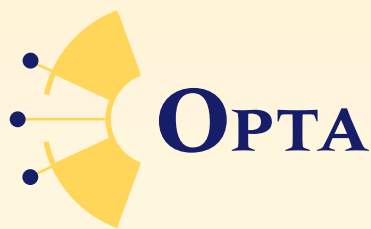


# **Economic considerations on balancing infrastructure and services based competition**



INDEPENDENT POST AND TELECOMMUNICATIONS AUTHORITY

## ECONOMIC CONSIDERATIONS ON BALANCING INFRASTRUCTURE AND SERVICES BASED COMPETITION

**This OPTA Economic Policy Note is a translation of (academic) economic literature into insights that are understandable to non-economists. An Economic Policy Note (EPN) contains implications for regulation policy.**

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Content

<b>Disclaimer .....</b>	<b>II</b>
<b>Content .....</b>	<b>III</b>
<b>Abstract .....</b>	<b>IV</b>
<b>1 Desirability and feasibility of competition.....</b>	<b>1</b>
1.1 Introduction.....	1
1.2 Feasibility of competition: natural monopolies .....	1
1.3 Desirability of competition .....	2
1.4 Infrastructure and services competition.....	3
<b>2 Types of access.....</b>	<b>4</b>
<b>3 Access tariffs: static analysis .....</b>	<b>5</b>
3.1 Access tariffs based on marginal costs.....	6
3.1.1 Instruments and objectives .....	8
3.2 Summary of static analysis .....	9
<b>4 Access tariffs: dynamic analysis .....</b>	<b>10</b>
4.1 Gradual roll-out replication of infrastructure .....	10
4.2 Investments in infrastructure .....	11
4.2.1 Existing infrastructure.....	11
4.2.2 New infrastructure .....	12
4.3 Forward-looking costs .....	13
4.4 Summary of dynamic analysis .....	14
<b>5 Certainty and non-tariff elements .....</b>	<b>15</b>
5.1 Certainty.....	15
5.2 Access offers .....	15
<b>6 Conclusions and regulatory implications.....</b>	<b>16</b>
<b>7 How to proceed?.....</b>	<b>18</b>
7.1 Elaboration .....	18
7.2 Immediate implementation .....	18
<b>LITERATURE .....</b>	<b>19</b>

## Abstract

One of the objectives of regulators of communications markets is to promote competition, also within the new European regulatory framework. A distinction is often made between competition based on services or based on infrastructure. Promoting competition at the infrastructure level and at the services level often cannot be achieved with the same instrument. In some cases promoting one form even has a negative effect on the other form of competition. Regulators have to choose and it is challenging to achieve the proper balance over the course of time. The objective of this Economic Policy Note (EPN) is to identify the economic arguments that should play a part in the considerations between infrastructure and service competition, such as:

- Considering the form of access, is the imposition of obligations desirable? Yes, if the access is one-way. Perhaps, in the case of two-way access and access to bottlenecks.
- Is it easy to replicate the infrastructure? If so, then no access or access with relatively high tariffs is recommended. If not, then easy and inexpensive access is preferable.
- Does the access relate to existing or new infrastructure? If it already exists, then strictly on (forward looking) cost-based access. If it is new, a mark-up as a reward for investment risk.

Following on from this EPN, these economic considerations should be translated into a practical framework that can be applied to individual decisions of the regulator.

## 1 Desirability and feasibility of competition

### 1.1 Introduction

Prior to 1997, there was only one company in the Netherlands with monopoly rights and duties for the supply of telecommunication services. The gradual removal of restrictions in order to facilitate competition in this sector was completed in 1997. Since then a large part of the telecommunications sector is competitively supplied and a regulatory regime exists for those parts that do not (yet) know effective competition.

