise connectivity, i.e. upstream capacity for Internet access, and hosting services. CAPs are interested in highly reliable Internet access to realise customer satisfaction. To achieve this, CAPs may decide to offer their services via content distribution networks (CDNs). CDNs are interconnected systems of cache servers spread out across the globe that allow CAPs to make content available closer to the customer, reducing the risk of congestion as well as the amount of traffic between CAP and its customers.

2.3.3 Content delivery networks

To distribute their content and deliver it to end-users, CAPs can purchase services from other parties such as content delivery networks (CDNs) or transit providers. CDNs operate global networks of server clusters via which they distribute mainly static content of their customers (CAPs). Examples of CDN players are Akamai and Limelight. Due to their global presence, CDNs offer their customers geographical proximity, i.e. essentially the ability to deliver content close to or even within the terminating networks.

CDNs also allow their customer increased control over the end-to-end QoS. Network operators have limited control over traffic routing between their network and the terminating network. As such, their ability to avoid congestion when traffic is handed over from one network to another is limited. By purchasing services from CDNs the content is placed in closer proximity of the terminating network, reducing the number of network hops. See Figure 8. The reduction of network hops can reduce the response time to user requests as well as the risk of suffering from congestion, thereby improving the user experience.

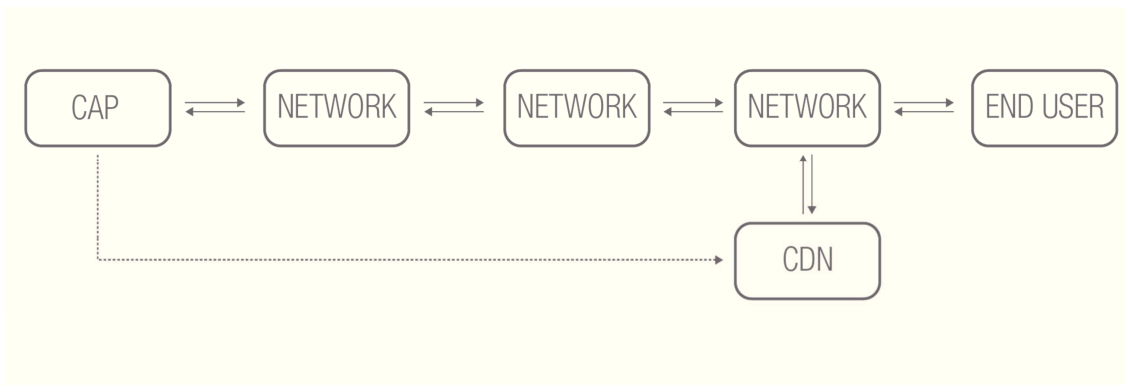


Figure 8 Reducing the number of network hops using a CDN.

Next to improved performance, CDNs improve the availability of services provided by their customers and reduce bandwidth costs, i.e. transit, for their customers. Availability of services is achieved by distributing the content among various locations, making an individual location no longer the single point of failure. To monitor the performance of various contracted CDNs, CAPs use middleware from parties such as Cedexis and Conviva. The middleware of these parties monitors the performance of CDNs based on parameters which are relevant for CAPs. If, for example, a contracted CDN performs less than another, the CAP can decide to move its content to another CDN.

According to [BEREC, 2012a], CDNs typically bill CAPs for their services based on a Mbps basis or per MB consumed. To provide their services CDNs incur costs for hosting their servers in data centres and costs for transit services.

2.3.4 Transit providers

Just as ISPs sell connectivity to the Internet to residential end-users, transit providers sell connectivity to the Internet to other networks such as ISPs and CAPs. Transit providers operate at the wholesale level and are also known as backbone providers. Large transit providers such as Cogent and Level3 operate a global network. Transit services are typically billed on the basis of capacity and actual usage.

To achieve universal connectivity, transit providers purchase transit from other parties or peer with them. Interviewees mention that, by default, 'hot potato' routing is applied among transit providers. Transit providers can decide to carry hand over traffic to another network as soon as possible, but they can also decide to transport the traffic over longer distances and hand it over closer to the terminating network. In case of 'hot potato' routing a network hands over its traffic to its partner network as soon as possible, and vice versa. However, should the traffic load among transit providers become unbalanced, they can decide to apply 'cold potato' routing. In 'cold potato' routing, the content is delivered as close as possible to the terminating network or end-user.



2.3.5 Internet exchange points

Peering and transit can be costly affairs for smaller parties or for parties dealing with large quantities of traffic. To reduce costs for interconnection, IXPs offer platforms where multiple networks can interconnect to exchange traffic. By means of a single connection to an IXP, a network is potentially able to interconnect with all other networks present at the IXP, depending on whether an interconnection agreement exists between the involved parties. The decision of whether or not to interconnect and under what conditions does not involve the IXP, but solely the involved networks. The benefits of an IXP from the perspective of the associated networks are, first, improved network redundancy, as an additional route with other networks can be used. Second, IXPs lower the costs of peering, as networks only need to be present at one point to be able to peer with many other networks. Third, cost reductions can be achieved as networks are less dependent on transit. Globally, the British LINX, the German DE-CIX and the Dutch AMS-IX are large players.

The size of IXPs is typically expressed in terms of the number of associated networks or the amount of traffic travelling via the IXP. Exchange of traffic via an IXP is referred to as 'public peering', whereas peering interconnections between networks without the involvement of an IXP are known as 'private peering'.

According to interviewees, the commercial for-profit IXP model, typically used in the United States, is contrasted by the 'European model'. In Europe, IXPs tend to be independent of both carriers and data centres, whereas IXPs in the United States are mainly operated by owners of data centres. IXPs in Europe also tend to be organized as not-for-profit association, where its users are not customers but members. Their primary focus is providing mutual value and sharing costs.

In the European model, the IXP is typically spread across multiple competing data centres. As a result, the European model allows users of the IXP to select their preferred data centre. In case the IXP is exploited by the owner of a data centre, the owner is typically more reluctant to allow customers to interconnect to its IXP via other data centres. Peering in the European model is typically via public peering, whereas peering in the United States model is predominantly private.¹⁴

2.3.6 The end-user

Although not an actor, another stakeholder in IP interconnection is the end-user. The end-user has a direct relationship with the ISP and CAPs. These relationships exist in different markets: the relationship between the ISP and the end-user is situated in the retail Internet access market, manifested by traffic sent and received via the ISP connection. The relationship between the CAP and the end-user is one situated in the content and application markets, for instance Netflix subscriptions, YouTube usage, and the use of mobile apps.

¹⁴ Source: http://drpeering.net/a/Internet-Peering-Playbook/Second-Edition/Source/HTML_IPP/chapters/ch12-9-US-vs-European-Internet-Exchange-Point/ch12-9-US-vs-European-Internet-Exchange-Point.html.

2.4 Trends and developments

Both internal and external developments influence the dynamics in IP interconnection. Initially affecting only a single actor, developments propagate their way through the market, thereby impacting the business models of other actors. This section discusses trends with significant impact on the developments in IP interconnection; shifts in Internet traffic and its increased relevance for society, the expansion and consolidation of actors (both vertical and horizontal), and the decline in prices for transit and CDN services.

2.4.1 Changes in the Internet ecosystem

Technological innovation changed the nature of Internet traffic. Instead of static data and file transfers, the predominant types of traffic have become streaming and interactive content [Arthur D Little, 2014]. The requirements for these new types of traffic entail both higher bandwidth and increased quality. An increasing amount of the downstream traffic in Europe is caused by real-time content. [Sandvine, 2015] states that this amount is 42 percent in the second half of 2014. In countries where services such as Netflix are present, the share can be up to 67 percent. Translating these developments to the dynamics in IP interconnection, traffic volumes across networks increase and the original benefits of a peering agreement may increase or be nullified.

In addition to the shift in traffic, new types of Internet services emerge, demanding improved end-to-end QoS. [Arthur D Little, 2014] foresees an evolution of the Internet from nice-to-have services towards mission-critical services. These services demand improved service levels resulting in improved IP interconnection delivery features such as lower jitter, packet-loss and latency levels. Both trends influence the actors in IP interconnection, leading to both opportunities and tension among players in the IP interconnection market, especially CAPs, CDNs and ISPs.

2.4.1.1 CAPs

The shift in the nature of Internet traffic towards streaming content propels the existence of CAPs specializing in distribution of content, as well as CDNs facilitating these CAPs. The increase in traffic volumes and the associated costs for transit, prompts CAPs to look for alternatives to reduce their costs caused by traffic. At the same time, in order to increase their profitability, CAPs have the incentive to improve their services. This is typically referred to as the quality of experience (QoE). It entails the quality as perceived by the user, and is more generic and less technological than QoS.

Via a CDN, CAPs can reduce the costs for transit and simultaneously increase the QoE as the content is in closer proximity to their users. Additionally and depending on their bargaining power, CAPs can improve their peering agreements with ISPs by saving costs that are the result of paid peering agreements. Popular CAPs such as Netflix may mobilise their customers by providing



services such as the Netflix ISP Speed Index. These services provide transparency to the end-user and simultaneously allow naming and shaming of ISPs not willing to cooperate.

For both the CAP and the ISP, it can be beneficial to engage in private peering, instead of public peering. The reason is that it means creating a dedicated link for the exchange of traffic which allows for increased control of the traffic flow.

2.4.1.2 CDNs

Initially, the increase in traffic and the willingness to improve the QoE is in the interest of CDNs. They allow CAPs to reduce their costs due to traffic, while improving the QoE of the CAP's services. On the other side, CDNs are under constant pressure by CAPs to improve the QoS while reducing their costs. Depending on the success of a specific CAP, they risk losing their client when it decides to develop its own CDN.

A notable side effect of the use of CDNs is regionalizing the Internet. The use of CDNs implicitly reduces the distances across which traffic flows. Traffic no longer flows from the ISP to the CAP and vice versa, but the traffic from the CAP to the ISP is replaced by local traffic from a CDN to the ISP. As a result, the majority of traffic increasingly remains within the region in which the content was requested.

2.4.1.3 ISPs

Not only do large amounts of traffic flowing from one CAP towards an ISP imply a large tax on the ISP's network. It also implies popularity of the CAP's services among end-users. For ISPs, this means an increment possibly straining their networks, which they will have to address or risk losing customers (potential or current). On the other hand, with ISPs typically providing additional services such as pay TV and, in case of mobile operators, messaging services, they are confronted with a potential competitor, the CAPs.

With the emergence of successful CAPs among its subscribers, an ISP has to consider whether a good interconnection with a specific CAP is beneficial or not. Improving the interconnection may result in an increased popularity of its Internet services, whereas the services provided by the CAP may affect the popularity of its own additional services.

From the perspective of peering agreements, the number of end-users using the CAP's services may provide the CAP the incentive not to lose a peering relation with a specific ISP. This allows for increased bargaining power for the ISP. But increased demand from end-users not only stimulates CAPs to improve their services, it also provides an incentive to various ISPs to formalize their peering agreements. Formalizing agreements enables ISPs to make more accurate estimates of their future network loads, thereby allowing them to provide a constant level of service to their end-users. Additionally, violation of the negotiated terms is clear, allowing the involved parties earlier to renegotiate the terms agreed upon.



The increased demand for improved QoS provides ISPs, and other actors, the opportunity to engage in initiatives such as ETICS [ETICS, 2014]. These initiatives allow to improve QoS over various interconnected networks. With the improved QoS available across networks, new services can be developed and offered to end users.

Cord-cutting

Whether the services provided by CAPs compete with services provided by ISPs or whether they are a mere complement seems to vary per geographical market. The phenomenon of consumers switching to services provided by CAPs while cancelling their pay TV subscription is known as ‘cord cutting’, where the consumer limits its subscription to an Internet access package (fixed or mobile). Note that cord cutting focuses on pay television services, but also applies to voice services and SMS.

In various countries the number of pay TV subscriptions is dwindling in recent years [PwC, 2014], [IHS, 2014]. In these countries consumers choose to limit their subscription to Internet access only, effectively cutting away additional services and the provision of services they do not use. Although consumers may decide not to cancel their pay TV subscription, the actual time they watch television decreases, affecting advertisers, their willingness to pay to the channels and eventually the profitability of these channels.

The Dutch television market mainly consists of pay TV subscriptions. A market survey from [Telecompaper, 2015] shows that the willingness of Dutch consumers in 2014 to cancel their pay TV subscription is limited, because, at that time, the most popular channels are only present in pay TV subscriptions. Recently, both KPN and Vodafone introduced their “over-the-top” (OTT) services, respectively KPN Play and Vodafone TV Anywhere. When subscribing to these services, a consumer can cancel his regular pay TV subscription and engage in a subscription for a service provided via the Internet.

From the perspective of broadcasters distributing their content via Internet instead of via pay TV services, allows them to liaise directly with consumers without the interference of the pay TV provider. The broadcaster deals with the network operator, both as a potential peering partner as well as the pay TV provider. As a result the negotiations take place on multiple levels.

2.4.2 Consolidation and expansion

Even though there appears to be somewhat of a stark delineation between the various actors, there is a growing trend of expansion and consolidation, both vertical and horizontal, across the media value web. This value web comprises the development of content, as well as the aggregation, distribution and delivery to the end-user. Consequently, a single actor can have multiple roles in the

IP interconnection market, introducing additional dynamics to the market. The main actors initiating consolidation are CAPs and ISPs.

2.4.2.1 CAPs

Depending on their size and the geographical distribution of their users, it can be economically beneficial for CAPs to exploit their own CDN [BEREC, 2012a]. Additionally, it allows them improved control over their services. The additional control can contribute to an increased quality of experience from the perspective of the end-user. Examples of CAPs exploiting their own CDN are Google, Netflix and Facebook, who have several CDNs across the globe.

It also allows CAPs to put their CDN within the network of the ISP, of course depending on the willingness of the ISP. The willingness of ISPs is typically limited as it may violate network integrity and security, they argue. On the other hand, the demand for CDNs within the ISP's network, leads to a trend where ISPs offer CDNs.

2.4.2.2 ISPs

Aside from providing services such as pay TV, messaging and telephony services, ISPs may decide to exploit their own CDN or transit services. An example of an ISP operating its own CDN is TDC in Denmark [OECD, 2015]. Operating its own CDN allows each CAP to cache the content for users in the network of the ISP. This solution is beneficial for ISPs as it allows them to remain in control of their networks, primarily in terms of network integrity and security. As such, these arguments are brought forward by ISPs as reasons not to allow CDNs of CAPs into their networks. Depending on the geographical limitations of the networks, the size and quality of the various networks and the availability and quality of IXPs, it may be sufficient to interconnect via IXPs or directly to achieve high quality of service. Various interviewees argue that this is the case in the Netherlands.

Next to provisioning of Internet and pay TV services, various ISPs are also active as content provider. An example of this type of vertical integration is Liberty Global's acquisition of a controlling stake in De Vijver Media [European Commission, 2015] and the controlling stake of Ziggo in HBO. The extent to which this is relevant in the Netherlands will be discussed in section 2.5.2.

ISPs are also inclined towards vertical integration in other aspects. Various ISPs in Europe such as Deutsche Telekom, KPN and Orange have a separate transit division where other networks can purchase transit. Depending on their position, this type of ISPs can also decide to redirect networks requesting peering to their transit division, thereby increasing their profitability.

2.4.3 Decline of interconnection prices

Transit prices provide actors the incentive to consider and engage in peering to reduce their interconnection costs. In some regions, these practices led to the rise of IXPs, especially in Europe. Due to technological developments such as the increase of capacity of networks and competition

among transit providers, transit prices decline over time [TeleGeography, 2014], see Figure 9. Parallel to the decline of transit prices, the prices of CDNs drop [Rayburn, 2015].

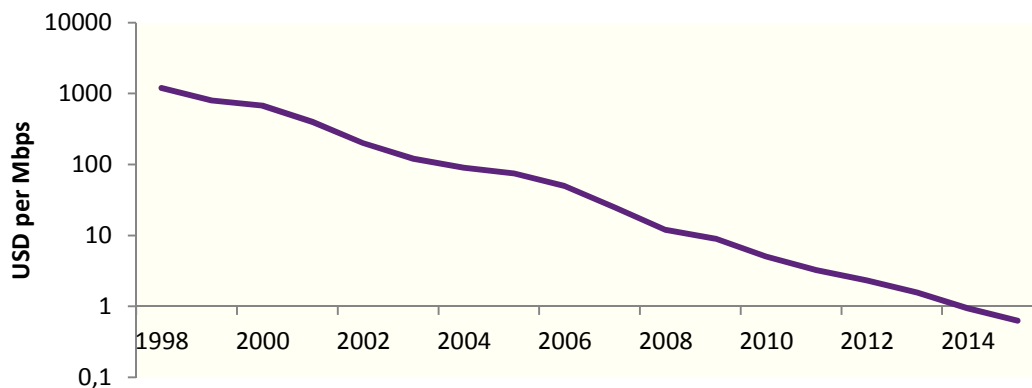


Figure 9 Internet transit prices in U.S. Internet region. Source: [DrPeering, 2015]

With transit usually available as a default option, the decline of transit prices allows actors continuously to reconsider existing peering agreements. This holds for both private and public peering agreements at IXPs. Moreover, declining prices for transit and CDNs reduces the bargaining power of terminating networks (typically ISPs) whereas it increases the bargaining power of originating networks (typically CAPs). This relation between peering agreements and transit is reciprocal as transit providers and CDNs will have the incentive to remain innovative and reduce their prices to remain interesting as a means of interconnection.

Further, transit is of interest for networks which desire robust access to networks they peer with. Instead of solely depending on direct or public peering, they use a second or third interconnection by means of purchasing transit from a third party.

2.5 The Dutch IP interconnection market and Internet access market

Most parties active in the Dutch IP interconnection market have their core business in adjacent markets. They are active as content provider, ISP or IXP. To understand their relative positions on the IP interconnection market, their positions and relations on these markets are relevant. In this section ACM discusses the retail Internet access market, the vertical integration of the largest ISPs and the distribution of content in the Netherlands. Further, the organization of Dutch IXPs is discussed.

2.5.1 Competition in the retail Internet access market

The majority of Dutch consumers has a fixed Internet access service via either KPN or Ziggo, both operating their own infrastructures. KPN operates a nationwide DSL network and the majority of fibre networks, whereas Ziggo operates a cable network reaching ninety percent of Dutch households.