### 1.2 Feasibility of competition: natural monopolies<sup>1</sup>

An important reason for governments to regulate certain sectors is if this sector has characteristics of a natural monopoly. A natural monopoly exists if total demand for a certain good or service can be produced most efficiently by one firm. Whether a sector can be characterised as a natural monopoly, therefore depends on both the demand function of the product and the cost function for its production. The cost function of a natural monopoly is characterised by important economies of scale caused by the existence of large fixed costs related to infrastructures and in some cases to large economies of scope related to delivering a number of services over these infrastructures. In the past, access networks in sectors like electricity, gas, water and telecommunications were regarded natural monopolies. Competition was deemed not possible nor desirable. To prevent abuse of monopoly power in these sectors, the utilities were mostly government owned. As a result of privatisation, deregulation and liberalisation (segments of) these markets have opened for competition. Most of these markets (segments) are highly dependent on the natural monopoly. Sector specific regulation is directed to this monopoly and to promoting competition where this is possible. If competition is possible, regulation focuses on access to the natural monopoly (the network, thus wholesale level). If competition is not possible or access does not lead to sufficient competition, end-user tariffs are often regulated as well (retail level).

The existence of a natural monopoly is not necessarily a fixed market situation. When demand suddenly increases strongly in a sector that can be regarded as natural monopoly, production by more than one firm can become efficient. A changing cost function, for example as a result of technological innovation, can also alter the natural monopoly character of the sector.

Telecommunications is a sector characterised by fast technological change. This can result in competitive supply for the local access network by infrastructures that were previously not competitive (for example telephony by cable or mobile telephony).

The existence of an incumbent controlling the local access network, regarded as being a natural monopoly, can be compared to a first mover advantage or to a barrier that blocks efficient entry<sup>2</sup>.

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<sup>1</sup>For a more detailed discussion see Viscusi et al (1995).

<sup>2</sup>Armstrong (1994). A natural monopoly does not exclude the possibility that more parties are active on the market. From a welfare perspective however, this is not optimal because it is not efficient. If a natural monopoly actually exists entry should be blocked by the regulator.

### 1.3 Desirability of competition

Armstrong<sup>3</sup> asks if competition is possible (see previous paragraph) and if it is desirable. He concludes that in general competition is preferable over a monopoly. Competition results in improved utilisation of resources<sup>4</sup> and stimulates parties to produce less expensively. Competition partially replaces<sup>5</sup> the ex-ante regulator and thus the costs and possible market distortions associated with regulation disappear<sup>67</sup>.

In figure 1 the questions regarding feasibility and desirability of competition are combined.

**Figure 1: The feasibility and desirability of competition**

		Is competition desirable?	
		Yes	No
Is competition feasible?	Yes	The usual case	'Creaming off' behaviour of entrants
	No	Obstruction of entry	Strong natural monopoly

Source: Armstrong, 1994

Armstrong asserts that competition is desirable and feasible in most industries (top left). As discussed previously, this is not the case for natural monopolies (bottom right). In some cases, competition could result in too many entrants. Inefficient entry on the most profitable market segments could undermine the profitability of the total market (top right).

In most parts of the telecommunications sector competition is desirable and possible, but the incumbent(s) will try to prevent competition by anticompetitive behaviour (bottom left).

<sup>3</sup> Armstrong (1994), page 100.

<sup>4</sup> Allocative efficiency improves because competition ensures that the price is closer to the marginal costs. The information asymmetry between the monopolist and the regulator means that the price will be higher than the marginal costs.

<sup>5</sup> Noam (2002) refers to an anti-monopoly rationale and a transaction cost rationale for regulation. "...the regulation of interconnection is an essentially transitional task that will fade away with the emergence of competition." "In contrast, the transaction cost rationale comes to the opposite conclusion. As open entry permits more and more carriers to offer services, the need for basic rules for their interaction becomes increasingly important if the overall network infrastructure is not to fragment into incompatible network parts."

<sup>6</sup> Laffont & Tirole (2000), page 163: competition usually is a favourable substitute for regulation in competitive markets.