Additional competition comes from ISPs such as Caiway, Tele2, Online.nl and Vodafone. These ISPs either provide Internet access services via their own HFC¹⁵-networks or via wholesale access to the KPN network, either regulated or non-regulated.

In the Netherlands, around 95 percent of all households had a broadband (fixed and/or mobile) connection by the end of 2014, resulting in one of the highest penetration rates across Europe.¹⁶ The penetration rate of fixed broadband subscriptions is 43 subscriptions per 100 inhabitants¹⁷, whereas there are 66 mobile broadband subscriptions for every 100 inhabitants.¹⁸

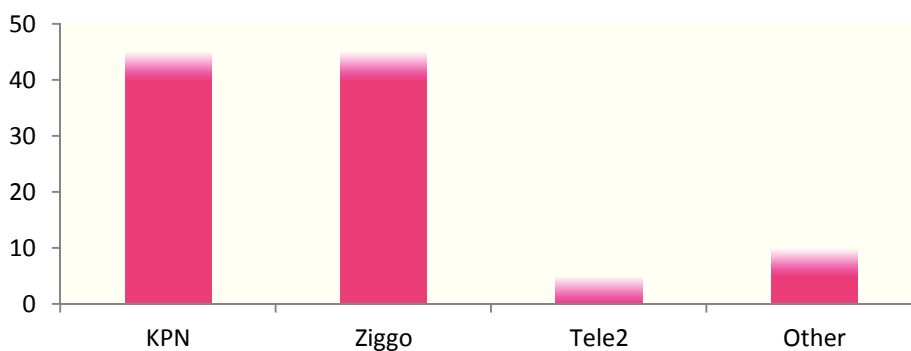


Figure 10 Market shares on the retail market for fixed Internet access, 2015-Q1 [ACM, 2015a].

The market shares of KPN and Ziggo are shown in Figure 10. The figure reveals that the combined market share of the other market players lies between 5 to 15 percent by the end of the first quarter of 2015. These other market players are mostly players active on the networks of KPN. Although ACM has not performed a market analysis of the retail market for Internet access in the presence of access regulation, this market is not regulated and is considered to be effectively competitive as a result of the imposition of effective access regulation.

The level of competition on the retail market in the Netherlands is recognized by all interviewed parties as an important factor that disciplines the ISPs active in the Dutch market. Most interviewees are of the opinion that the retail market for Internet access in the Netherlands can be favourably distinguished from markets for Internet access in the United States and various other European member states with respect to the degree of competition.

¹⁵ Hybrid fibre-coaxial. Broadband network combining optical fiber and coaxial cable. Typically employed by cable operators.

¹⁶ Source: European Commission, Digital Agenda Scoreboard, Households having a broadband connection, 2014.

¹⁷ Source: European Commission, Digital Agenda Scoreboard, Fixed broadband take-up, 2014.

¹⁸ Source: European Commission, Digital Agenda Scoreboard, Take-up of mobile broadband, 2014.



2.5.2 The degree of vertical integration of ISPs and the position of adjacent markets

Both KPN and Ziggo are active on the markets for pay TV services in the Netherlands. Ziggo, being the result of a series of mergers of cable companies, has a market share of 55-60 percent on the retail market for pay television services by the end of the first quarter of 2015. At that moment, the market share of KPN was 25-30 percent. Although neither ACM nor the EC has drawn conclusions on the question whether Ziggo has significant market power on the retail market for pay television services, one can conclude that Ziggo is by far the most important provider of television services in the Netherlands. Consequently, Ziggo is also the most important purchaser of pay TV channels for inclusion in its retail pay television services, buying 50-60% of all content [European Commission, 2014b].

Next, Ziggo is active as a supplier of premium television content. This position has been investigated in the merger procedure between Liberty Global and Ziggo as the merger would combine the only two linear Premium Pay TV film channels in the Netherlands, HBO and Film1. This combination was considered likely to create a significant impediment to effective competition on the possible market for the wholesale supply and acquisition of Premium Pay TV (film) channels. The identified competition problem however was remedied by the divestment of Film1. Therefore, post-merger Ziggo only owns a controlling stake in one premium film channel HBO (together with TimeWarner) and Sport1. On the markets for premium television content, KPN has no significant activities as supplier.

KPN and Liberty Global (Ziggo) are also providers of transit services. KPN operates a global transit network (AS286) with points of presence in Europe and the United States. KPN also owns, via Ziggo is part of Liberty Global which operates a European backbone network (AS6830), with extensions to the United States, over which Liberty Global sells transit services. Neither operator appears in the global top 20 of transit providers [TeleGeography, 2015]. CAIDA performs a ranking of the extent to which certain networks are connected to other networks. This can serve as a proxy for the potential of a certain network to provide transit services. In this ranking, KPN and Liberty Global take place 38 and 52 respectively.¹⁹ This indicates that at a global scale, the positions of both KPN and Ziggo as transit providers are relatively small.²⁰

¹⁹ Source: <http://as-rank.caida.org>.

²⁰ It should be noted that the estimation of KPN's position on the transit market is slightly underestimated, for two reasons. First, KPN acquired NL-ix in 2011. NL-ix is an IXP that offers facilities for public and private peering at over 30 cities across Europe. NL-ix also offers transport services between its data centres to its members. Hence, in effect NL-ix offers a transport service that is potentially a substitute for transit. However, ACM has not been able to find a measure that enables one to compare the scale of this transport service of NL-ix relative to the scale of known transit providers. Second, NL-ix has a sister company Open Transit, which sells transit under the name "Jointtransit" (AS24785). This network ranks quite low in the CAIDA ranking, namely rank 127.



Summarizing, both KPN and Ziggo are active on the retail market for pay television services. On this market, the position of Ziggo is over twice the size of KPN. Also, both KPN and Ziggo are vertically integrated into the transit services but their positions on that market on a world scale are not very significant. Only Ziggo has a significant position as provider of premium television content.

2.5.3 Content providers in the Dutch market

In the Netherlands, NPO, RTL and SBS are the largest broadcasters, distributing Dutch content. They distribute their content primarily via linear pay television services. Additionally, they distribute their content via video on demand platforms, both as part of services provided by the pay television provider and via the Internet. In terms of networks, NPO, RTL and SBS all operate their own networks²¹.

For the distribution of their content via the Internet they organized themselves in the NLZiet portal, but also operate independent initiatives. For the interconnection with ISPs, they use both public and private peering as well as transit to improve robustness of their services.

In terms of CAPs, the largest foreign parties in terms of traffic on the Dutch networks are Netflix and Google. They typically do not make use of third party CDNs, but exploit their own. For interconnection with ISPs, they either buy transit, peer directly or by means of the Dutch IXPs.

2.5.4 IXPs in the Dutch interconnection market

The Netherlands houses two large IXPs; AMS-IX and NL-ix. The presence of these large IXPs attracts other networks. AMS-IX is typically considered to be among the three largest IXPs in Europe. AMS-IX is an organization where parties can choose to become a customer or a member²². Despite being active internationally, the Amsterdam-based AMS-IX operates independently from other AMS-IX related IXPs. This means that a network active on AMS-IX in the Netherlands cannot peer with a network active on AMS-IX in the United States via the platform of AMS-IX as both IXPs are separate platforms.

The second largest Dutch IXP is NL-ix which was acquired by the Dutch telecom operator KPN in 2011. NL-ix states it operates independently from KPN and data centres. NL-ix has a single network connecting multiple data centres in Europe, allowing for instance a network active in Germany to interconnect with a network in the Netherlands. There are also various regional IXPs in the Netherlands, such as the Netherlands Duitse Internet Exchange (NDIX) and the Rotterdam Internet Exchange (R-IX).

²¹ The AS numbers of NPO, RTL and SBS are respectively AS25182, AS20504 and AS50072.

²² Source: <https://ams-ix.net/about/about-ams-ix/the-ams-ix-association>.



2.6 Conclusion

So far, the IP interconnection market has functioned well. Transit is generally available as a default option. Network operators are free to engage in negotiations over peering, which may be a more efficient mode of interconnection for both parties. Most peering agreements are on a handshake basis, although various parties are in the process of formalizing their peering agreements, due to the increased importance of IP interconnection for the business model of network operators.

Over the past decade, networks became faster. This gave rise to new services and new actors. Nowadays the IP interconnection market is populated by ISPs, CAPs, transit providers, CDNs and IXPs, all contributing to an increased diversity of Internet services. Some of these services changed the IP interconnection landscape, by causing disruptions in traffic ratios between networks. Initially balanced traffic flows, have become unbalanced. Additionally, actors have become simultaneously customers, suppliers and competitors. These changes provide opportunities, but also cause tension among actors in IP interconnection. Other trends influencing the interaction of actors in IP interconnection are the expansion and consolidation of actors as well as the declining transit and CDN prices.

In the Netherlands, IP interconnection is characterized by the presence of two large IXPs (AMS-IX and NL-ix), two large ISPs and various smaller ISPs. They allow actors to interconnect via public peering, next to interconnecting via private peering and transit.



3 Potential competition problems regarding IP interconnection in the Netherlands

3.1 Introduction

In this chapter, ACM analyses the potential competition problems on the market for IP interconnection in the Netherlands. Section 3.2 describes a number of historical cases where some form of IP interconnection had been restricted as a result of which the market for IP interconnection may have functioned sub-optimally, and outlines a number of factors that seem important for the evaluation of these cases. No Dutch authority has ever addressed a case concerning IP interconnection, which implies that all cases are taken from other jurisdictions. However, the merger analysis of the European Commission regarding Liberty Global and Ziggo relates, among other markets, to the market for IP interconnection in the Netherlands. Section 3.3 describes two theories of harm that may apply to restrictive interconnection behaviour²³ and outlines conditions under which each theory of harm may hold. Section 3.4 discusses possible efficiency rationales and possible objective justifications for restrictive interconnection behaviour. Section 3.5 concludes the chapter by discussing the likelihood of competition problems on the market for IP interconnection in the Netherlands.

3.2 Description and synthesis of relevant cases

Over the course of this investigation ACM has analysed a number of case studies. ACM has selected the case studies on the basis of the following criteria. In the first place, the cases have to deal with behaviour related to interconnection. As a result, cases relating to copyright issues or net neutrality issues are not discussed here.²⁴ In the second place, ACM has selected cases which were assessed or investigated by a public authority (competition authorities or telecoms regulatory authorities). This choice was made in order to be able to provide as much as possible an objective and authoritative description of the facts of the case.²⁵ In the third and last place, although they were not addressed by a public authority, ACM has also studied the conflicts between content provider Netflix and the US cable operator Comcast, because the situation was discussed extensively in the professional press,

²³ At this point, it is important to note that by 'restrictive interconnection behaviour' ACM does not mean that the behaviour was restrictive within the meaning of competition law, but rather that one party either refused some form of IP interconnection or imposed certain extra conditions on a specific form of IP interconnection. For example, demanding a settlement-fee for peering is restrictive in our use of the term, but need not be a restriction of competition.

²⁴ This report takes as given the position of the Dutch government that the net neutrality provisions in the Dutch Telecommunications Act apply to practices of ISPs within their networks and not to interconnection between networks of ISPs (see chapter 5).

²⁵ This also implies that pending investigations of competition or regulatory authorities are not described here.

attracted much public interest, and caused serious consumer harm [Open Technology Institute, 2014]. The aim of the analysis of the cases is to provide an indication of the type of competition issues that may arise in Internet interconnection markets.

3.2.1 Case summaries

ACM has selected the following cases for study:

- Cogent - France Telecom, [Autorité de la Concurrence, 2012]
- Proposed regulation of Telekomunikacja Polska by the Polish NRA, [European Commission, 2010]
- Netflix - Level3 - Comcast, [Netflix, 2014b] and [Comcast, 2014]
- Google - Free (Iliad), [ARCEP, 2013]
- Netflix - Cogent - Comcast, [Netflix, 2014b] and [Comcast, 2014]
- Telefónica - Orange - Deutsche Telekom, [European Commission, 2014a]
- Liberty Global - Ziggo, [European Commission, 2014b]

These cases will be described in more detail in this section.

Cogent – France Télécom

The conflict between transitprovider Cogent and France Télécom (FT), brought before the Autorité de la Concurrence (Autorité), centres around Cogent's request to increase the capacity of the peering links between FT's Open Transit network and Cogent's network. Cogent requested this capacity upgrade in order to have better access to the subscribers of FT's subsidiary network Orange Internet. FT refused to increase the capacity of the peering link with Open Transit free of charge, claiming that the traffic ratio between Cogent and Open Transit was out of balance. Cogent claimed, among others, that FT's behaviour amounted to refusing access to an essential facility.

In assessing Cogent's claims, the Autorité first established that the relevant product market concerned the market for access to the subscribers of Orange Internet. Transit, partial transit and peering all provide access to Orange Internet subscribers. The Autorité notes that differences between the end-to-end QoS of peering and transit are in reality very small, especially if one would acquire transit from only one transit provider. The Autorité therefore concludes that peering and transit are substitutable solutions for parties seeking access to Orange Internet subscribers. Consequently, FT does indeed control the technical access to Orange Internet. FT has no commercial monopoly over access to Orange Internet, however. The reason for this is that FT must ensure global connectivity for its Orange Internet subscribers. This implies that FT must either buy transit or peer with Tier-1 ISPs. Other networks than those belonging to FT are therefore in a position to sell transit routes to Orange Internet (and this was, in fact, the case). The Autorité next established that FT did not deny Cogent access to Orange Internet, since FT offered Cogent both a paid peering link with Orange Internet and a (partial) transit service to Orange Internet through FT's Open Transit network. The Autorité further held that FT's refusal to upgrade the peering link free of charge does not appear in itself to be anticompetitive behaviour. The reason is that Cogent's traffic ratio with Orange Internet was strongly asymmetric. This traffic pattern increases costs to FT due to the need



to size its network infrastructure to carry traffic from Cogent to its subscribers. The Autorité also assessed the claim that FT offered content providers access to Orange subscribers at very low prices, thereby creating a margin squeeze resulting in foreclosure of third party transit providers from offering access to Orange Internet subscribers. Without coming to a complete assessment of this theory of harm, the Autorité concluded that these practices would potentially infringe competition rules. The Autorité accepted a remedy creating transparency in the relationship between Orange and Open Transit for this issue.

European Commission's veto of proposed regulation of Telekomunikacja Polska by Urząd Komunikacji Elektronicznej

This case involves the Polish Telecommunications Regulatory Authority's (UKE) intention to impose regulatory obligations on **Telekomunikacja Polska (TP)** regarding its peering and transit agreements. UKE found that TP's behaviour in relation to peering and transit differed from that of incumbents in other Member States in the sense that: TP and TP's subsidiary PTK did not have a Point-of-Presence at any public IXP, TP had no peering policy, and TP refused to peer with any commercial ISP but instead offered a transit product which, according to UKE, was excessively priced.

In its draft decision UKE defined two relevant markets: a market for IP traffic exchange with TP in peering mode, and a market for IP traffic exchange in Poland in transit mode. In order to be able to implement regulation on these markets, UKE had to show that, for each market, the following three criteria were cumulatively met: i) there are high and non-transitory entry barriers, ii) the structure of the market must not tend towards effective competition within the relevant time horizon, and iii) the application of competition law alone would not adequately address the market failure(s) concerned. The markets identified by UKE were not regulated elsewhere. The EC vetoed UKE's decision to implement regulation on two grounds.

First, the EC holds that UKE insufficiently substantiated its claim that the peering and transit markets are distinct. Among others, the EC notes that Polish ISPs can replace peering with TP with transit services provided by other Polish ISPs or foreign ISPs, which, in fact, also happened. The EC also does not accept UKE's argument that the peering market is distinct from transit because peering yields higher end-to-end QoS. Transit bought from Polish ISPs has the same end-to-end QoS as peering because of the relatively short distance of conveyance. The EC also notes that international IP transit may yield comparable quality as evidenced by the fact that one of the most successful Polish ISPs only uses international transit links to reach TP's customers.

Second, the EC holds that UKE insufficiently substantiated its claim that TP holds Significant Market Power (SMP). Among others, the EC points to indications that the transit market was in fact competitive, such as the large number of transit deals between Polish ISPs and national and international transit operators, and to the fact that entry barriers are low because ISPs only need to be present at one public IXP in Poland to be able to sell transit there. The EC also notes that TP



lacks an incentive to refuse interconnection because TP has to ensure its users can access the whole Internet. UKE also did not analyze the implications of TP's growing retail competition for TP's interconnection behaviour which, according to the EC, disciplines TP to ensure good IP interconnections.

Netflix – Level 3 – Comcast

This case concerns a conflict between Netflix and Level 3 on the one hand and Comcast on the other hand. The case arose from the fact that Comcast started demanding termination fees for the increased traffic originating from Netflix that was delivered by Level 3 onto the network of Comcast. The case eventually ended with the conclusion of a paid peering deal between Level 3 and Comcast.

From 2008, Netflix purchased Content Delivery Network services for its video streams from Akamai and Limelight. Netflix paid these parties for delivery of the traffic to terminating networks. When Netflix volumes increased, Akamai and Limelight were confronted with terminating networks that were demanding termination fees for the increased traffic. In response to the resulting uncertainty, Netflix entered into an agreement for CDN services with Level 3. Level 3 had long-standing settlement-free peering arrangements with the major terminating networks, among which Comcast, whose customers increasingly requested video content from Netflix. Approximately one week after Netflix's agreement with Level 3 had gone into effect, Comcast demanded payment from Level 3 for terminating traffic on its network, thereby making reference to the traffic ratio requirements in its peering policy. After three days of heavy congestion at interconnection points between Comcast's and Level 3's network, Level 3 agreed to pay the requested fee for terminating traffic on Comcast's network.

Netflix – Cogent – Comcast

This dispute between Netflix and Comcast originated when Netflix started to deploy its own Content Delivery Network called Open Connect. Since Netflix started delivering its traffic to terminating ISPs itself through Open Connect, it had to conclude interconnection agreements with terminating ISPs. While some smaller ISPs agreed to settlement-free peering with Netflix, Comcast demanded fees for terminating the traffic on its network because the traffic was heavily unbalanced. The dispute ended with the conclusion of a paid peering deal between Netflix and Comcast.

Comcast noted that the traffic ratio in a direct interconnection relationship with Netflix would be out of the bounds specified in its peering policy, and therefore required a settlement-fee from Netflix. Netflix refused to pay the settlement-fee and returned to using transit providers Cogent and Level 3 to deliver its traffic Comcast's network. Since a large part of the Netflix traffic now travelled over Cogent's network into Comcast's network, Comcast demanded a fee from Cogent. Cogent and Comcast did not reach agreement on which party had to pay for the necessary increase in capacity of their interconnection links and on the settlement-fee demanded by Comcast. This resulted in heavy congestion between Cogent and Comcast. In reaction to this Netflix looked for alternative ways to get its traffic delivered to its customers subscribing to Comcast's network. Netflix concluded new agreements with other transit providers (Cogent, Level 3, NTT, TeliaSonera, Tata, and XO



Communications) to address the congestion problems. Only three of these ISPs (Cogent, Level3 and Tata) had a direct interconnection with Comcast. The new transit agreements did not solve the congestion problems. In 2013, congestion on Cogent's and Level 3's routes into Comcast's network steadily increased, reaching a level where it began to affect the performance of Netflix streaming for Comcast's subscribers. In December 2013 and January 2014, congestion on routes into Comcast's network reached a critical threshold and Netflix's consumers connected to Comcast's network were significantly harmed. Average quality of Netflix content on Comcast's network went from HD quality to nearly VHS quality. Hence, despite purchasing transit on all available routes into Comcast's network that did not require payment of an access fee to Comcast, the viewing quality of Netflix's service reached near-VHS quality levels. Faced with such severe quality degradation of its streaming video service, Netflix began to negotiate for paid access to connect with Comcast. Netflix and Comcast eventually reached a paid peering agreement [Rayburn, 2014]. Within a week after the agreement, the quality of Netflix streams on Comcast's network shot back up to HD-quality levels.

European Commission's decision in the Liberty Global/Ziggo merger

This case concerns the acquisition by Liberty Global (the parent company of UPC) of Ziggo, which resulted in the merger of the two largest cable operators in the Netherlands in 2014. The new entity controls around 90% of all cable connections in the Netherlands. The case was reviewed by the EC and was ultimately approved subject to a number of conditions. In order to ensure the effectiveness of distribution of OTT content, Liberty Global also submitted a commitment in relation to the behaviour of the new entity in relation to IP interconnection (transit).

The EC identified competition concerns relating to the position of the new entity vis-à-vis providers of television channels (TV broadcasters) and providers of OTT services. The investigation showed that before the merger, UPC and, to a lesser extent, Ziggo, used their position as important distributors of television channels to try to prevent the TV broadcasters from supplying their content to OTT parties, and to try to prevent the TV broadcasters from exploiting their content themselves through their own OTT services. UPC and Ziggo did so by coupling the contract negotiations with TV broadcasters about the distribution of linear TV channels via their cable networks with negotiations on provision of OTT services.

The EC concluded that the proposed transaction would clearly increase the ability to prevent, delay or hamper OTT services by contractual means as a result of the merged entity's increased buyer power on the market for the acquisition of pay TV channels. This behaviour would result in foreclosure of potential and existing competitors of the merged entity in the downstream market for the retail provision of Pay TV services, in particular, potential innovative OTT audio visual service providers from TV broadcasters' linear TV channels and associated catch-up TV content. This would prevent the development of a full OTT substitute to the traditional cable pay TV model. Ultimately, Dutch consumers would be harmed through higher prices for TV subscriptions and less innovation in the way they watch TV.



Although the analysis focused on the potential effects of increased buying power on the market for pay TV channels, the EC also investigated the technical means of the merged entity to hinder OTT competitors. With regard to peering, the EC noted that, among other things, UPC engaged in settlement-free peering only if the incoming/outgoing traffic ratio is below 3:1, a ratio that is not attainable for OTT services providers.

If OTT providers cannot reach the Internet customers of UPC via private or public peering, the only accessible route to UPC customers is transit. The EC noted that UPC was not obliged under its agreements with transit providers to increase interconnection capacity in line with capacity utilization. It could even decrease the capacity should it wish to do so. The EC's investigation showed that already a modest number of customer switching from watching linear TV via cable to watching TV via the open Internet (OTT) would cause congestion of the total transit capacity of the UPC network. The analysis of the EC also showed that UPC was able to congest specific interconnection links with providers of transit services in a targeted manner. The EC therefore concluded that the merged entity's ability to hinder the development of OTT services by contractual means was compounded by its technical ability to restrict interconnection capacity available to such OTT services.

The EC accepted remedies aimed at removing contract provisions that prevented or restricted the development of OTT services by broadcasters. In addition in order to ensure the effectiveness of the commitment not to hinder OTT distribution via contractual means, a remedy was accepted regarding IP interconnection: the merged entity should maintain sufficient interconnection capacity (transit) for parties seeking to distribute data to its broadband customers by providing at least three uncongested routes into the merged entity's IP network in the Netherlands.

Google - Free (Iliad), ARCEP (French NRA)

This case concerns an investigation by ARCEP in reaction to a complaint of consumer protection association UFC-Que Choisir that the traffic of certain Internet services, notably Youtube, were not functioning properly for customers of Free. In this context ARCEP investigated the technical and financial terms governing IP traffic routing between Internet service provider Free and Google but found no irregularities.

In its investigation, ARCEP queried the companies involved, along with the transit providers that relay a portion of the traffic between Free and Google. Over a six-month observation period, the enquiry made it possible to ascertain that: 1) the traffic between Free and Google is relayed both directly, via peering, and indirectly via several international transit providers, and 2) Free's interconnection and IP traffic routing capacities are congested during peak hours since the use of the most bandwidth-hungry applications continues to rise. ARCEP noted that this is an issue that all ISPs are having to contend with. The inquiry did not reveal any discriminatory practices in the terms governing interconnection and IP traffic routing between the two companies. Nor did the inquiry reveal that Free was employing traffic management techniques on its network that differentiated traffic routing conditions based on the type of content, its origin, its destination or the type of protocol used. ARCEP concluded that the methods used to relay Internet traffic, i.e. transit or peering, and

Free and Google's respective ratio of use of these systems do not require any particular comment from ARCEP.

European Commission's antitrust investigation of Telefónica/Orange/Deutsche Telekom

In October 2014, the EC closed an antitrust investigation targeted at Telefónica, Orange and Deutsche Telekom, which was triggered by an informal complaint from a transit provider. The EC found no evidence of behaviour aimed at foreclosing transit services from the market or of providing an unfair advantage to the telecom operator's own proprietary content services, in breach of EU rules that prohibit the abuse of a dominant market position.

The investigation focused on the three former national incumbent telecommunications operators Telefónica, Orange and Deutsche Telekom. All these operators act as ISPs at their domestic retail markets for Internet access, provide transit through their international backbone networks, and provide content to end-users. The EC investigated whether the operators were foreclosing other transit providers from providing transit services to parties seeking access to residential subscribers of Telefónica, Orange and Deutsche Telekom. Presumably, the operators may be able to do so by refusing to upgrade capacities of existing peering links or offering only transit or paid peering links to their domestic networks. This behaviour may have the effect that third-party transit providers can no longer offer certain transit routes, or only do so at higher cost. The routes may also get congested at the point of entry into the operators' domestic networks, causing a deterioration of service quality for end-users. Next to hindering competing transit providers, behaviour of this kind may also hinder competing OTT content providers. As noted, however, the EC did not find evidence that the operators tried to hinder competitors on the transit and content markets.

3.2.2 Synthesis of relevant cases

This section aims to draw some more general observations from the selected case studies. These observations are grouped around the following aspects:

- The type of behaviour observed and the type of possible consumer harm;
- The importance of traffic imbalances for settlement-free peering;
- The degree to which parties involved are vertically integrated in the value chain;
- The degree to which peering, paid peering and transit are substitutable.

3.2.2.1 The type of behaviour observed and the types of possible consumer harm

All cases in which the behaviour of parties involved is clearly described, **Cogent - France Telecom**, **Telekomunikacja Polska**, **Netflix – Level3 – Comcast** and **Netflix – Cogent – Comcast** are related in some way or another to refusals of settlement-free peering. Parties that demanded settlement-free peering from the respective ISPs were offered either only transit (in the Telekomunikacja Polska case) or were offered paid peering deals (other cases).

If negotiations on interconnection agreements other than settlement-free peering are not resolved in a timely manner, consumer harm can emerge because interconnection links can get congested. This



consumer harm materialises through reduced end-to-end QoS of specific content services (such as Netflix video services and Youtube) over the consumer's Internet connection. This was the case in **Cogent - France Telecom** (Autorité de la Concurrence, 2012), **Netflix – Level3 – Comcast, Netflix – Cogent – Comcast** (Open Technology Institute, 2014).

The **Google – Free (Iliad)** complaint was initiated by a consumer organisation because of low end-to-end QoS of Youtube viewing during certain times of the day on the network of Iliad. ARCEP noted that Free's interconnection and IP data traffic routing capacities were congested during peak hours, as a result of the use of bandwidth-hungry applications, but described this as an issue that all ISPs are having to contend with. ARCEP therefore closed the investigation.

In the **Liberty Global – Ziggo** case, the EC concluded that the merger would increase the merged entity's ability to restrict the emergence of OTT services by contractual means as a result of increased buyer power vis-à-vis broadcasters. This ability was compounded by the technical ability to hinder OTT services through interconnection practices. The potential consumer harm resulting from the merger was that the merger prevented the development of further competition and innovation on the Dutch retail market for pay TV services. This could lead to higher prices for Dutch consumers and deprive Dutch consumers of the benefits of innovation in the way they watch TV.

In the **Cogent – France Telecom** case, the Autorité noted in addition to consumer harm in the form of reduced end-to-end QoS due to congestion that the specific behaviour of margin squeeze between the upstream market level (transit) and the downstream level for access services to Orange subscribers could cause consumer harm. If successful, this behaviour might lead to a reduction of competition in the transit market ultimately leading to higher prices for Internet access.

3.2.2.2 The importance of traffic imbalances for settlement-free peering

Traffic imbalances seem to be a relevant factor in most of the cases: **Cogent – France Telecom, the Netflix – Comcast cases** and **Liberty Global – Ziggo**. In all three cases, the peering policies of the ISPs (France Telecom, Comcast, Liberty Global) stated that settlement-free peering was conditional to certain traffic ratio's. France Telecom and Comcast both refused settlement-free peering for volumes exceeding the traffic ratio's and demanded paid peering instead.

In **Liberty Global – Ziggo**, the peering policies of Liberty Global and Ziggo were assessed. Liberty Global's public peering policy indeed provided for bounded traffic ratios.

In the other cases (**Telekomunikacja Polska, Google – Free (Iliad)** and **Telefónica – Orange - Deutsche Telekom**) it is not clear from the case descriptions what role imbalanced traffic played in the cases.

3.2.2.3 The degree to which vertical integration and foreclosure was relevant

Vertical integration played a clear role in the following cases: **Liberty Global – Ziggo, Cogent - France Telecom** and **Telefónica – Orange – Deutsche Telekom**.



In **Liberty Global – Ziggo**, the EC explicitly discussed the potential for vertical foreclosure as a result of vertical integration. The EC concluded that the increased ability of the merged entity to restrict TV broadcasters' possibilities to offer their content over the Internet was likely to result in a foreclosure of rival third-party CAPs that could distribute that content to retail consumers. Through restrictions on alternative distribution methods for their TV content, the merged entity would be able to maintain the significant market power that it would hold vis-à-vis the TV broadcasters as the main distributor of their TV content in the Netherlands. This would likely have negative effects on the upstream market for the acquisition of Pay TV channels. According to the EC, OTT offers would introduce further competition and innovation on the retail market for pay TV services. The merger was likely to prevent this from happening, which would lead to higher prices for Dutch consumers and deprive Dutch consumers of the benefits of innovation in the way they watch TV.

In **Cogent – France Telecom**, the activities of Orange Internet as retail provider of Internet access to customers in France and those of Open Transit as international provider of transit to third parties are vertically integrated. In this case, transit provider Cogent demanded settlement-free peering with either the network of Orange Internet or the transit network Open Transit. One of the theories of harm mentioned by the Autorité related to this vertical integration.

The Autorité investigated whether by refusing settlement-free peering with the domestic network of Orange Internet, France Telecom was effectively forcing Cogent to become a purchaser of transit services of Open Transit instead of provision of the transit services by Cogent themselves. On this issue, the Autorité concluded that, “in the light of the case details, no practices amounting to refusal of access to an essential facility were observed, as Cogent was simply refused a settlement-free increase in the capacity available under the terms of the peering agreement.” [Autorité de la Concurrence, 2012].

In addition, France Télécom was alleged to have offered content providers access to Orange subscribers at very low prices, thereby creating a margin squeeze resulting in foreclosure of third party transit providers from offering access to Orange Internet subscribers.

The EC investigation on **Telefónica, Orange and Deutsche Telekom** focused on the three former national incumbent telecommunications operators who all acted as ISPs in their domestic retail markets for Internet access and were vertically integrated into transit provision through their international backbone networks. The EC investigated whether the operators were foreclosing other transit providers from providing transit services, which include access to end-users of Telefónica, Orange and Deutsche Telecom and whether the operators were giving an unfair advantage to the telecom operator's own proprietary content services. Presumably, the parties involved might be able to do so by refusing settlement-free peering or offering only paid peering to their domestic networks. A refusal of settlement-free peering or charging for peering (paid peering) may have the effect that traffic on certain routes becomes congested at the point of entry into the domestic networks, causing a deterioration of service quality for end-users. The EC found no evidence of behaviour aimed at foreclosing transit services from the market or at providing an unfair advantage to the telecom



operator's own proprietary content services, in breach of EU rules that prohibit the abuse of a dominant market position.

In the **Netflix – Cogent/Level3 – Comcast** cases, vertical integration between retail Internet access provision and provision of transit services did not play a role. As Comcast is not only a provider of retail Internet access but also a provider of pay TV services over its cable network, this vertical integration could have played a role in this case. This, however, cannot be inferred from the relevant documents of the case.

A specific feature of these cases is that Netflix, next to its activities as content provider also deploys its own CDN in order to decrease its transit costs and increase the QoS of transmission. As a result, Netflix increasingly acts as its own transit provider and is seeking direct interconnection relationships through settlement-free peering with ISPs. ACM has found no cases in which this vertical integration between content provision and transit/CDN provision caused competition issues as a result of market power in content provision.

3.2.2.4 *The degree to which peering, paid peering and transit are substitutable*

In all cases, the substitutability between different forms of interconnection plays an important role. This was explicitly discussed in the **Telekomunikacja Polska** and the **Cogent – France Telecom** cases.

In the **Telekomunikacja Polska** case, the Polish regulator UKE proposed to define separate national markets for a) settlement-free peering with the network of Telekomunikacja Polska and b) IP transit. The EC, however, argued that IP transit functions as a demand substitute for peering. The arguments of UKE that IP transit was not a substitute for peering because the services showed significant differences in terms of quality was dismissed by the EC.

In **Cogent – France Telecom**, the Autorité defined a market for access to the clients of Orange (France Telecom) Internet which comprised both peering and transit. In relation to quality differences between peering and transit the Autorité noted that there may be differences between direct access to Orange subscribers through peering and indirect access through transit and these differences may affect the quality of these services. The Autorité however noted that these differences were very small if only one third-party transit operator is used for indirect access, and concluded that the different modes of interconnection indeed represent substitutable solutions for content providers seeking to specifically target Orange Internet users.

In **Liberty Global – Ziggo**, the EC did not explicitly define relevant markets for Internet interconnection but rather made an assessment of the peering policy of Liberty Global and the specific technical possibilities for other ISPs to interconnect with Liberty Global. The EC noted that Liberty Global had a relatively restrictive peering policy, and noted specifically on public peering that the interconnection capacity with the Liberty Global network at public IXs was not sufficient for the provision of even a limited number of video streams. Furthermore, the EC noted that if CAPs would



not be able to reach Liberty Global's customers through public or private peering, the only way to achieve this would be via transit.

The other cases do not provide an explicit analysis of substitutability but the facts of the cases sometimes reveal information on this question. Of particular interest is the behaviour of Netflix as a party demanding connectivity. The Netflix cases show that Netflix has both used peering and transit links to deliver its content to terminating networks. From this one can take that transit was an acceptable solution for Netflix in terms of quality, given that the capacity of the transit links was sufficient. The Netflix cases also show, however, that this latter condition is not always met. Whereas Netflix could initially buy sufficient transit capacity into Comcast's network from Level 3 alone, a few years later Netflix could not buy sufficient transit capacity even from Level 3, Cogent, NTT, TeliaSonera, Tata, and XO Communications together. The differentiating factor here seems to be that Level 3 was willing to pay Comcast a settlement-fee in return for the necessary upgrade of their peering link. Cogent, however, was not willing to do so, implying that Cogent's peering link with Comcast did not have sufficient capacity to satisfy the demand of Netflix. Therefore, when a party demands very large amounts of transit capacity, the availability of transit may be restricted depending on whether the transit provider needs to and is willing to renegotiate its interconnection agreement with the terminating network.

3.2.3 Concluding observations from the case studies

ACM draws the following observations from the case studies. In all cases except the Liberty Global Ziggo, case some form of actual restrictive interconnection behaviour caused the dispute to arise. The cases also show that consumer harm only arises in the situations where there is not enough interconnection capacity between the parties involved, which results in congested interconnection links. In all cases but the Telekomunikacja Polska case, traffic ratios played a role in the decision to engage or not to engage in settlement-free peering. The case studies show that in all cases dealt with by public authorities, except the Telekomunikacja Polska case, the authorities concluded on the basis of their investigation explicitly or implicitly that transit and peering are substitutable. The Netflix cases, however, suggest that transit may not be a substitute for peering if the demand for transit capacity is very large. Finally, vertical integration of the ISP into transit services and into downstream markets related to Internet access played a role in some of the cases.

3.3 Theories of harm

This section describes theories of harm that explain under what circumstances ISPs may deliberately limit the interconnection capacity of their network or impose restrictive conditions on interconnection, and how this may affect consumers and content providers. On the basis of the relevant economic literature and the analysis of the interconnection cases described in section 3.2, ACM describes two possible theories of harm in this section: 1) exploitation of a competitive bottleneck and 2) usage of a competitive bottleneck to foreclose the market for content.