<sup>7</sup> There are more "regulatory failures", like f.e. regulatory capture and regulatory commitment. It is outside the scope of this paper to discuss all regulatory failures. For more detailed coverage refer to Laffont & Tirole (2000).

Allowing competition does not necessarily result in competition. Armstrong asserts that barriers to entry<sup>8</sup> can arise as a result of: absolute advantages compared to new entrants, for example, because the incumbent has access to certain production resources, such as the local loop, while entrants do not<sup>9</sup>; strategic advantages for the incumbent, for example, first-mover advantages; possibilities for the incumbent to obstruct entry by means of strategic behaviour, such as by engaging in price squeezes. Regulation is essential in such circumstances to make competition possible<sup>10</sup>.

### 1.4 Infrastructure and services competition

Competition can take place at various levels. If end-users can choose from services/products offered by various providers, competition exists at the services level. Competition at the infrastructure level means that there are various infrastructures over which competitive services can be offered and that the underlying infrastructures are competing.

An alternative infrastructure tackles competitive problems at their source, i.e. the market power held by the (fixed) network owner. Therefore, competition on services resulting from competition between infrastructures is preferable to competition on services delivered over the same infrastructure (network).

The European Commission's Recommendation regarding relevant product and services markets in the electronic communication sector states<sup>11</sup>: "The aim of the new regulatory framework is ultimately to achieve a situation where there is full infrastructure competition between a number of different infrastructures. This can occur within or between platforms. Regulation mandating access to existing networks serves as a transitional measure to ensure services competition and consumer choice until such time as sufficient infrastructural competition exists. Investment in new network infrastructure will hasten the day when ex-ante regulation can be withdrawn from this market."

The difference between infrastructure and services based competition has important implications for the regulatory regime. If a competitive infrastructure is unlikely or undesirable because of natural monopoly characteristics of the network, the regulator should design an access regime favouring services based competition. If infrastructure competition is possible (and desirable) the regulator should focus on stimulating competition between those networks.<sup>12</sup>

Stimulating services competition on the one hand and infrastructure competition on the other, could lead to opposite incentives in the market. Easy and cheap access to the network of the incumbent could hinder investments in alternative infrastructures. However, stimulating infrastructure competition could lead to wasteful duplication of networks and to inefficient entry by network providers.

Imposing access obligations and subsequently regulating access tariffs not just affects investment decisions of entrants, but also the investment decision of the incumbent. If access tariffs are too low the incumbent makes insufficient return to invest in the existing infrastructure. If access tariffs are too high

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<sup>8</sup> Entry barriers exist if the incumbent continues to achieve high profits as a result of its historical position of advantage, without this attracting entrants.

<sup>9</sup> Or at least not for reasonable tariffs

<sup>10</sup> Armstrong (1994), p.100/101 distinguishes pro-competitive regulation and "monopoly regulation" like tariff regulation.

<sup>11</sup> Commission Recommendation on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services, Brussels, 16/12/2002, page 24.

<sup>12</sup> Also see Oxera (2003)

the incumbent has an incentive to invest too much, operate inefficiently and/or to make monopoly profits<sup>13</sup>.

Alternative infrastructure is crucial for sustainable competition. An important choice and task of regulation is to determine whether access obligations are imposed and if so to set access tariffs. The choice for imposing access obligations and the level of the access tariffs should be based on a balance between possibilities for infrastructure competition on the one hand and services based competition on the other. Access obligations and tariffs have important consequences for investment decisions of incumbents and entrants.

## 2 Types of access

With *one-way access* the incumbent holds a monopoly on an input that is vital to the entrant while the incumbent needs nothing from the entrant<sup>14</sup>. If the incumbent is vertically integrated, like in the Netherlands, and thus competes directly with the entrant on the consumer market it has additional incentives to limit access to its network to its (retail) competitors. The entrants do not have the power to negotiate access at reasonable tariffs. The incumbent therefore has a stimulus to apply high access tariffs or to withhold access to entrants altogether. This means a continuation of the incumbent's market power. One-way access is especially important when competition is just starting, because competitors then do not have (sufficient) infrastructure and therefore have no access to their own users. One-way access is characterised by an extremely asymmetrical position between incumbent and entrants. Regulation serves to safeguard access to the incumbent's network under reasonable conditions.