3.3.1 Exploitation of a competitive bottleneck

3.3.1.1 The theory of harm

In this theory of harm, an ISP may extract rents from the exploitation of a competitive bottleneck. A competitive bottleneck can exist in situations where for instance firms A and B compete to attract consumers and these consumers each wish to deal with just one firm for technological or geographical reasons. So customers in group A only deal with firm A and customers in group B only deal with firm B. The competitive bottleneck arises when the customers of firm B (group B), wish to interact (or communicate) with the customers of firm A (group A) or vice versa. Because each customer in group A exclusively deals with only firm A, that firm can charge firm B high prices (or pay low input prices) for access to its captive customers. The same holds in the other direction for firm B. If competition for customers between the firms controlling the bottleneck (A and B) is vigorous, the monopoly profits gained from controlling access to their consumers are passed back to these consumers in the form of a lower priced (subsidised) service [Armstrong and Wright, 2009]. See Figure 11.

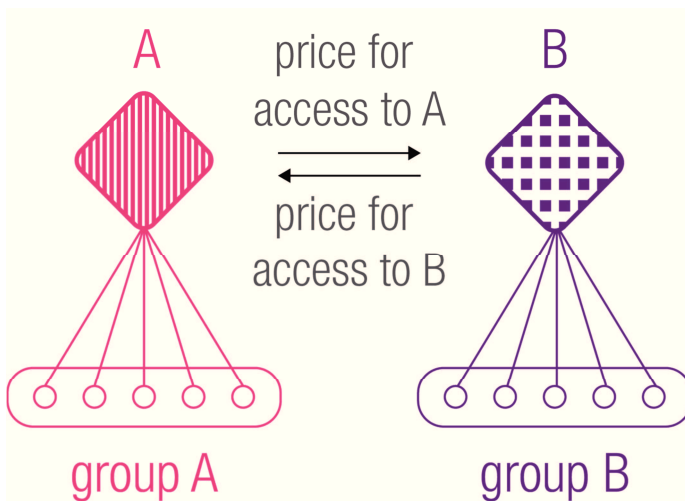


Figure 11 Bottleneck.

The competitive bottleneck theory of harm was applied in ACM's market analysis decision on mobile and fixed voice termination [ACM, 2013]. In this decision, ACM found that the "calling party pays" regime allows that mobile operators increase the charges for access to their own customers without those customers suffering from that. The reason is, first, that customers are single homing, which means that each consumer is connected to only one network. Hence there is technically only one way to deliver voice calls to these customers. Furthermore, ACM noted that callers do not know on which network a called party is homed and call providers do charge average tariffs for all networks. Callers are therefore not aware of the (higher) costs for reaching a certain party, and do not take them into account in their calling decision. Finally, ACM concluded that called parties do not care about the costs of being called to the caller. They do not take this into account in their decision to



choose a certain provider of access and do not switch provider when the costs of being called increase. On this basis, ACM concluded that wholesale call termination on a single mobile or fixed network can be defined as a relevant product market, and on such a market an operator has 100% market share. As countervailing buyer power was not effective ACM concluded that all mobile and fixed voice providers did have significant market power on the markets for termination of calls on their respective networks.

Applied to the Internet, the possible theory of harm would be as follows. An ISP may control access to a group of consumers because it is the only ISP operating in a given area, and/or consumers do not easily switch ISPs. If so, CAPs wanting to provide a particular content or application service to the Internet access customers of an ISP, need access to the network of that ISP. The CAP could realise this access by purchasing transit from a transit provider whose network is directly or indirectly connected to the network of the ISP. The CAP might want to connect directly with the ISP in order to reduce cost of transit or improve the quality of the traffic. In that scenario, the CAP and the ISP have to agree on the terms on which the direct interconnection link is realised. The ISP may exploit this situation by refusing settlement-free peering and demanding a settlement-fee for interconnection (paid peering). Alternatively, in case the ISP also offers transit services, the ISP may only offer interconnection to its access network through the provision of (partial) transit. In case the CAP is not willing to pay the settlement, the direct interconnection will not be realised. The effect of this might be that the particular service will not be available to the customers of the ISP or only available at a lower quality or against a higher price.²⁶

3.3.1.2 Factors relevant for the assessment of this theory of harm

The assessment of this theory of harm depends on a number of factors described below. One can distinguish factors that determine whether a competitive bottleneck exists and factors that determine whether an existing competitive bottleneck can be exploited by the ISP as described above.

Are customers single homing? A crucial requirement in the assessment of whether a competitive bottleneck situation exists is whether the customer to which the CAPs traffic is directed can be reached through different networks. If the customer is connected to the Internet through more than one network at the same time, a competitive bottleneck is unlikely to arise.

Do customers of the ISP care about the cost and quality of Internet access and can and will they switch supplier of Internet access? In contrast to the situation in voice telephony, customers of Internet access are initiating the traffic flow towards themselves demanding the relevant content or applications from the CAPs. This could cause these customers to be more sensitive to price rises and quality reductions than in the case of voice telephony. In a situation where several ISPs compete on the retail market for Internet access, and it holds that switching barriers are low or non-existent

²⁶ It should be noted that the extent to which a CAP is able to pass the higher cost of access to its customers on the network of the ISP is dependent on whether it has a direct commercial relationship with the customer and whether it is able to price discriminate those customers.



and consumers are price-sensitive and quality-sensitive, it is unlikely that a competitive bottleneck can be exploited by the ISP.

Are peering and transit substitutable? There may be cheap transit routes into the ISPs network, which limits the interconnection fees the ISP can impose. These cheap transit routes exist because every ISP must ensure that its network is connected to the rest of the Internet (universal connectivity). This means that every ISP is buying transit or peers with other ISPs to ensure universal connectivity. The other ISPs that are selling transit to or peer with the ISP in question are able to offer transit services to third-party networks through which the customers of the ISP in question can be reached. In some cases, ISPs operating an access network also own a transit network. If so, the ISP may effectively control a significant number of transit routes into the access network, which may effectively reduce the number of alternatives for a paid peering link with the access network.

Does the ISP have incentives to charge fees for interconnection? Charging interconnection fees might not be in the interest of the ISP because it would reduce the supply of content on the ISPs network and hence reduce the attractiveness of the ISPs network for Internet access customers. In other words, the ISP has an incentive to maximize the value of its network to consumers, and then extract this value from consumers. On the other hand, if ISPs operate as platforms that bring together CAPs and end-users, ISPs may use interconnection fees to reduce prices of Internet access for end-users in order to increase penetration and use of the Internet, which in turn could increase the valuation of CAPs for the interconnection with the ISP [Lee and Wu, 2009].

Do CAPs have countervailing bargaining power? CAPs may have countervailing bargaining power if they have unique content. If the content or services offered by the CAP are of such nature that they are essential to the ISPs offering of Internet access, the bargaining power of the CAP may constrain the ability of the ISP to charge interconnection fees. In addition, the CAPs may be able to affect the ISP's costs by choosing from which server or through which transit route to send data into the ISP's network. This may give CAPs more bargaining power vis-à-vis ISPs [Clark et al, 2011].

3.3.2 ISPs may use the competitive bottleneck to foreclose the market for content²⁷

3.3.2.1 *The theory of harm*

As described in section 2.5.2, a significant number of ISPs offer both Internet access services and content to end-users.²⁸ On the market for content, a vertically integrated ISP may therefore compete with CAPs offering content over the open Internet. As explained in the previous section, ISPs affect the access of CAPs to end-users through their interconnection decisions. A vertically integrated ISP may therefore hinder a competing CAP by demanding an access fee for direct interconnection (paid peering) and/or congesting direct interconnections, and/or congesting transit ports that the CAP uses to distribute its content to the end-users connecting to the ISP's access network. This behaviour

²⁷ This section builds strongly on [Farrell and Weiser, 2003].

²⁸ For what follows, it is not relevant how the ISP offers content (i.e., whether as a linear TV signal or otherwise).



clearly harms CAPs that distribute their content over the open Internet. In addition, this behaviour may lead to harm for end-users due to increased prices of content, lower quality of content that is not affiliated with the ISP, and less innovation in the market for content.²⁹

The scenario where a vertically integrated ISP uses its control over the bottleneck to favour own content may be intuitively convincing. However, current economic thinking depicts this scenario as an exception rather than the rule [Farrell and Weiser, 2003].

First, note that the vertically integrated ISP should face limited competition on the market for Internet access to profitably pursue a foreclosure strategy on the content market. The reason is that consumers would resort to a competing ISP as soon as valuable content is hindered or unavailable on their current ISP's network.

Second, a vertically integrated ISP may have no incentive to foreclose competing content providers even if he does not face competition in the market for Internet access. The argument supporting this claim is the 'one-monopoly-profit' theorem developed by the Chicago School. In short, the argument states that a vertically integrated ISP that holds a monopoly on the Internet access market can extract monopoly profits on content by appropriately pricing its Internet access product and its own content. In particular, by setting low prices for content, the ISP reduces margins on content. However, since end-users need the ISP's Internet access services to enjoy the content, low prices on content increase consumers' valuation for Internet access. The ISP can subsequently extract the margins on content by increasing the price for Internet access. The ISP thus does not need to foreclose the market for content in order to extract the profits on content.

Third, a vertically integrated ISP may actually have an incentive to stimulate the presence of CAPs on its network. The reason is that content enhances the value of the ISP's Internet access services: the more and the better the content available on the ISP's network, the more end-users are willing to pay for Internet access. A vertically integrated ISP may thus well benefit from the presence of competing CAPs on its network, especially if this content is differentiated from the ISP's own content.

Although not the rule, vertically integrated ISPs may have an incentive to foreclose competing content providers by reducing interconnection. This may be the case if:

1. *The ISP's Internet access offerings are price-regulated (Baxter's Law)*. If the ISP's Internet access product is price-capped by the NRA, the ISP cannot extract profits on content by

²⁹ The EC uses a different yet similar theory of harm in its decision in the merger of Liberty Global and Ziggo. As in the theory of harm displayed here, the EC posits that the merged entity would be likely to foreclose its potential and existing competitors in the downstream market for the retail provision of Pay TV services, in particular, potential innovative CAPs. The difference is that the EC's theory of harm relies on an increase of buyer power in the upstream market for the acquisition of Pay TV channels of the merged entity whereas the theory of harm here relies (among others) on the existence of a competitive bottleneck.



raising the price for Internet access. In such cases, the ISP may be better off by foreclosing rivals on the content market and making profits there directly.

2. *Price discrimination.* ISPs may engage in price discrimination by offering various combinations of content and Internet access to end-users. Price discrimination typically increases firm profits, because it enables firms to sort consumers according to their willingness-to-pay and subsequently charge each (group of) consumer(s) a price that is closer to their willingness-to-pay. ISPs may price discriminate, for example, by offering a 'standard' Internet access product and a 'plus' Internet access product that includes a TV series streaming service. Since the consumers buying the latter package are more likely those consumers that attach most value to the Internet access product, the ISP can charge a higher price for the 'plus' package (in excess of the price increase that the content alone gives rise to). However, if a competing content provider also offers a TV series streaming service, the ISP's price discrimination strategy may be less effective because consumers have the option of buying the standard Internet access product and the competitor's streaming service. This reduces the possibilities for the ISP to sort consumers according to their willingness-to-pay. Vertically integrated ISPs may therefore foreclose CAPs in order to practice (more) profitable price discrimination.
3. *CAPs may become competitors in the Internet access market.* If a (large) CAP starts investing in Internet access services, vertically integrated ISPs may limit interconnection with the CAP in order to hurt a potential future competitor in the market for Internet access services. Although theoretically plausible, CAPs entering the market for Internet access services seem to be very rare.³⁰

3.3.2.2 *Relevant factors for the evaluation of the assessment of this theory of harm*

The following factors are important for the assessment of the theory of harm.

Does the ISP have market power in the market for Internet access services? An effective foreclosure strategy requires that the vertically integrated ISP holds market power on the market for Internet access services. The reason is that, if there are alternative ISPs and consumers are willing to switch ISPs in order to be able to consume the excluded content, other ISPs would have an incentive to offer the excluded content. In such cases, foreclosing content on its network would likely be an ineffective strategy for the vertically integrated ISP because it would lead to consumers switching ISPs. Note that if the ISP could deny minimum efficient scale to the CAP, a foreclosure strategy is effective even if the vertically integrated ISP faces competition in the Internet access market [Winston, 1990].

Degree of competition in the content market and the ISP's position on the market for content. It is more difficult for the vertically integrated ISP to profitably foreclose content from its network if the market for content is competitive and if the ISP holds a small position on the market for content. If

³⁰ At this moment, ACM is aware of only one example, namely Google, which is deploying a fibre network in a number of cities in the US.



there are many content providers, consumers may substitute to content providers other than the ISP in reaction to foreclosure of some content on the ISP's network. Importantly, competition for the ISP's content may also come from content that is not necessarily distributed over the Internet. For example, ISPs' premium TV packages may compete with watching movies in the theatre or on DVD.

Indications that the Chicago critique does not apply. Even if a vertically integrated ISP would be able to raise margins on its own content by excluding some content from its own network, the ISP does not necessarily have an incentive to do so. The reason is that more content makes the ISP's network more valuable. Hence, vertically integrated ISPs may only have an incentive to exclude competing content under certain circumstances, among which are the following:

- price regulation of the vertically integrated ISP's Internet access services,
- the potential for (more) profitable price discrimination by the vertically integrated ISP, and
- potential competition from CAPs in the market for Internet access services.

3.4 Possible efficiencies and objective justifications

Restrictive interconnection behaviour may in some circumstances be motivated by anti-competitive concerns. However, it is equally true that this behaviour can be motivated by pro-competitive concerns or otherwise legitimate reasons. From a commercial and economic perspective, the following efficiencies and objective justifications may apply to restrictive interconnection behaviour³¹:

- *ISPs may have a legitimate aim to protect their own transit business.* By peering with a network, the ISP reduces demand for transit. After all, networks no longer need to buy transit for the traffic they exchange over a peering link. ISPs that base (partly or in full) their business model on selling transit are therefore naturally less inclined to peer.
- *Paid peering may be an efficient contract solution in certain cases.* Allowing for settlement-fees expands the scope for mutually beneficial transactions between networks. If small network A wants to peer with large transit provider B while B only offers transit to A, the parties may not close a deal. However, if A were to pay B a settlement-fee, both parties may be better off relative to the case where they do not trade. This may be the case, for example, if the settlement-fee is such that i) A exchanges traffic with B at a lower cost than via its transit alternative, and ii) the settlement-fee compensates B for foregone transit income.
- *Paid peering may reflect the relative bargaining strength of the parties.* In general, a direct interconnection between two networks yields some value to both parties. If one of the parties holds a relatively strong bargaining position, for example because the other party gains relatively much from the direct interconnection, the party may be able to extract a larger share of the value from the direct interconnection by charging a settlement-fee.

³¹ Parties may also restrict interconnection for technical and security reasons, discussion of which does not belong to the scope of this report.



- *ISPs may refuse to upgrade a peering link or demand a settlement-fee because they have spare capacity on other peering links.* In case an ISP has overcapacity on an existing peering link with A which is used by A to sell transit services, the ISP may not want to upgrade peering links with some network B. The reason is that it is costless for the ISP if B buys transit from A, since it has overcapacity on the peering link with A. However, upgrading or initialising a peering link with B requires additional investment.
- *Settlement-fees may be used to harness valuable indirect network effects.* If ISPs operate as platforms that bring together CAPs and end-users, ISPs may use settlement-fees to reduce prices of Internet access for end-users in order to increase penetration and use of the Internet, which in turn could increase the valuation of CAPs for the interconnection with the ISP [Lee and Wu, 2009].

3.5 Likelihood of actual competition problems in the Netherlands

In this section ACM discusses the potential for competition problems related to IP interconnection in the Netherlands. Section 3.5.1 discusses the evidence from the interviews. In section 3.5.2 ACM provides an assessment of factors identified in section 3.3 for the market situation in the Netherlands. The final section 3.5.3 describes the position of Ziggo after the implementation of the remedies in the merger case.

3.5.1 Evidence from interviews with market players and experts

The evidence from interviews with market players and experts points to the absence of competition problems on the market for IP interconnection in the Netherlands. Interviewees provide the following picture of past and current IP interconnection practices in the Netherlands.

Paid peering is seemingly rare in the Netherlands

ISPs and CAPs active in the Netherlands sometimes pay settlement-fees and receive settlement-fees for peering links abroad. Interviewees have provided to ACM very few examples of paid peering in the Netherlands. All CAPs interviewed indicated that they do not pay for peering in the Netherlands, although in rare occasions, paid peering occurs in the Netherlands.

The market for IP interconnection functions well in the Netherlands

Almost unanimously, the interviewees are of the opinion that the market for IP interconnection works very efficiently in the Netherlands. Parties do report minor frictions, such as temporary de-peering or disagreements about who is to pay for upgrades of peering links. In addition to this, market players report that they sometimes resort to transit because CAPs refuse to pay a settlement-fee for peering while the ISP denies settlement-free peering. In some of these cases, it seems that transit is not the most efficient mode of interconnection as large amounts of traffic are exchanged. In other words, it seems that a paid peering deal would be a more efficient contract



solution in these cases. ACM's interpretation of these cases is that paying a settlement-fee is a big hurdle for CAPs as it may provide a precedent for future negotiations, which is confirmed to us by CAPs. Thus, CAPs are willing to resort to a less efficient mode of interconnection in order to prevent paying more settlement-fees in the future. In any case, transit is a proper substitute for peering in terms of quality as long as the ISP guarantees sufficient transit capacity into its network. According to the CAPs interviewed by ACM, this condition is met by all ISPs in the Netherlands. CAPs and ISPs alike therefore maintain that end-users in the Netherlands do not experience degradation of quality of requested content due to insufficient interconnection capacity or conflicts over IP interconnection.

The market for IP interconnection is different in the Netherlands compared to Europe and the US

Most interviewees note that the Netherlands is one of the countries that is the least prone to conflicts over IP interconnection. Four reasons are provided for this. First, ISPs in the Netherlands are relatively small. This implies that the ISPs have little bargaining power to demand settlement-fees and lack power to otherwise restrict IP interconnection in ways that are favourable to the ISP. Second, ISPs face relatively strong competition compared to, for example, the United States. Dutch consumers can choose between different networks, which gives the ISPs an incentive to serve the consumer better and to make interconnection decisions accordingly. Third, the presence of AMS-IX and NL-ix has made it very cheap and easy to engage in public peering. Moreover, historically, the not-for-profit character of AMS-IX has created an atmosphere in which good relationships between CAPs and ISPs have developed. This has resulted in a large number of peering deals between CAPs and ISPs. Finally, since the Netherlands is geographically a small country, networks can achieve nation-wide high quality IP interconnections through only one point-of-presence (which is often the AMS-IX).

3.5.2 Assessment of relevant factors identified in the theories of harm

In this section ACM provides an assessment of factors identified in section 4.3 for the market situation in the Netherlands. The assessment is restricted to the factors on which ACM is able to make an assessment on a general level. As the assessment of some of the factors, in particular the incentives of ISPs to charge fees for interconnection and the degree of countervailing buyer power of CAPs may be specific to a certain ISP or CAP (or combination of ISP and CAP), these factors are not assessed in general here.

3.5.2.1 Are Internet access customers single homing or multi homing?

A crucial factor for the evaluation of the competitive bottleneck theory is the extent to which Internet access customers are single homing or multi homing. If the customer is connected to the Internet through more than one network at the same time (i.e. multi homing) a competitive bottleneck is unlikely to arise.

In the Netherlands 43 per 100 households are connected to the Internet through a fixed broadband network.³² In addition a fast growing number of inhabitants has a mobile subscription that includes broadband Internet access (Q1 2015: 58% of 20.5 million subscriptions)³³. This indicates that a growing number of residential Internet users might be multi-homing. However, in its analysis of the retail market for Internet access through a fixed network and Internet access through a mobile network, ACM has considered that the two modes are not substitutable for end-users and therefore do not belong to the same relevant market [ACM, 2015b]. Although this conclusion may change in the future, depending on the technological development of both fixed and mobile networks, the current situation implies that a large part of the users of Internet access can be considered single homing.

3.5.2.2 The degree of competition in the Dutch market for Internet access services

The extent to which an ISP can exploit a competitive bottleneck depends among other factors on the state of competition in the retail market for Internet access. The state of competition in this market is described in section 2.5.1. The conclusion of that section is that, although ACM has not performed a market analysis of the retail market for Internet access in the presence of access regulation, this market is currently not regulated and is considered to be effectively competitive as a result of the imposition of effective access regulation. This gives the ISPs an incentive to ensure quality of internet access and to make interconnection decisions accordingly.

3.5.2.3 Switching motives and behaviour in the retail market for Internet access

The market structure described implies that Internet access customers have a choice between a wide number of different Internet access subscriptions from a significant number of players. Figure 12 shows that Dutch Internet access customers are actually switching providers. On average, 14% of the Internet access users have switched provider in the last twelve months.³⁴

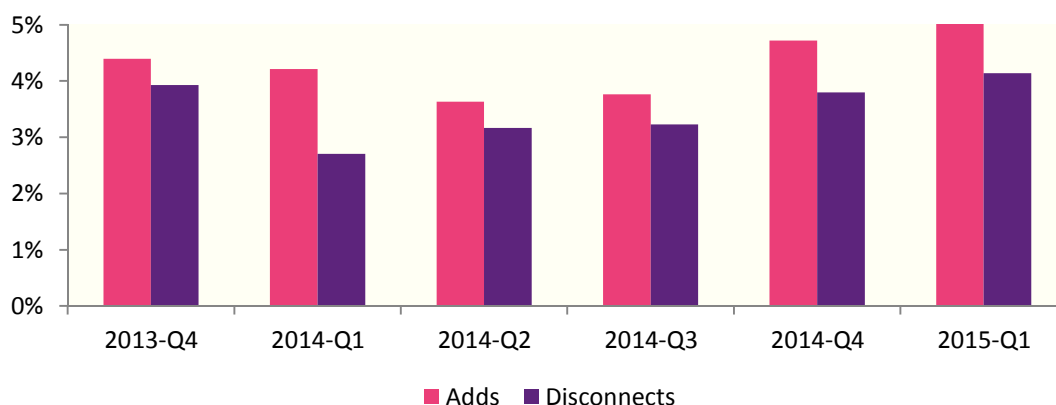


Figure 12 Churn in the retail market for fixed Internet access per quarter, [ACM, 2015a].

³² Source: European Commission, Digital Agenda Scoreboard, Fixed broadband take-up, 2014.

³³ Source: [ACM, 2015a].

³⁴ Calculated as the sum of the number of disconnects. The number of disconnects is chosen as the market grows in volume. The use of adds would be an overstatement as the autonomous growth of the market is not corrected for.



Research into the motives on which consumers base their choice of provider of Internet access show that price, stability of the connection (quality of the connection) and speed are the most important aspects for the choice of providers [Blauw, 2014]. The price of Internet access is considered “decisive” for the choice of Internet providers by 30% of the users and important by 57%. The stability of the connection is considered “decisive” for the choice of Internet providers by 14% of the users but important by 73%. In addition, the research shows that dissatisfaction with the current providers plays an important role in the decision to switch or to consider switching.

The above indicates that consumers of Internet access in the Netherlands are sensitive to changes in price and changes in the quality of Internet access. As shown in the case descriptions in section 3.2, decisions on interconnection can directly affect the quality of the Internet access experienced by consumers at the retail market. ISPs that are faced with potential switching of end-users in reaction to quality degradation will have an incentive to ensure a sufficient level of interconnection capacity through either selling or purchasing transit or engaging in (settlement-free) peering.

3.5.2.4 The degree of substitutability between transit, settlement-free and paid peering

IP transit and peering are in the vast majority of cases substitutes. Every network needs to interconnect with every other network in order to be able to provide its subscribers universal access to the Internet, or to bring its content to all the subscribers of the Internet. The default mode of achieving this universal connectivity is to buy IP transit services from one or several providers. Peering provides a network with a connection with one particular network. Hence, both peering and transit cater to the need for IP interconnection. In terms of product characteristics, transit differs from peering only in the scale at which a network acquires IP interconnection.

Universal connectivity requires that every ISP is buying transit or peers with other ISPs to ensure universal connectivity. Therefore, other ISPs that are buying or selling transit from/to or peer with the ISP in question are able to offer third-party networks transit services through which the customers of the ISP in question can be reached. In some cases, ISPs operating an access network also own a transit network, as is the case with KPN and Ziggo. If so, the ISP may also control a significant number of transit routes into the access network, which may effectively reduce the number of alternatives for a paid peering link with the access network. This however depends on the extent to which the ISP's access network is depends on its transit network for connectivity to the rest of the internet and the position of the ISP as transit provider (see section 3.5.2.5).

It is often noted that peering may yield superior quality to transit, as it reduces the distance over which traffic is carried and it reduces the number of hops the traffic has to traverse. In practice, however, the difference in quality of the connection between transit and peering is often negligible. The reason is that many applications are not so sensitive to latency and packet loss [Arthur D. Little, 2014]. Video streaming, for example, makes use of buffering which allows content to be enjoyed at high quality even if a transit link is slower than a peering link. For certain applications, transit may not be a substitute for peering due to quality concerns. This may hold for e.g. real-time applications such as video conferencing and gaming.



Another possible exemption to the rule that transit is a substitute for peering is the case where two networks exchange very large amounts of traffic. In such cases, a network cannot simply shift its traffic to a transit link as transit providers would have to upgrade interconnection capacity with the destination network. As the Netflix cases show, transit providers may not always be able or willing to close IP interconnection deals with the destination network such that the transit provider can satisfy large demands for transit. One of the reasons for this may be that the destination network starts charging the transit providers for their peering link as traffic becomes unbalanced. Another reason may be that transit providers are reluctant to invest in upgrades of the interconnection link with the destination network just to be able to serve one big buyer. Such investments are risky because the buyer may decide to switch transit providers overnight, which leaves the original transit provider and the destination network with stranded investments in their IP interconnection. Hence, when very large amounts of traffic are involved, transit may not be a substitute for peering.

Based on the above, ACM concludes that in the vast majority of cases IP transit and peering can generally be considered substitutes. The relatively small distances within the Netherlands and the high level of connectivity due to the presence of two important internet exchanges contributes to this conclusion. In the end, the degree of substitutability of transit and peering in a specific case depends on the availability in the specific situation.

In this study, ACM assumes that transit routes are efficiently priced because transit providers experience relatively strong competition. This is an assumption widely held. For example, [BEREC, 2012a] concludes that “backbone providers are increasingly exposed to competitive pressure”³⁵. [Analysys Mason, 2011] draws a similar conclusion. The interviews with market players and experts conducted by ACM also support the view that transit routes are generally priced efficiently. However, exceptions are made for the case where a party demands a very large amount of transit capacity. As explained above, in these cases transit may not be a viable alternative for peering or the price of the transit route may be increased by the destination network. Hence, ACM assumes that transit prices are efficient, with the possible exception for cases where the party requesting peering exchanges very large amounts of data with the destination network.

3.5.2.5 Vertical integration into content and transit and the positions on these adjacent markets

In both theories of harm discussed above, integration of the ISPs into vertically or otherwise related markets plays an important role. In the first theory of harm on exploitation of a competitive bottleneck, the position of the ISPs as providers or transit services plays a role. In the second theory of harm, the position of the ISPs as providers of services that potentially compete with so-called over-the-top services plays a role. The case studies show that almost all interconnection disputes relate to the delivery of video services over the Internet by CAPs. Therefore ACM considers the position of ISPs on the retail markets for (pay) television services and the markets for television content most relevant

³⁵ See [BEREC, 2012a, p. 46].



for the assessment of the second theory of harm. Since both theories of harm take possible market power in the retail market for Internet access as a starting point, ACM has only looked at the two most important providers of Internet access in the Netherlands: KPN and Ziggo.

The degree of vertical integration of KPN and Ziggo is described in section 2.5.2. Conclusions that can be drawn from the analysis are the following. Both KPN and Ziggo are vertically integrated into the transit services but their positions on that market on a global scale are not very significant. Both KPN and Ziggo are also active on the retail market for (pay) television services but the position of Ziggo on that market is twice as big as KPN's. Only Ziggo has a significant position as provider of premium television content.

The degree of vertical integration of the biggest ISPs into vertically and adjacent markets is relevant in the context of the second theory of harm as it can influence the incentives of ISPs to foreclose entry into particular markets. The theory of harm only applies to those over-the-top services that rely on access (through) interconnection to retail customers of Internet access of the ISP. In addition, the incentives to foreclosure are also dependent on whether the CAP's services are actually competing with content services of the ISP. Consequently, an assessment of incentives and abilities for foreclosure is dependent on the specific application or service, the situation of the ISP involved, the extent to which the services is sensitive to changes in interconnection quality and the extent to which this service is a substitute or complement to the services of the ISP. Such assessment is difficult to make without a specific case in mind. The following section sheds more light on the general possibility that KPN and Ziggo have an incentive to foreclose competing services of CAPs.

3.5.2.6 Do KPN and Ziggo have an incentive to foreclose competing CAPs' services?

As argued in section 3.3.2, ISPs integrated into content do not necessarily have an incentive to foreclose competing CAPs' services on their network. The reason is that if consumers derive benefits from non-affiliated CAPs' services, these services also increase the value of the ISP's network to the consumers (Chicago Critique). There are exceptions to the Chicago Critique, however, in which cases ISPs may nonetheless have an incentive to foreclose competing OTT services. Notable possible exceptions in the current context are when i) the ISP's Internet access offerings are price-regulated (Baxter's Law), ii) the ISP engages in price discrimination, and iii) competing OTT services may become competitors in the Internet access market. In the following, ACM discusses the relevance of each of these exceptions to the Chicago Critique for the Dutch situation.

Price regulation (Baxter's Law)

Regulation in the Internet access market in the Netherlands is characterized by unbundling of the local loop, and only imposed on KPN. This implies that KPN has to provide access to the last mile of its network, and indeed, there are various parties currently using the last mile of KPN's network to offer retail Internet access services. ACM regulates the price against which KPN must sell access to the last mile of its network to these parties. Although this regulation does not control KPN's retail prices directly, the effect of this regulation is that KPN's and other ISPs' retail prices are disciplined by the presence of competing ISPs using the last mile of KPN's network. Hence, in the Dutch



context, regulation in the Internet access market constitutes an exception to the Chicago Critique: since regulation implies that KPN and other vertically integrated ISPs cannot extract margins on content by raising prices on their Internet access product, these ISPs may have an incentive to foreclose competing content. One should be careful, however, to equate price regulation as meant in Baxter's law with access regulation as applied in the Netherlands. The reason is that the first-order effect of access regulation is that the degree of competition in the market for Internet access increases, which disciplines ISPs to offer as attractive a proposition to consumers as possible. As a result of this, access regulation in the Netherlands most likely limits the possibilities and incentives for ISPs to foreclose competing content providers.

Price discrimination

ISPs active in the Netherlands often practice price discrimination. ISPs offer Internet access services of various qualities and in various combinations with content and/or additional services. Some ISPs, for example, always offer Internet access services combined with pay TV services and telephony services ('triple-play' packages), whereas some also offer Internet access services on a standalone basis. Packages also differ in maximum download/upload speeds, the number of TV channels (including HD) available, the number of series and films that are available on demand, and whether or not previewing TV shows is possible.³⁶ Price discrimination typically increases ISP profits as it allows ISPs to sort consumers according to their willingness-to-pay and subsequently charge a price that is closer to consumers' willingness-to-pay. However, if consumers have the option to enjoy some content cheaply or for free over-the-top, they are less inclined to buy a premium package offered by their ISP. To restore the effectiveness of price discrimination, ISPs may therefore want to foreclose competing OTT services on their networks. This is especially true if ISPs make most of their margins on selling content (premium or otherwise). To what extent price discrimination may motivate the foreclosure of competing content providers varies on a case-by-case basis.

Competing CAP services may become competitors in the Internet access market

At this moment, ACM does not have any indications that CAPs may enter the market for Internet access services in the Netherlands. The only example that ACM knows of applies to the US: there, Google is deploying a fibre network in a number of cities in the US. ACM therefore notes that ISPs in the Netherlands currently do not seem to have an incentive to foreclose competing CAPs to hinder their entry into the market for Internet access services.

3.5.3 Some words on Ziggo after the merger and the implementation of the remedies

The only real-world case regarding the Dutch market is the **Liberty Global – Ziggo** case. The source of market power in this case was not the control of Ziggo over a competitive bottleneck, but the

³⁶ See for example the offers of Ziggo, KPN and Tele2 as of 30 June 2015 on <https://www.ziggo.nl/alles-in-1/>, https://bestellen.kpn.com/?icid=p=pakketten:l=body:c=acq:co=A_ref, and <https://www.tele2.nl/shop/thuis/> respectively, as visited on 30 June 2015.



market power of the merged entity as purchaser of television content, covering TV broadcasters' linear TV channels and the related catch-up TV content. The alleged potential anti-competitive behaviour that the new entity would be able to show is primarily related to the abuse of that power in contract negotiations with television providers. The EC added to this that the merged entity's ability to hinder CAP competitors through contractual conditions was compounded by its ability to restrict IP interconnection capacity. The competition concerns in this specific case are remedied by commitments relating to the contents of contracts between Ziggo and television providers and to IP interconnection. The remedy regarding IP interconnection contains a commitment by Ziggo to maintain sufficient interconnection capacity for parties seeking to distribute data to its broadband customers for the next 8 years by providing at least three uncongested routes into the merged entity's IP network in the Netherlands.

3.6 Conclusion

On the basis of the analysis in this chapter, ACM concludes that the likelihood of competition problems in the market for IP interconnection resulting in consumer harm is currently very low in the Netherlands, without ruling out this possibility completely. The reasons are the following.

First, interviews with market players and experts have not revealed any significant problem related to IP interconnection within the Netherlands. Players sometimes do not get their preferred way of IP interconnection. IP interconnection capacity is ultimately sufficient, however. Specifically, even though refusals to peer are observed in the Netherlands, this does not imply that the IP interconnection is not functioning properly. This holds because parties that refuse to peer do currently provide sufficient transit capacity.

Second, since transit providers experience sufficient competition, alternative routes for peering are presumably efficiently priced. Possible exceptions to this assumption are situations where the party requesting peering exchanges very large amounts of data with the destination network. In such cases, transit may not even be a feasible substitute, or it may be priced inefficiently high. Naturally, this exception only applies to a limited set of parties, but it is unclear how often this exception applies in the Netherlands.

Third, settlement-fees for peering seem to be rare in the Dutch market. Moreover, even if they are present, settlement-fees need not necessarily be anti-competitive.

Fourth, ACM also assessed important factors of possible theories of harm. This assessment revealed that IP interconnection problems are not so likely to occur in the Netherlands. ISPs in the Netherlands are relatively small in terms of eyeballs on a European or global scale, and ISPs face relatively strong competition on the Internet access market. Consumers are sensitive to price and quality of their Internet access and switch suppliers for these reasons. This mitigates the potential for restrictive interconnection behaviour resulting in consumer harm. This conclusion is in line with the



view of most market players and experts interviewed, who rank the Netherlands among the countries that are least prone to experiencing IP interconnection problems.

In the event the competent Dutch authorities would have to evaluate IP interconnection conflicts, ACM would consider a case-by-case analysis appropriate. Most conflicts concern a refusal to peer or the conditions under which peering is granted. Importantly, restrictions on peering by one of the parties may be motivated by both anti-competitive exploitation or foreclosure objectives as well as legitimate efficiency objectives. The judgement in a specific case should therefore depend on the particular economic circumstances of the case. In all this, a key element is whether or not a party refusing to peer offers sufficient transit capacity. As long as a player does so, there are alternative routes available into the ISP's network, making it unlikely that consumer harm will occur.

4 The regulatory context for IP interconnection in the Netherlands

4.1 Introduction

In the previous chapter ACM concluded that the risk of competition problems related to IP interconnection in the Netherlands is very low. However, as the occurrence of anti-competitive behaviour cannot be ruled out completely, this chapter analyzes whether ACM is sufficiently equipped to deal with anti-competitive behaviour. To answer this question, this chapter also elaborates on the relevant legal instruments ACM has at its disposal and on what parties on the IP interconnection market are subject to the legal framework.