With *two-way access*, all market parties must purchase essential input, i.e. access to the competitor's subscribers, from one another<sup>15</sup>. This therefore relates to parties that both have users connected to their own infrastructure<sup>16</sup>. Market parties can negotiate access and access tariffs between themselves. The market parties compete for the same customers, giving them an incentive to keep the prices they charge other parties within reasonable limits. However, if the market is not mature small entrants should be protected for high access tariffs charged by the incumbent. Asymmetrical regulatory measures can be defended in such situations.

*Competitive bottlenecks*<sup>17</sup> exist if there is competition on one market (competition for subscribers), but a monopoly position on a related market (providing access to these subscribers)<sup>18</sup>. The outcome in markets of this type is unclear. Competition for subscribers prohibits excessive profits, but on the monopoly market excessive profits are obtained, which are then applied to attract subscribers. A well-known example of a competitive bottleneck is the mobile market. There is a fierce competitive battle to attract mobile subscribers. Relatively low calling charges and subsidies on mobile telephones are partially

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<sup>13</sup> See also Oxera (2003)

<sup>14</sup> Examples are the local loop and carrier selection.

<sup>15</sup> Interconnection, for example.

<sup>16</sup> Even though there are also examples of two-way access without infrastructure competition, such as internet access; see Armstrong (2002) and Canoy et al (2002).

<sup>17</sup> This can also be regarded as a special two-way access case. See OECD (2003)

<sup>18</sup> For example, access to call termination markets that do not compete for the same customers, such as access to mobile subscribers for fixed network subscribers.

financed by extremely high tariffs for *access* to the subscribers. A subscriber on the fixed network calling a mobile subscriber also pays that high access tariff. In short, fixed network subscribers partially finance the low tariffs and free telephones for mobile subscribers. Armstrong therefore concludes that even in the most 'competitive' markets, such as the mobile sector, the regulation of access tariffs continues to play a role<sup>19</sup>.

With one-way access, measures to enforce access under reasonable conditions are clear and uncontested. With two-way access and access to bottlenecks, the need for regulatory measures is less clear, but regulation of the access tariffs continues to be important here as well.

The emphasis in the remainder of this paper will be placed on the effect that the access tariffs have on investment decisions (Sections 3 and 4). This is in line with the importance that market parties place on this<sup>20</sup>. However, tariffs are not the only variables that are important to entrants and that the regulator can influence<sup>21</sup>. The regulator can provide certainty with respect to the access regime and is able to influence non-tariff aspects of access offers (Section 5).

The difference between one-way and two-way access results in varying considerations when determining access obligations and the level of access tariffs.

The following sections further analyse the relation between regulation of access to networks and incentives for infrastructure investments. This note does not analyse regulatory regimes without access obligations and the effect of retail price regulation on investments in infrastructure.

### 3 Access tariffs: static analysis

As indicated before, the *level* of access tariffs affects decisions of (possible) entrants to focus on infrastructure or service competition. In this section optimal access tariff setting is analysed in a static environment. Two things are optimised with static efficiency. Firstly, scarce resources are optimally utilised. In other words, no other allocation of resources will result in a higher level of social welfare (allocative efficiency). Secondly, the output is produced at the lowest possible costs, given the state of technology (productive efficiency). Maximum static efficiency is achieved in a situation with perfect competition where prices are the same as marginal production costs. In a static analysis, developments and investments in new technology are not taken into consideration<sup>22</sup>.

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<sup>19</sup> Armstrong (2002), page 379

<sup>20</sup> Armstrong (2003), page 26: "The general tone from the interviews was that the financial terms of wholesale arrangements are the key consideration in the 'make-or-buy' decision."