ACM has competence to act under the Dutch Telecom Act 1998 (DTA) and the Dutch Competition Act (DCA) with regard to IP interconnection. ACM can also act upon European Law that is directly applicable, for example in case of competition (Art. 101 and 102 TFEU). In the DTA and DCA, general and specific legal instruments can be distinguished with which IP interconnection disputes might be addressed in the Netherlands. Potentially relevant *general* legal instruments are (i) Section 24 (1) DCA regarding the abuse of dominance and (ii) Chapter 6a of the DTA that deals with undertakings having Significant Market Power (SMP) on a telecommunications market. Potentially relevant specific legal instruments within the context of the DTA are: (iii) the obligation to interconnect, (iv) rules regarding net neutrality and (v) the option of having a dispute settled by ACM.

As the DTA applies to a specific set of actors, this chapter begins with the legal classification of the actors active in the IP interconnection market. This allows for a better understanding whether these actors are subject to the relevant articles that are to be discussed in section 4.2. Next, the general legal instruments are discussed section 4.3 and after that the specific legal instruments 4.4. Finally, this chapter finishes with a conclusion regarding the regulatory context for IP interconnection in the Netherlands in section 4.5.

4.2 Legal classification of actors active in the IP interconnection market

4.2.1 Definition of public electronic communication networks and services

A number of instruments within the DTA specifically applies to providers of public electronic communication networks (PECN) and public electronic communication services (PECS). In this sense, one of the key issues for the applicability of the DTA is whether actors involved in the IP interconnection market can be qualified as a provider of PECN/S or not. This is necessary in order to be able to understand how and whether relevant articles of the DTA apply.



The definition of providers of public electronic communication networks (PECN) and public electronic communication services (PECS) is given in Section 1.1 e and f in conjunction with 1.1 g and h of the DTA. According to this definition, there are three basic criteria that should be met to qualify as an electronic communication service (ECS):

1. The service should normally be provided for remuneration;
2. The service should consist wholly or mainly in the conveyance of signals and;
3. Excluded are services providing, or exercising editorial control over, content.

The definition of ECS³⁷ requires that the service consists wholly or mainly in the conveyance of signals on electronic communications networks. This criterion can be interpreted in many ways. The Court of Justice of the European Union (ECJ) recently addressed the question regarding the conveyance of signals in its recent rulings in *UPC v. NMHH*.³⁸ According to the ECJ '*all that matters in that regard is that UPC is responsible vis-à-vis the end-users for transmission of the signal which ensures that they are supplied with the service to which they have subscribed*' (para 43).³⁹

The ruling in *UPC v. NMHH* shows that the ECJ considers the defining criterion for ECS to be whether the service provider is responsible for the transmission of the signal. By means of the transmission of the signal, the service provider is able to ensure that end-users are supplied with the service to which they have subscribed. However, although this ECJ ruling has further clarified the criterion that an ECS should consist wholly or mainly in the conveyance of signals, it still leaves room for interpretation. In some cases, it can be difficult to determine whether a party can be qualified as a provider of an ECN/S. In the context of IP interconnection this is also the case. The next subsection reveals the difficulty around the legal classification of some actors active in the IP interconnection market.

4.2.2 Legal status of parties involved in the IP interconnection market

In light of the definition of ECS, this subsection will focus on the legal classification of the actors in the IP interconnection market: ISPs, transit providers, CAPs, CDNs and IXPs.

ISPs

ISPs are, in a legal sense, providers of PECN/S, because they deliver internet access to end-users. To deliver internet access, the service in itself is an ECS that is provided to the public. According to

³⁷ In this context, the analysis of the interpretation of these criteria is focused on the second criterion and the third being a "negative" one. Hence, the third criterion excludes services providing content, but does not indicate what services are qualified as an ECS. The first criterion "normally provided for remuneration" will usually be satisfied in practice.

³⁸ ECJ, 30 April 2014, C-475/12, *UPC v. NMHH*.

³⁹ The ECJ continued '*Any other interpretation would considerably reduce the scope of the NRF [New Regulatory Framework], undermine the effectiveness of its provisions and therefore compromise the achievement of the objectives pursued by that framework*' (par. 44).



BEREC, ISPs are clearly undertakings that control access to end-users (in the legal sense) [BEREC, 2012a].

Transit providers

Transit providers sell connectivity to the Internet to other networks at the wholesale level, whereas ISPs do the same for residential end-users at the retail level. Transit providers transmit traffic on behalf of other actors. This service consists wholly or mainly of the conveyance of signals. Hence, their services can be qualified as ECS. Since their services are also publicly available and delivered over their own networks, transit providers qualify as providers of PECN/S.

CAPs

CAPs create and aggregate content or applications. CAPs constitute end user in the sense that they are intrinsically defined as neither providing ECS, nor operating networks [BEREC, 2012a]. This is in line with the definition of ECS that exclude services providing, or exercising editorial control over, content. However, CAPs may vertically integrate along the value chain if they get bigger. In this case they may explore further functionalities, such as hosting capacities, deploying their own network, providing CDN services themselves or taking responsibility for a part of the network end-to-end transmission path towards end users. The latter makes them responsible for some conveyance of signals, therefore the question arises whether these extra services can be qualified as an ECS. Hence, the criterion that should be examined is whether these services provided by the CAP consist wholly or mainly of the conveyance of signals. There is an ongoing discussion on this issue, as the aforementioned criterion leaves room for interpretation in this context. Next to these questions, further aspects may apply, more specifically technical characteristics and/or demand-side related aspects. Because of this ongoing discussion at a national and European level, ACM, normally does not consider CAPs as ECS.

CDNs

The legal status of CDNs is unclear, since they have been evolving. Their core functionality consists of caching content of CAPs on their servers, which are geographically distributed. Originally, CDNs run services and buy connectivity to the Internet for transmission between its servers like any other application provider. In this sense, it uses the Internet to provide a transmission infrastructure for its own services and thus may not be held responsible [BEREC, 2012a]. Based on this, a CDN may not qualify as an ECS, since it would not consist wholly or mainly in the conveyance of signals.

However, studies by ARCEP [ARCEP, 2011] and NPT [NPT, 2012] have shown that infrastructure-based models exist in which the CDN, in addition to its core functionality, also runs the infrastructure to connect its servers. In these cases, a CDN could qualify as an ECS. This is because of the additional offer that consists wholly or mainly in the conveyance of signals. Nevertheless, both these studies come to different conclusions as to whether these ECS delivered over their own networks are publicly available in order to qualify CDNs as PECNs. Giving these approaches about the legal



classification of CDNs as well as the ongoing discussion at the European level, ACM has not determined what the legal classification of CDNs is.

IXPs

IXPs offer platforms where multiple networks can interconnect to exchange traffic. Due to the developments at an EU level, especially the proposed Directive to ensure a high common level of network and information security (NIS)⁴⁰, ACM has not yet come to a conclusion regarding the legal classification of IXPs. The entry into force of the aforementioned proposed Directive is to be taken into account when it comes to the qualification of IXPs, because, in the context of the proposal, there is a possibility that IXPs do not fall into the scope of the Framework Directive⁴¹. This might imply that IXPs are excluded from the DTA. In the meantime, ACM waits for the proposed Directive to come into effect, in order to analyze the legal classification of IXP within the context of the DTA.

4.3 General legal instruments to address IP interconnection issues

This section describes the two general legal instruments for dealing with IP interconnection problems, should they occur;

1. Article 102 TFEU / Section 24 (1) of the DCA prohibiting the abuse of a dominant position;
2. Chapter 6a of the DTA that allows ACM to impose obligations on undertakings with SMP.

Each of these two approaches is different in nature, with the former being an *ex post* regulation and the latter being an *ex ante* regulation. The applicability of both legal instruments is complex. Hence, this section will lightly touch upon their application to illustrate how they can apply to IP interconnection.

4.3.1 Prohibiting the abuse of a dominant position

Section 24 (1) is the counterpart Article 102 TFEU, and applies only where one undertaking has a 'dominant position' or where two or more undertakings are 'collectively dominant'. The subjects of Section 24 (1) DCA could be any actor involved in IP interconnection, that meets the below mentioned criteria.

Establishing dominance, whether individual or collective, usually involves a two-stage assessment. The first stage is to determine the relevant market. Once the relevant market has been defined, it is necessary to determine what is meant by a dominant position⁴². This cannot be determined purely on

⁴⁰ COM(2013) 48 final, 7 February 2013.

⁴¹ Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communication networks and services (Framework Directive).

⁴² The Court of Justice in *United Brands v Commission*, Case 27/72 [1978] 1 CMLR 429 defined a dominant position as: "a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition being



the basis of an undertaking's market share. Rather, it is necessary to examine three issues, as set out in paragraph 12 of the Guidance [Whish and Baily, 2012]:

- Constraints imposed by the existing supplies from, and the position on the market of, actual competitors;
- Constraints imposed by the credible threat of future expansion by actual competitors or entry by potential competitors;
- Constraints imposed by bargaining strength of the undertaking's customers (countervailing buyer power).

Although Section 24 (1) DCA has not been examined in the Netherlands in the context of IP interconnection, the approach of the EC in the Telefónica/Orange/Deutsche Telekom case shows that Art. 102 TFEU and Section 24 (1) DCA are relevant norms to address problems should they occur in the field of IP interconnection. However, in that particular case the EC did not find evidence that the operators tried to hinder competitors on the transit and content markets. Nevertheless, due to the significance of this matter for the services provided to the internet users, the EC announced that it will continue to monitor the sector closely.⁴³

This case illustrates that these types of investigations have a relatively high burden of proof for establishing a violation of antitrust law and procedures can become lengthy. An advantage of the DCA is that it applies irrespective of a legal classification of the undertaking, as required under the DTA. In conclusion, Section 24 DCA is an option to address problems on the IP interconnection market should they occur.

4.3.2 Finding Significant Market Power

Chapter 6a of the DTA sets out obligations for undertakings with SMP⁴⁴. At first, ACM has to investigate relevant markets in the electronic communication sector before imposing ex ante regulation on undertakings with SMP according to Section 6a.2 DTA. ACM has three options to start an investigation of the relevant market;

1. The market is referred to by the EC as a relevant market.⁴⁵

maintained on the relevant market by affording it the power to behave to appreciable extent independently of its competitors, customers and ultimately of its consumers”.

⁴³ Source: http://europa.eu/rapid/press-release_IP-14-1089_en.htm.

⁴⁴ Art. 8 FD in conjunction with Art. 8 and 12, (1) lit i AD empowers Member States to impose obligations on operators as a result of finding SMP. Art. 8 AD is very specific because it is only applicable to parties that qualified as having SMP on a specific market as a result of an analysis carried out in accordance with Article 6 FD. If an NRA has established that a party has SMP, national authorities shall impose obligations set out in Art. 9 to 13 of the FD as appropriate.

⁴⁵ Markets defined by the EC within the electronic communications sector in which the product or service market corresponds with a product or service market recommendation within the meaning of Article 15(1) of Directive No. 2002/21/EC.



2. Imposition or maintenance of obligations being the result of SMP on the relevant market.
3. The regulator has reasons to start an investigation.

Out of these three options to start an investigation, the only option currently applicable is the one where the regulator has reasons to start an investigation. The reason for this is that the EC did not identify a market for wholesale Internet connectivity for the purpose of its Relevant Market Recommendation [BEREC,2012a]. Neither is the IP interconnection market currently regulated. Hence, the only option is the last one.

In order to be able to apply chapter 6a to IP interconnection issues, if ACM would have reasons to do so⁴⁶, ACM would have to prove that a relevant market for IP interconnection meets the following three cumulative criteria⁴⁷:

1. The presence of high and non-transitory structural, legal or regulatory barriers to entry;
2. A market structure that does not tend towards effective competition within the relevant time horizon, having regard to the state of infrastructure-based and other competition behind the barriers to entry; and
3. Competition law alone is insufficient to adequately address the identified market failure(s).

If these three criteria are met cumulatively in the context of the investigated relevant market, then the next step is for ACM to conduct a market analysis. If the market analysis results in establishing SMP with regard to an undertaking, obligations can be imposed on that undertaking under Section 6a.2 DTA. Taking into account that obligations on the basis of Section 6a.2 DTA can only be applied to providers of PECN/S and recalling the results of section 4.2.2, only ISPs and transit providers can be addressed by means of this Section. Hence, anti-competitive behaviour of CDNs, CAPs and IXPs are not addressable by means of this Section. Additionally, this procedure requires a high burden of evidence to find SMP in a relevant market. Second, the procedures are lengthy, hence it might not be possible to address the initial problem in the rapidly changing IP interconnection market.

In relation to the aforementioned criteria, it is noteworthy to recall the case of the Polish Telecommunications Regulatory Authority's (UKE). In this case, the NRA had the intention to impose regulatory obligations on Telekomunikacja Polska's (TP) regarding its peering and transit agreements. The EC vetoed UKE's decision to implement regulation on two grounds. First, the EC held that UKE insufficiently substantiated its claim that the peering and transit market are distinct markets. Second, the EC held that UKE insufficiently substantiated its claim that TP enjoyed SMP.

⁴⁶ Given the fact that the wholesale Internet connectivity is not included in the recommendation of the EC, it does not hinder NRAs from identifying such a market as appropriate to national circumstances according to Section 6a.1 (2) and 6a.2 (1) DTA in conjunction with Art. 15 (3) FD.

⁴⁷ Commission Recommendation of 9 October 2014, 2014/74/EU, recital 5. In accordance with Article 15(3) of Directive 2002/21/EC, it is for national regulatory authorities to define, in accordance with competition law and taking the utmost account of this Recommendation, relevant markets appropriate to national circumstances, in particular relevant geographic markets within their territory.



As already mentioned under section 3.2.1, according to the EC, the market did not meet the three criteria. This case gives a feeling of how the EC has examined the SMP issue in those circumstances. However, a general rule cannot be derived from it, to apply in other IP interconnection cases.

Until now, ACM has not identified the wholesale IP interconnectivity market in its SMP analysis on the basis of national circumstances. The reason is that, to date, the IP interconnection market has not revealed any potential problems due to market power of any party, nor has there been a request or complaint from parties that would indicate otherwise. In conclusion, similar to a Section 24 (1) DCA procedure, imposing obligations to parties on the IP interconnection market after finding SMP is a possibility. However, it also requires a high burden of proof and can result in lengthy procedures. In addition, any action of ACM on this basis is subject to review by the EC. Besides this, obligations on basis of SMP regulation can only be imposed on providers of PECN/S.

4.4 Specific legal instruments to address IP interconnection issues

Apart from the general legal instruments, the DTA provides a set of three specific legal instruments that authorize ACM to impose obligations on undertakings in the IP interconnection market if problems occur. These are: (i) the obligation to interconnect, (ii) rules regarding net neutrality and (iii) the option of having a dispute settled by ACM. These instruments will be discussed separately below.

4.4.1 Obligation to interconnect

A provider of a PECN/S can request another provider of a PECN/S that controls access to end-users, to negotiate in order to take the necessary steps to create end-to-end connections (Section 6.1 (1) DTA). The requested provider is bound to negotiate in order to establish interconnection with the requesting provider. In other words, there is an obligation to interconnect. If the requested provider refuses to negotiate with the requesting party, the latter may involve ACM in order to issue rules regarding the manner in which negotiations must be conducted (Section 6.1 (3) DTA). During their negotiations, the parties involved shall observe the rules issued by ACM. If negotiations do not lead to an agreement, the parties can request ACM to impose interoperability obligations on the other party in order to establish end-to-end connections and to guarantee this under reasonable conditions (Section 6.2 DTA).

In conclusion, on the basis of these articles, parties have to negotiate with each other to reach an agreement regarding interconnection and it even gives ACM the responsibility to intervene, if end-to-end connectivity is at stake. Parties that are subject to these articles are ISPs.



4.4.2 Net neutrality

The aim of Section 7.4a DTA is to ensure net neutrality by prohibiting ISPs to hinder, slow or block traffic on their networks. Through net neutrality, the legislature aims to realize a freely accessible Internet offering anybody the possibility to visit any website and use any service that requires the use of the Internet⁴⁸. ISPs have the ability to restrict access to websites or services provided via the Internet⁴⁹ by hindering or slowing down Internet traffic. This ability of ISPs, however, is at odds with the freedom of choice and expression of end-users. For this reason, Section 7.4a DTA prohibits all hindering or slowing down of services or applications on the Internet by operators of PECN through which Internet access services are supplied, and by providers of Internet access services.

Art. 2 of the Policy Rule on Net Neutrality⁵⁰ stipulates that Section 7.4a DTA only applies to providers of a PECS, that is only to Internet access services that qualify as PECS within the meaning of Section 1.1 (g) DTA. The rules and regulations of net neutrality in the DTA are only related to behaviour of providers delivering Internet access service to end-users. This means that rules regarding net neutrality are restricted to the behaviour of the ISP with regard to its own network when it comes to hindering, slowing or blocking traffic. These rules are not applicable for the same behaviour of the ISP outside of its network. That is the reason why, as for now, access to networks and interconnection with other networks in the context of transit and peering is beyond the scope of this article.⁵¹

4.4.3 Dispute settlement by ACM

Section 12.2 of the DTA contains provisions regarding dispute resolution by ACM. Section 12.2 DTA stipulates that certain parties can request ACM to settle their disputes on the basis of an obligation imposed by or pursuant to the present DTA. This article is an implementation of Art. 20 (1) Framework Directive, which empowers national authorities to issue binding decisions to handle disputes under the regulatory framework at the request of either party. This concerns disputes between undertakings providing electronic communication networks or services. It also concerns disputes between such undertakings or other undertakings in the Member State benefiting from obligations of access and/or interconnection arising under this Directive or the Specific Directives.⁵²

⁴⁸ Parliamentary Papers II 2010/11, 32549, no. 29.

⁴⁹ Parliamentary Papers II 2010/11, 32549, no. 29, p. 2.

⁵⁰ Decision of the Minister of Economic Affairs of 11 May 2015, no. WJZ/15062267, in the form of a Policy Rule with regard to the application by the Netherlands Authority for Consumers and Markets of Section 7.4a of the Telecommunication Act, Dutch Government Gazette 134781, 15 May 2015. Also known as '*Beleidsregel Netneutraliteit*'.