<sup>21</sup> An important factor that the regulator cannot influence is the situation on the capital market. After a period in which the sky was the limit, this market is now shut tight. Analysys (2003), page 23, states that investments must now meet extremely strict requirements, including a return time of no more than 12 months.

<sup>22</sup> Canoy et al (2002), p.11

### 3.1 Access tariffs based on marginal costs

If access tariffs are equal to marginal costs, the end-user tariffs are not distorted and entrants have the right incentives: they can only make a profit if they are more efficient than the incumbent<sup>23</sup>. This section discusses the most important reason why, in telecommunications, access tariffs from the incumbent should deviate from marginal costs: a tariff based on marginal costs does not cover fixed costs<sup>24</sup>. The telecommunications sector is characterised by substantial fixed costs generating economies of scale. Most of the costs are incurred by the installation of the network. The costs of carrying 1 extra call minute is almost zero once a network has been built. In other words, the marginal costs of this call minute are close to zero. If a call minute were to be assigned a tariff on the basis of marginal costs, the network owner would never be able to recoup the initial investment. In a first-best situation<sup>25</sup>, these costs should be covered by a contribution from the state. Since this is practically unfeasible, the fixed costs must be financed in a different manner. This could be done by taxing the end-user products offered by entrants. This solution is also politically unrealistic. A third method is to determine a mark-up on both retail and access tariffs to cover the fixed costs. If there were no mark-up on the access tariffs, entrants would prevent the incumbent from putting a mark-up on the end-user tariffs. In this case, the fixed costs would not be recouped. As a result the total fixed costs would have to be recouped in any monopoly segments, resulting in enormous distortions. There are various ways to determine the optimum mark-up on the access tariffs in relation to end-user tariffs deviating from marginal costs. The three methods most commonly discussed are outlined below.

#### *Ramsey Pricing*

*Ramsey-Pricing* is theoretically the optimum solution for determining the right mark-up or increment. With this method, the end-user and access tariffs are determined simultaneously in such a way that welfare is maximised. Thus both the access and the end-user tariffs contribute to covering the fixed costs. The main question in Ramsey pricing is: what is the optimum tariff structure for a regulated business with multiple products, given the fact that the total costs must be covered? Answering this question means that the prices that contribute to the company's profitability are the basis for determining the prices of the various products that consumers prefer<sup>26</sup>.

With Ramsey pricing, the tariff for an access service depends on what the service is used for. Access tariffs are higher when used for services that generate only limited welfare losses if a significant mark-up is

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<sup>23</sup> Canoy et al (2003), page 6

<sup>24</sup> Another reason can be that end-user tariffs are used to achieve social objectives and that this has consequences for access tariffs. In the Netherlands, the end-user tariffs are not overly distorted by social requirements imposed by the legislator or regulator. There is policy to keep the tariffs in line with the underlying costs as much as possible: complete re-balancing has been implemented; the universal service subscription should pay for itself and therefore is not subsidised by other services; the division between call set-up and traffic is determined by the incumbent itself and not by the regulator's social desires; connection costs, with some exceptions, are paid in a lump sum. The tariffs must still be geographically uniform, however. It remains to be seen whether the geography and topography of the Netherlands are such that this will lead to a strong deviation between costs and tariffs.

<sup>25</sup> This is the theoretical solution if there are no imperfections that prevent application of this solution.

<sup>26</sup> Laffont & Tirole (2000), page 61.

imposed (products with low price elasticity)<sup>27</sup>. Thus as little market disruption as possible is introduced, so that the outcome is optimal in terms of welfare.

Despite the good theoretical results, Ramsey pricing is rarely used in practice where regulation is concerned. There are various reasons for this. The end-user tariff level is often considered to be fixed and these tariffs are not determined at the same time as the access tariffs<sup>28</sup>. Consumers' familiarity with the existing tariffs and tariff structure makes it less attractive for parties<sup>29</sup> to use a different tariff structure. The information requirement for determining tariffs is also considerable. The regulator needs information on price elasticities of all services offered. As a result Ramsey pricing is difficult to implement for the regulator.

From a welfare perspective, tariffs would optimally be based on the willingness of consumers to pay for the service. With Ramsey pricing, certain groups of consumers will, therefore, pay different tariffs for the same access service (depending on usage lower in the production chain). This results in acceptance and institutionalisation of 'discrimination', which does not always appear to be tenable from the perspective of law and the regulator<sup>30</sup>.

### *ECPR*

Unlike Ramsey pricing, the Efficient Component Pricing Rule (ECPR) analyses supply and demand in isolation. ECPR opts for an access price that maximises welfare *given* the end-user tariff<sup>31</sup>. If the end-user tariff includes excess profit, ECPR does nothing to reduce this profit. Therefore, ECPR assumes retail prices are regulated.

ECPR can be regarded as a marginal rule. In this respect, the maximum access tariff equals the incumbent's end-user tariff minus the incumbent's marginal costs on the end-user segment of the market. In other words, the margin available to a competitor is equal to the incumbent's marginal retail costs. This rule therefore leaves intact the mark-up that the incumbent needs to cover the fixed costs.

The above rule corresponds to determining access tariffs equal to the costs of access plus the lost profit of the incumbent on the retail market as a result of access<sup>32</sup>. With ECPR an optimal mark-up on the access tariffs based on the fact that the end-user tariffs must cover the fixed costs, will ensure that only parties that are more efficient than the incumbent will enter the market.

### *Access tariffs based on costs*

A third method for determining a mark-up on the marginal costs is by allocating costs using certain ratios. A variety of ratios are conceivable. An *use-dependent* mark-up means that the costs that cannot

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<sup>27</sup> Armstrong (2002), pages 335/336.

<sup>28</sup> For the record, this does not mean that end-user tariffs are not regulated or that the level is fixed. The current tariff is, however, used as a point of departure for the end-user tariff regulation.

<sup>29</sup> This applies to the regulator, the incumbent and the entrants (they often base end-user tariffs on the incumbent's existing tariff structure).

<sup>30</sup> See Laffont & Tirole (2000) for a detailed analysis of the limited use of Ramsey pricing.

<sup>31</sup> Canoy (2002), page 9: The regulator therefore strives (via ECPR) not to maximise the total welfare but to recoup the costs and be productively efficient.

<sup>32</sup> See also Cave et al (2001), Canoy et al (2002), Armstrong (2002), OECD (2003).

be allocated directly are divided between the services, with the mark-up thus being the same for every service<sup>33</sup>. A mark-up of this type is the same as a mark-up to cover the loss of profit incurred by the incumbent caused by entry to the market (comparable with ECPR). With a *price-dependent mark-up*, the mark-up on the marginal costs is proportional to the marginal costs<sup>34</sup>. A use-dependent mark-up is preferable to a price-dependent mark-up. A price-dependent mark-up results in the fixed costs being disproportionately borne by the end-user services. The access tariffs do not contribute enough and are therefore set too low. No matter which method is applied, cost prices based on complete allocation of costs are undesirable from a theoretical point of view. Because all costs are covered, this method does not result in cost minimisation<sup>35</sup>, and may result in inefficient entry and leads to inefficient bypass<sup>36</sup>.<sup>37</sup>

However, in practice this method for determining tariffs is often used. It is relatively simple (compared to Ramsey pricing and ECPR) and has neither the 'discrimination' problem of Ramsey pricing nor the monopoly-profit problem of ECPR.

The existence of substantial fixed costs in the telecommunications sector is a reason for applying a mark-up on the marginal costs when determining access tariffs.