⁵¹ Consultation paper with regard to Draft General Administrative Order on Net Neutrality, published on 24 September 2014, p.8.

⁵² Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communication networks and services (Framework Directive), recital 32.



Section 12.2 DTA addresses all possible relations between parties in the telecom sector and the disputes that may arise out of these relations within the context of the DTA. According to this it seems like even CAPs and CDNs can request ACM to settle a dispute regarding a provider of a PECN/S as long as their dispute can be based on an obligation imposed by or pursuant to the present DTA. However, in case of an interconnection dispute that is based on Article 6.1 DTA, the question arises if these parties are subject to the aforementioned Article. Recalling section 4.2.1, the conclusion can be drawn that CAPs and CDNs, normally, do not qualify as providers of PECS/N. This means that they are not subject to this Article. Therefore, their request for a dispute settlement in context of the interconnection obligation via Article 12.2 will be dismissed.

So, in principle any actor involved in IP interconnection is entitled to appeal to this Section, making this option in the context of IP interconnection favourable compared to the other instruments within the DTA. However, the limitation regarding this option is that the dispute should have a legal basis according to the DTA. As the DTA applies to a specific set of actors, the legal classification of the actors active in the IP interconnection market is determined for the applicability of this Article.

4.5 Conclusion

ACM concludes that the current regulatory context in the Netherlands does provide ways to address IP interconnection disputes to a certain extent, should they occur. Both the DTA and the DCA are applicable. In these acts, general and specific legal instruments can be distinguished with which IP interconnection disputes might be addressed in the Netherlands. The relevant *general* legal instruments are Section 24 (1) DCA regarding the abuse of dominance and Chapter 6a of the DTA that deals with undertakings enjoying SMP on an electronic communications market. The most relevant *specific* legal instruments within the context of the DTA are: the obligation to interconnect and the option of having a dispute settled by ACM.

The general legal instruments differ in nature: Section 24 (1) DCA is an *ex post* regulation, whereas Chapter 6a of the DTA is an *ex ante* regulation. Both of these approaches provide options to address competition problems in the IP interconnection market should they occur. However, both these approaches have a couple of similar disadvantages. They require a high burden of proof to establish dominance or SMP, and in case of Section 24 (1) DCA also abuse of dominance, in a relevant market. Also the procedures can become lengthy. In addition, any action of ACM on the basis of Chapter 6a of the DTA is also subject to review by the EC.

Whereas Section 24 (1) DCA could be held against any actor involved in IP interconnection that meets the required criteria, it should be noted that instruments within the DTA specifically apply to providers of a PECN and PECS. At this moment, only ISPs and transit providers are classified as such. For the remaining actors, this classification is generally not clear. The exception to this is the article that deals with settling disputes by ACM, which holds for all actors. The opportunity to settle a dispute by ACM addresses all actors in IP interconnection, as long as the dispute can be based on



an obligation imposed by or pursuant to the present DTA. Rules concerning net neutrality are restricted to the behaviour of the ISP with regard to its own network when it comes to hindering, slowing or blocking traffic. These rules are not applicable for the same behaviour of the ISP outside of its network. In conclusion, the DTA certainly provides legal instruments to address problems in the field of IP interconnection, but it also has its limitations.



5 Conclusions

Over the past decades, the Internet prospered under a competitive and unregulated IP interconnection market. Transit is generally available as a default mode for IP interconnection and seems to be efficiently priced. In addition to this, network operators are free to establish peering arrangements from which networks benefit. The vast majority of peering arrangements are closed via a handshake, although various network operators are in the process of formalizing their agreements, due to the increased importance of IP interconnection.

The relative position of the various actors in IP interconnection has shifted over the past decades. Due to a number of trends, this shift is expected to continue. The evolution of the Internet allowed actors to offer new types of services, which disrupt traffic ratios anticipated under existing peering agreements. At the same time, actors are faced with new actors as suppliers, customers and competitors. These actors, simultaneously, consolidate and expand along the value chain, while prices in transit and CDN services decline.

The dynamics in IP interconnection may result in conflicts between actors, causing deteriorated IP interconnections, ultimately leading to decreased service from the end-user's perspective. Most conflicts concern refusals to peer or the conditions under which peering is granted. Importantly, restrictions on peering by one of the parties may be motivated by anti-competitive exploitation or foreclosure objectives as well as legitimate efficiency objectives.

In this study, ACM concludes that the likelihood of competition problems in the market for IP interconnection resulting in consumer harm is currently very low in the Netherlands. Four reasons account for this result.

First, the market players and experts interviewed have not revealed significant problems regarding IP interconnection. Even though refusals to peer do sometimes occur in the Netherlands, parties that refuse to peer have so far provided sufficient transit capacity. Second, as transit providers face relatively strong competition, the alternative for peering is also efficiently priced in most cases. Third, settlement-fees for peering seem to be rare in the Dutch market, and if they are present, settlement-fees are not necessarily anti-competitive. Fourth, the assessment of possible theories of harm revealed that competition problems regarding IP Interconnection are most likely to occur when ISPs hold many eye-balls and ISPs face limited competition in the market for Internet access services. On both factors, the Dutch IP interconnection landscape looks favourable. ISPs in the Netherlands hold relatively few eyeballs and face relatively strong competition from each other.

In the event the competent Dutch authorities would have to evaluate IP interconnection conflicts, ACM considers a case-by-case analysis appropriate. Particular economic circumstances are of importance when evaluating IP interconnection conflicts. A key element is whether or not a party refusing to peer offers sufficient transit capacity. As long as a player does so, there are alternative



routes available into the player's network, making it less likely that consumer harm will occur. In addition to this, one would have to assess the relevance of the theories of harm and the possible efficiency justifications as outlined in chapter 3.

To address IP interconnection conflicts, both the DTA and DCA provide relevant norms. Section 24 (1) DCA regarding the abuse of dominance and Chapter 6a of the DTA that deals with undertakings having SMP on a telecommunications market are general legal instruments, that can be applied to deal with IP interconnection conflicts. However, both of them require a high burden of proof to establish dominance or SMP in a relevant market. In addition, the procedures are lengthy.

A number of relevant specific legal instruments within the context of the DTA is also applicable with regard to IP interconnection disputes. These are the obligation to interconnect and the option of having a dispute settled by ACM. The net neutrality provisions are not relevant here, as they solely apply to traffic *on* the network of an ISP. The DTA predominantly applies to providers of PECS and PECN. This is also the case for all the relevant legal instruments within the context of the DTA in order to address IP interconnection conflicts. At this moment, ISPs and transit providers are classified as providers of PECN or PECS. The classification is generally not clear for the remaining actors. The only relevant provision in the DTA that holds for all relevant actors is Section 12.2 on settling disputes by ACM, as long as the dispute can be based on an obligation imposed by or pursuant to the present DTA.

Based on the above, ACM considers its current set of instruments sufficient to guarantee a competitive IP interconnection market in the Netherlands. Hence, ACM does not deem it necessary to provide the Ministry recommendations on amendment of the regulatory framework applicable to IP interconnection.

However, the regulatory analysis showed that it's unclear whether or not various actors in the field of IP interconnection are subject to the Dutch Telecommunications Act. As the classification of an actor as a provider of PECN and PECS can imply a variety of norms to which the actor can be subject, ACM recommends the Ministry to provide clarity on this matter and resolve ambiguities.



6 Glossary

AS	Autonomous system. Each separate (ISP) network is an autonomous system. An AS connects its own network to the Internet. A collection of IP networks controlled by a single entity, such as an ISP, a transit operator or a provider of public online communication services (PPOCS).
BEREC	The Body of European Regulators of Electronic Communication.
CAP	Content and application provider. Creators and aggregators of content and/or applications. By buying connectivity or using hosting services, the content becomes available for end-users.
CDN	Content delivery network. Content aggregators facilitating CAPs by delivering content closer to the terminating network. In general, a system of local caching servers deployed at the edge or within the terminating ISP network.
DCA	Dutch Competition Act.
DTA	Dutch Telecom Act.
Eyeball	Consumer of content services.
ISP	Internet service provider. Operators who provide Internet connectivity to end-users through (broadband) access at the retail level and connectivity at the wholesale level through interconnection.
IXP	Internet exchange provider. Facilitator of a platform via which networks can interconnect with each other.
OTT	Over-the-top. Services via the Internet without control over the traffic quality.
(P)ECS	(Public) electronic communication services
(P)ECN	(Public) electronic communication networks
SMP	Significant market power.



7 Bibliography

ACM (2013), ACM market analysis decision on fixed and mobile voice termination, (<https://www.acm.nl/nl/publicaties/publicatie/11831/Besluit-marktanalyse-vaste-en-mobiele-gespreksafgifte-2013-2015/>).

ACM (2015a), Telecommonitor Q1 2015, 7 August 2015, (<https://www.acm.nl/en/publications/publication/14607/Competition-between-internet-providers-has-shifted-to-all-in-one-packages/>).

ACM (2015b), Ontwerp-besluit Marktanalyse Ontbundelde Toegang, 17 July 2015, (<https://www.acm.nl/nl/publicaties/publicatie/14504/Consultatie-nieuw-marktanalysebesluit-ontbundelde-toegang/>).

AMS-IX (2015), https://ams-ix.net/connected_parties, visited 2 July 2015.

Analysys Mason (2011), Overview of recent changes in the IP interconnection landscape.

ARCEP (2011), Étude sur le perimeter de la notion d'opérateur de communications électroniques. Carried out by Hogan Lovells and Analysys Mason on behalf of ARCEP, (http://www.arcep.fr/uploads/tx_gspublications/etude-Hogan-Analysys-juin2011.pdf).

ARCEP (2013), Décision n° 2013-0987 de l'Autorité de régulation des communications électroniques et des postes en date du 16 juillet 2013, (http://www.arcep.fr/fileadmin/uploads/tx_gsavis/13-0987.pdf).

Armstrong and Wright (2009), Mobile Call Termination, *The Economic Journal*, 119 (June), pp. 270-307, Oxford, (<http://else.econ.ucl.ac.uk/papers/uploaded/255.pdf>).

Arthur D Little (2014), The Future of the Internet, (<http://www.adlittle.com/time-viewpoints.html?&view=673>).

Autorité de la Concurrence (2012), Decision no. 12-D-18 of 20 September 2012 on practices concerning reciprocal interconnection services in the area of Internet connectivity, (http://www.autoritedelaconcurrence.fr/doc/12d18_en.pdf).

Bauer, Steven and Clark, David D. and Lehr, William (2009), The Evolution of Internet Congestion, (http://groups.csail.mit.edu/ana/Publications/The_Evolution_of_Internet_Congestion_Bauer_Clark_Lehr_TPRC_2009.pdf).



van der Berg, Rudolph (2008), ArsTechnica 'How the 'Net works: an introduction to peering and transit', (<http://arstechnica.com/features/2008/09/peering-and-transit>).

Blauw (2014), Consumentenonderzoek - Aanschaf- en overstappedrag vast Internet, (<https://www.acm.nl/nl/download/publicatie/?id=13054>).

BEREC (2012a), BoR (12) 130 - An assessment of IP interconnection in the context of Net Neutrality, (http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/1130-an-assessment-of-ip-interconnection-in-t_0.pdf).

BEREC (2012b), BoR (12) 132 - Differentiation practices and related competition issues in the scope of net neutrality, (http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/1094-berec-report-on-differentiation-practice_0.pdf).

BEREC (2014), BoR (14) 182 – Strategy 2015-2017, (http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/4785-berec-strategy-2015-2017_0.pdf).

Besen, Stanley, Paul Milgrom, Bridger Mitchell and Padmanabhan Srinagesh (2001), Advances in Routing Technologies and Internet Peering Agreements, *American Economic Review Papers and Proceedings*, 91:292-296
(<http://web.stanford.edu/~milgrom/publishedarticles/Advances%20in%20Routing%20Technologies%20and%20Internet%20Peering%20Agr.%202001.pdf>).

Clark, David D., William Lehr and Steven Bauer (2011), Interconnection in the Internet: the policy challenge, (http://groups.csail.mit.edu/ana/Publications/Interconnection_in_the_Internet_the_policy_challenge_tprc-2011.pdf).

Comcast (2014), Opposition to petitions to deny and response to comments, in relation to Comcast – Time Warner and Comcast, (<http://corporate.comcast.com/images/2014-09-23-REDACTED-Comcast-TWC-Opposition-and-Response.pdf>).

DrPeering, <http://www.drpeering.net>, visited 2 June 2015.

ETICS (2014), ETICS White Paper - Economics and Technologies for Inter Carrier Services, (<https://www.ict-etics.eu/>).

European Commission (2010), Commission decision of 3 March 2010 pursuant to Article 7(4) of Directive 2002/21/EC: Case PL/2009/1019: The wholesale national market for IP traffic exchange (IP transit) and Case PL/2009/1020: The wholesale market for IP traffic exchange (IP peering) with the



network of Telekomunikacja Polska S.A., (https://circabc.europa.eu/sd/a/547c0fee-3830-489e-8260-79548b0454cf/1_EN_ACT_part1_v4.pdf).

European Commission (2014a), *Commission closes investigation into internet connectivity services but will continue to monitor the sector*, EC press release of 3 October 2014, (http://europa.eu/rapid/press-release_IP-14-1089_en.htm).

European Commission (2014b), *Case M.7000 – Liberty Global / Ziggo*, (http://ec.europa.eu/competition/mergers/cases/decisions/m7000_20141010_20600_4221982_EN.pdf).

European Commission (2015), *Case M.7194 – Liberty Global / Corelio / W&W / De Vijver Media*, (http://ec.europa.eu/competition/mergers/cases/decisions/m7194_20150224_20600_4264271_EN.pdf)

Faratin, Peyman, David D. Clark, Steven Bauer, William Lehr, Patrick W. Gilmore and Arthur Berger (2008), *The Growing Complexity of Internet Interconnection, Communications & Strategies*, No. 72, p. 51, 4th Quarter 2008, (http://www.akamai.com/dl/technical_publications/growing_complexity_of_internet.pdf).

Farrell, Joseph and Philip J. Weiser (2003), *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*. *Harvard Journal of Law & Technology*, 17(1): 85-134, (<http://escholarship.org/uc/item/5ps3f7p9>).

IETF (2006), A Border Gateway Protocol 4 (BGP-4), (<http://www.ietf.org/rfc/rfc4271.txt>) - visited 24 February 2015.

IHS (2014), *Television Market Monitor - European pay TV Q1 2014 update*.

Lee, Robin S. and Tim Wu (2009), *Subsidizing Creativity through Network Design: Zero-Pricing and Net Neutrality*, *Journal of Economic Perspectives*, Volume 23, Number 3, Summer 2009, p. 61–76, (<http://pages.stern.nyu.edu/~rslee/papers/NetNeutrality.pdf>).

Netflix (2014a), *In the Matter of Protecting and Promoting the Open Internet Framework for Broadband Internet Service*, (<http://apps.fcc.gov/ecfs/document/view?id=7522726656>).

Netflix (2014b), *Petition to deny of Netflix, in relation to Comcast – Time Warner*, (<http://apps.fcc.gov/ecfs/document/view?id=7521819696>).

NPT (2012), *Content Delivery Networks – regulatory assessment*.



OECD (2015), *OECD Digital Economy Outlook 2015*, OECD Publishing,
(<http://dx.doi.org/10.1787/9789264232440-en>).

Open Technology Institute (2014), *Beyond Frustrated, The Sweeping Consumer Harms as a Result of ISP Disputes*, (<https://www.newamerica.org/oti/beyond-frustrated-the-sweeping-consumer-harms-as-a-result-of-isp-disputes/>).

PTS (2009), PTS-ER-2009:12 - Which services and networks are subject to the Electronic Communications Act?,
(<http://www.pts.se/en-gb/Documents/Reports/Internet/2009/Which-services-and-networks-are-subject-to-the-Electronic-Communications-Act>).

PwC (2014), *Feeling the Effects of the Videoquake - Changes in how we consume video content*, (https://www.pwc.com/en_US/us/industry/entertainment-media/publications/consumer-intelligence-series/assets/pwc-cis-videoquake-video-content-consumption.pdf).

Rayburn, Dan (2014), *Here's How The Comcast & Netflix Deal Is Structured, With Data & Numbers*, (<http://blog.streamingmedia.com/2014/02/heres-comcast-netflix-deal-structured-numbers.html>).

Rayburn, Dan (2015), *The State Of The CDN Market: Video Pricing, Contract, Volume and Market Sizing Trends*, (<http://conferences.infotoday.com/documents/234/2015CDNSummit-Rayburn-Pricing.pdf>).

Stil, Robert and Wood, Kevin (2014), *Betaling voor dataverkeer en de openheid van het internet*, *ESB Jaargang 99 (4678)*, 70-73.

Telecompaper (2015), *Behoefte aan NPO-, RTL- en SBS-zenders het grootst, voordat het tv-abonnement wordt opgezegd*, (<http://www.telecompaper.com/achtergrond/behoeft-aan-npo-rtl-en-sbs-zenders-het-grootst-voordat-het-tv-abonnement-wordt-opgezegd--1057326>).

TeleGeography (2014), *IP transit price declines slow globally*, (<https://www.telegeography.com/products/commsupdate/articles/2014/09/24/ip-transit-price-declines-slow-globally/>).

TeleGeography (2015), *Global Internet Geography Research Service*, (<https://www.telegeography.com/research-services/global-internet-geography/>).

TNO (2014), *Marktrapportage Elektronische Communicatie 2014*, (<http://publications.tno.nl/publication/34611864/kSscvS/TNO-2014-R11119.pdf>).



Weller, D. and B. Woodcock (2013), Internet Traffic Exchange: Market Developments and Policy Challenges, OECD Digital Economy Papers, No. 207, OECD Publishing, (<http://dx.doi.org/10.1787/5k918gpt130q-en>).

Winston, Michael D. (1990), Tying, Foreclosure, and Exclusion. *American Economic Review*, 80(4): 837-859.

Whish, R. and Baily, D. (2012), Competition Law. Oxford University Press.

Annex A: Response to the consultation



1 Introduction

During the public consultation, the following parties have provided written comments on ACM's analysis of and conclusions regarding the market for IP interconnection in the Netherlands:

- Cogent;
- Netflix;
- Tele2 Netherlands (hereinafter: Tele2); and
- Ziggo;

Hence, four of the fourteen parties interviewed for the purpose of this study have responded to ACM's draft report. In parallel, the European Commission, the French NRA ARCEP, the French NCA l'Autorité de la Concurrence and the Polish NRA UKE provided comments related to the factual description of their respective cases.

In this Appendix ACM describes the comments it received from stakeholders and the subsequent changes to the draft report. ACM distinguishes two kinds of comments: i) related to ACM's analysis of the market for IP interconnection in the Netherlands, and ii) related to the appropriate level and type of government intervention in the market for IP interconnection in the Netherlands. Comments of stakeholders related to either factual omissions or the form of the report, are not discussed in this annex. However, some of them have resulted in adjustments to the report itself.



2 ACM's analysis of the market for IP interconnection in the Netherlands

2.1 The availability of transit as a substitute for peering

Netflix is of the opinion that transit and peering are not substitutable means for IP interconnection. Netflix notes that it has experienced instances where ISPs have congested all transit paths into their networks. In such cases transit from a third party may be available, yet this option is more expensive and yields lower quality than peering. In addition to this, a third party may not be able to deliver transit services as it may not possess the necessary direct interconnection capacity with the destination network. Finally, in order to provide transit services, a third party transit provider may have to (re)negotiate a peering deal with the destination network because providing transit would lead to imbalanced traffic between the transit provider and the destination network. The destination network may then impose a settlement-fee and/or apply traffic caps on the transit provider, which may restrict the transit alternative, reduce its quality, and/or raise its price.

ACM is of the opinion that Netflix' arguments do not support the general conclusion that transit and peering are no substitutes. As explained in the report, peering and transit are substitutes except in a number of circumstances. The exceptions mentioned in the report are cases where i) transit cannot provide the high level of quality necessary for a particular application, and/or ii) the quantity of exchanged traffic is very large (section 3.5.2.4). These circumstances for non-substitutability of peering and transit essentially overlap with the circumstances Netflix identifies. ACM therefore sees no reason to alter its conclusion regarding the substitutability of peering and transit in response to Netflix' comments.

Cogent is of the opinion that ACM correctly identified the need for a default transit route into each AS and that ACM correctly noted that transit is generally available as a default option. However, ACM failed to note that substitutability between transit and peering is only achieved if the specific destination ISP purchases adequate transit capacity and offers to peer at the same time. If the destination ISP does not buy (enough) transit, there is no default route into the ISP's network available. According to Cogent, this is precisely what currently happens in the Netherlands.

ACM disagrees with Cogent that there is currently insufficient transit capacity available in the Netherlands as a substitute for peering. In fact, during the research stage, interviewees made clear to ACM that in some cases some networks present in the Netherlands are not willing to peer. The same interviewees also made clear that in these cases they reach these networks through transit. ACM therefore concludes that there is sufficient transit capacity in the Netherlands as a substitute for peering. Finally, at this point Cogent suggests that transit to a destination network is only available if the destination network buys transit itself to connect to the rest of the internet. In ACM's understanding of the matter, this representation is incorrect. The reason is that a destination network



may also be reached by purchasing transit from one of the networks it peers with. This option is available to networks seeking access to the destination network, except in the particular circumstances mentioned above.

2.2 The assumption of efficient prices for transit services

Netflix has argued that ACM's assumption that transit routes are efficiently priced does not hold. First, according to Netflix, the market for transit has been competitive for a number of years, but the market is becoming less competitive due to consolidation, especially for parties like Netflix. Second, if a party like Netflix is denied peering by an ISP, that party does not have a free choice of using an affordable transit provider to reach the network of the ISP, because the ISP will enforce the same restrictive peering policy upon the available transit provider. The reason is that becoming a customer of the transit provider might tip the ratio for that provider on its peering with the denying ISP, as a result of which the potential transit provider faces the same restrictions on peering as the party initially requesting peering with the ISP. This will either harm the end-user or raise the price of transit services towards the ISP's network.

ACM does not agree with Netflix that the recent consolidations in the transit market imply that transit routes are priced less efficiently than before the consolidations. In fact, as Netflix acknowledges, price competition between transit providers has been vigorous. One important reason for this is the fact that networks increasingly peer with each other. The consolidations Netflix refers to, therefore may well be a response to the fact that transit services are increasingly substituted by peering deals. Consolidations in the transit market are therefore not to be taken as an indication that transit prices have become less efficient. ACM does agree with Netflix that for parties that exchange large amounts of IP traffic with an ISP, transit may not be a viable substitute for peering, as described at pages 49 and 50 of the report. Indeed, in such situations transit may be priced higher due to settlement-fees imposed on the transit provider by the destination ISP, or transit may not be available at all. Although ACM had acknowledged this exception to the assumption of efficient transit prices in the draft report, ACM feels that this exception did not receive sufficient attention throughout the entire draft report. The reason is that in the draft report the assumption was stated or used without mentioning the exception several times. ACM has therefore changed the report by adding the exception at all instances where ACM uses or states the assumption on efficient transit prices (namely, in section 3.5.2.4, section 3.6, and chapter 5).

Cogent has argued that transit will not be efficiently priced, if the destination ISP interconnects mostly by peering and does not buy sufficient transit capacity. According to Cogent, in this case the peers of the destination ISP will offer transit to that ISP, but at prices that are subject to a much reduced competition level. The reason for this reduced level of competition on the transit routes to the destination ISP is, according to Cogent, the fact that the ISP pre-selects those parties it peers with.

In ACM's view, Cogent's argument that the prices of transit routes are subject to much less



competition and therefore inefficiently high, does not hold. It is true that ISPs pre-select their peers, but ISPs also pre-select the parties they buy transit from. Whether or not a peer or transit provider is pre-selected does not matter, however, for the pricing of transit services towards the ISP's network. What matters for these prices is, amongst others, the number of parties offering transit services to the ISP's network and the capacities of the interconnection links these parties have with the ISP's network. There is no reason to assume that the prices of transit towards ISPs that achieve interconnection mostly by peering are higher than the prices of transit towards ISPs that achieve interconnection mainly by buying transit. If anything, the former prices may be lower than the latter, since a network usually needs to peer with a lot of networks to achieve global connectivity, whereas global connectivity through transit may be achieved by buying transit from only one party. Therefore, the fact that ISPs handle much of their IP traffic through peering, does not imply that the price of transit towards these ISPs increases, relative to the case where these ISPs would handle most of their IP traffic through buying transit.

2.3 Competition between ISPs and bargaining power

Netflix is of the opinion that the effects of the Liberty Global/Ziggo merger on competition between ISPs have not been taken into account sufficiently in the report. According to Netflix the merger has led to a reduction of competition on the retail market of internet access in the Netherlands. As a result, the assumption that the market in the Netherlands can be distinguished from markets for internet access in the United States and various other European member states is no longer valid. To underpin its statement, Netflix argues that the EC also has concerns about ACM's analysis of the market for internet access.

ACM notes that the opinion expressed by Netflix is not supported by the conclusions of the relevant competition authority that investigated the Liberty Global/Ziggo merger, the EC. In its investigation, the EC focused on potential problems resulting from the merger. This is inherent to merger control. In this investigation, the EC concluded that the Liberty Global/Ziggo merger would not reduce the level of competition on the retail internet access market. Furthermore, the concerns of the EC to which Netflix refers, relate to a draft market analysis decision of ACM in which ACM analysed the retail market for internet access in the Netherlands in the hypothetical market situation, in which there would be no access regulation of the incumbents fixed networks. Such a market situation is in ACM's opinion not representative of the actual market situation after the Liberty Global/Ziggo merger. Therefore, neither the Liberty Global/Ziggo merger, nor the concerns on the draft market analysis decision expressed by the EC, can be used to underpin a view that the merger has led to a reduction in competition on the retail market for internet access in the Netherlands. ACM is of the opinion that the assessment of the EC in the Liberty Global/Ziggo merger, which is performed in the presence of access regulation, is indeed informative for the assessment of retail competition in the Netherlands.



Netflix does not agree with ACM's conclusion that consumers are sensitive to price and quality of their internet access. Netflix argues that history shows that consumers do not switch ISP because of poor quality of a content (such as video) service. If its service would degrade because of interconnection problems, Dutch consumers would, according to Netflix, most likely hold Netflix responsible for the poor service due to information asymmetries in the market. Even if they would hold their ISPs responsible, they would not switch due to information asymmetries, bundled contracts, fear of interrupted services and the necessary switch of devices.

ACM notes that Netflix bases its opinion on experiences in other markets than the Netherlands. ACM has based its conclusions on consumer research and observed consumer behaviour on the Dutch market and considers this analysis more relevant than Netflix' expectations based on observations in other markets, which have not been specified further.

Netflix makes the general statement that as ISPs gain a larger share of subscribers in a national market, they tend to limit interconnection with CAPs, which results in interconnection disputes.

ACM notes that this line of reasoning has indeed been brought forward in the interviews, in particular in relation to a number of former incumbent telecom operators acting as ISPs in other countries than the Netherlands. In ACM's view, the question whether or not an ISP has market power its national market is one of the decisive factors for the likelihood of restrictive interconnection behaviour. As concluded in section 3.5.2.2 of the report, ACM did not identify operators with significant market power on the retail market for internet access in the Netherlands, in the presence of access regulation, therefore the market is considered effectively competitive. Furthermore, as indicated by several interviewees and described in section 3.5.2.6, also larger ISPs have to take the possible negative consequences of restrictive interconnection behaviour on their own customers into account before engaging in foreclosure of CAPs.

2.4 Possible justifications for restrictions on peering and the usefulness of traffic ratio's

Netflix is of the opinion that restrictions on peering, including settlement-fees, the use of traffic ratios and the condition to use the IXP of an ISP, are always anti-competitive and cannot be justified by efficiency rationales or otherwise. Although ACM agrees with Netflix that especially large and vertically integrated ISPs may have anti-competitive reasons to restrict peering, ACM disagrees with Netflix' claim that such motivations lie behind all restrictions on peering. In the draft report, ACM has listed five reasons for which restrictions on peering, including settlement-fees, may be pro-competitive or otherwise justified. These reasons are i) the protection of the ISP's transit business, ii) paid peering may be an efficient contract solution in some cases, iii) settlement-fees may be the result of bargaining, iv) a refusal to peer may arise because of spare capacity on other links, and v) settlement-fees may harness valuable indirect network effects (section 4.4). None of these reasons are discussed by Netflix. Hence, ACM stands by its view that restrictions on peering should be

evaluated on a case-by-case basis, and consequently, sees no reason to change the report in this regard.

Both Netflix and Cogent claim that traffic ratios are used by ISPs to disguise unjustified attempts to demand settlement-fees for interconnection from CAPs. In this regard, ACM notes that opinions on the usefulness of traffic ratios differ widely, as discussed in the report. In the context of this report, however, ACM does not need to take a position in this debate. The reason is that there are many instances of settlement-free peering deals between CAPs and ISPs, where traffic is evidently imbalanced. Therefore, in ACM's view, the draft report suffices where it states that arguments regarding the usefulness of traffic ratios are not pivotal in peering deals, but that the success of peering deals depends on whether or not peering is an economically efficient option and whether or not the parties can agree to what the right split of the value of this relationship is (see section 2.2.2).

2.5 The likelihood of competition problems

Various parties (Netflix, Tele2) refer to the Liberty Global/Ziggo merger to underpin their view that the likelihood of competition problems is currently higher than ACM concludes. Netflix is of the opinion that the changed landscape of the Dutch market has resulted in very little competition between ISPs, which has led to competition problems in the past. Tele2 claims that the EC has found that Liberty Global already actively used its IP interconnection to limit the possibilities of OTT providers over its network and states that the Liberty Global/Ziggo merger assessment revealed a situation that was serious enough to warrant an eight year remedy.

ACM notes in response that the Liberty Global/Ziggo merger was investigated by the EC. The EC focused its investigation on potential problems resulting from the merger. This is inherent to merger control. In this investigation, the EC focused extensively on the question whether or not a merger of the two biggest cable operators in the Netherlands would reduce competition on the retail market for internet access. Finally, the EC concluded that the Liberty Global/Ziggo merger would not reduce the level of competition on the retail internet access market. In light of this, ACM is of the opinion that claims stating otherwise would have to be substantiated with more analysis than submitted by Netflix and Tele2.

ACM would like to reiterate that the potential competition problems found by the EC were the result of increased buying power of the merged entity on the market for acquisition of TV channels. The EC concluded that the proposed transaction would clearly increase the ability to prevent, delay or hamper OTT services by contractual means as a result of the merged entity's increased buyer power on the market for pay TV channels. With regard to interconnection behaviour, the EC concluded that the merged entity's ability to hinder the development of OTT services was compounded by its technical ability to restrict interconnection. Therefore, the EC only concluded on the ability to restrict interconnection but did not investigate the incentives to do so, nor did it conclude on the likelihood of competition problems related to interconnection. The statement of Tele2 that the EC concluded that



Liberty Global already actively used its IP interconnection to limit the possibilities of OTT providers over its network, is therefore not supported by the analysis of the EC.

Furthermore, Tele2 is of the opinion that competition is moving to OTT content provision and it could well be that interconnection between access networks become a competitive bottleneck. Tele2 mentions that this has happened in Australia, New Zealand and Poland (as described in the UKE case).

ACM notes that the conditions under which a competitive bottleneck can exist, have been investigated by ACM in the report in the specific situation of the market in the Netherlands. ACM has taken note of the examples brought forward by Tele2, but considers that the market situation in the Netherlands is significantly different from Australia and New Zealand. Therefore, these examples cannot be used without further analysis to show the likelihood of problems in the Netherlands. It is for that reason that ACM has analysed a selection of relevant cases in section 3.2 of the report, has developed theories of harm on the basis of these cases and has assessed the likelihood of competition problems in practice on the basis of these theories of harm. The UKE case mentioned by Tele2 is one of these cases.

3 Government intervention in the market for IP interconnection in the Netherlands

3.1 Prohibition of settlement-fees

Netflix has articulated the view that interconnection fees are a problem in need of a regulatory solution. First, according to Netflix, settlement-free peering is the most efficient way of interconnection to deliver high bandwidth Internet content, both in terms of economic and technical management. Second, Netflix argues that ISPs demanding settlement-fees do so for clearly anti-competitive reasons, and no economic justification may apply to settlement-fees. Especially large and vertically integrated ISPs have an incentive to impose anti-competitive settlement-fees. Netflix further argues that settlement-fees are harmful to the public. This behaviour has similar effects as discrimination between types of traffic: congesting interconnection points and demanding payment harms innovative services and end-users alike. Netflix therefore considers that settlement-free peering is the only model that can be justified. In other words, Netflix argues for a prohibition of settlement-fees. Finally, Netflix views this kind of regulation as a necessary complement to net neutrality regulation, which only guarantees equal treatment of traffic on the last mile.

ACM does not consider a prohibition of settlement-fees appropriate. ACM does agree with Netflix that settlement-fees could be anti-competitive, but this is not necessarily the case. As discussed above, ACM sees a number of economic justifications for the use of settlement-fees. Hence, settlement-fees may be anti-competitive, pro-competitive, or competitively neutral. At this point, it is not clear what share of actually imposed settlement-fees are anti-competitively motivated or lead to anti-competitive effects. Prohibiting settlement-fees altogether would therefore be an unwarranted strong piece of regulation, which may have the undesired effect of prohibiting justified or pro-competitive instances of settlement-fees. ACM is of the view that authorities may come to the judgement that a settlement-fee is anti-competitive, but only after a detailed analysis of the particular economic and legal circumstances of the case.

3.2 Obligation to maintain sufficient transit capacity

Cogent has stated that ACM should draw the logical consequences from its own observations. It recommends that at least one default transit option must exist to reach all end users in the Netherlands.

ACM notes that Cogent's submission is based on the premise that there is currently insufficient transit capacity available in the Netherlands as a substitute for peering. As discussed elsewhere in this chapter, ACM does not share this vision and concludes that there is sufficient transit capacity in the Netherlands as a substitute for peering.



Based on the observation that there is no competitive problem to be remedied ex ante, ACM sees no reasons for the introduction of a general requirement for all ISPs in the Netherlands to maintain sufficient transit capacity. Such a requirement would not be proportionate in the light of the conclusions drawn in the report.

3.3 Legal classification of CAPs

Tele2 has brought forward that the legal classification of various actors in IP interconnection has been discussed in the Dutch parliament. Examples of these actors are CAPs, such as hosting providers, and Internet voice providers. The discussions were related to the implementation of the Cybercrime Convention (Art. 126 Dutch Criminal Procedure Code) and lawful interception (Chapter 13 DTA). As a result of this, the legislator has excluded CAPs from the definition of providers of an ECS.

ACM shares the opinion of Tele2 that hosting providers are excluded from the definition of ECS. This is mentioned in the parliamentary documentation regarding the review of the DTA. However, various vertical integrated CAPs explore further functionalities. Examples of such functionalities are providing the physical transport of signals along a part of the end-to-end connection towards end users. This makes them responsible for some conveyance of signals. Hence, the definition of ECS can be applicable for this type of services. This could lead to a qualification of a CAP as a PECS/N for this part of the service only. In conclusion, ACM generally does not consider CAPs as ECS. Due to the comment of Tele2 the paragraph on the legal classification of CAPs has been further clarified.

3.4 The Dutch net neutrality and the Open Internet Order

Cogent is of the opinion that ACM's description of net neutrality rules in the Netherlands is short. Cogent would rather have ACM to complement the relevant section with a broader view and outline the larger differences between Europe and the US with regards to interconnection in relation to the proposal of the EC and Council concerning open internet. In Cogent's view ACM should seize the opportunity to point out that the European (existing and future) law should also establish an affirmative obligation for access providers to connect as the US Open Internet Order prescribes.

ACM does not agree with Cogent's view that ACM should take this opportunity to point out that the European law should establish an obligation for access providers to connect in the same way like the Open Internet Order prescribes in the US. In response to this, ACM would like to underline that the context of this report is limited to the IP interconnection market in the Netherlands. As already mentioned in the report, the likelihood of competition problems in the market for IP interconnection resulting in consumer harm is currently very low. Having taken this into account, ACM does not find support for Cogent's view to point out that rules and regulation around net neutrality in the



Netherlands should be similar to the Open Internet Order-approach in the US. Therefore, Cogent's view does not lead to changes in the paragraph regarding net neutrality.