### 3.1.1 Instruments and objectives

The methods to calculate the mark-up as discussed above have only one objective: the entrant's end-user tariffs are influenced by means of the access tariffs in order to arrive at the correct tariff structure, given the fact that the tariffs in this segment should contain a mark-up to cover the fixed costs.

Covering this shortfall, however, is not the only possible market distortion. If the access tariffs are used to address other distortions, there is a risk that this instrument becomes a "jack of all trades and a master of none"<sup>38</sup>. Objectives such as: providing the right investment incentive for incumbent and entrants; achieving the desired degree of entry; striving to achieve social objectives; limiting non-regulated end-user tariffs; etc. are not always in line with one another and attempts should not be made to achieve them with a single instrument (i.e. regulating access tariffs). This is also often unnecessary because there are better and more direct instruments available. An end-user tariff, for example, need not be limited by means of access tariffs; this can also be achieved by directly influencing the end-user tariffs. Social objectives are better achieved by means of taxation. In some cases, the regulator has access to these instruments (end-user tariff regulation, for example); in other cases it does not (introducing taxation is not an option). A regulator should acknowledge the interaction between various

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<sup>33</sup> The mark-up amounts to a fixed (price-independent) levy.

<sup>34</sup> The mark-up amounts to a proportional sales tax-like levy.

<sup>35</sup> The incumbent has no incentive to reduce costs.

<sup>36</sup> Bypass exists if entrants have the possibility of a substitute for establishing or acquiring the incumbent's access service.

<sup>37</sup> No cost minimisation: the incumbent has no incentive to reduce costs. Inefficient entry: because the mark-up is based on costs, inelastic market segments are basically subsidised at the expense of elastic market segments. An inefficient competitor will enter a retail market if its relative cost disadvantage is smaller than the mark-up the incumbent must apply to its end-user tariffs to cover the fixed costs. Inefficient bypass: the mark-up leads to a deviation in marginal costs and thus to too much bypass (Laffont & Tirole (2000), page 144).

<sup>38</sup> Laffont & Tirole (2000), page 125.

instruments and the impact of this on for example investment decisions and the relation between access tariffs and end user tariffs (price squeeze).

Deliberations regarding infrastructure and service competition do not come into play within a static analysis of possibilities to regulate access. However, as indicated above, an objective of regulation may be to give the right make-or-buy incentive by means of regulating the access tariffs.

A regulator must be aware of the fact that the access tariff can only be used to achieve a limited number of objectives. A regulator must make objectives explicit and assign priorities when conflicts occur.

### 3.2 Summary of static analysis

When competition is effective, tariffs are equal to marginal costs. The high fixed costs that characterise the telecommunications sector create a shortage when access tariffs are based on marginal costs. Preferably, this market distortion is not rectified by modifying the access tariffs. In practice, however, this is often the only option.

Covering this shortfall is often not the only desired objective of (modifications to) the access tariffs. A regulator must not attempt to pursue too many objectives with this one instrument.

If other objectives are strived for, modifications to the access tariffs must be reconsidered from this perspective. Applying mark-ups above the marginal costs can influence entrants' investment decisions. In the static analysis, an increase in the access tariffs stimulates infrastructure investments and thus infrastructure competition. Infrastructure and service competition are, therefore, at odds with one another.

A summary of the tariff methods, their advantages and problems, and possible solutions to these problems is shown in Table 1.

**Table 1 Summary of static analysis**

Basic case	Access charge:	Strength	Potential problems	Possible remedies:
First-best	Marginal cost	<i>Leads to static allocative efficiency</i>	require lump sums, otherwise fixed costs not covered	<ul style="list-style-type: none"> <li>• tariff rebalancing</li> <li>• USO funds</li> </ul>
Second-best	Ramsey	<i>Leads to best-achievable allocative efficiency given constraint of fixed cost recovery</i>	<ul style="list-style-type: none"> <li>• informational content</li> <li>• may not be sustainable</li> </ul>	<i>Global price cap on a basket of services so that incumbent can choose prices for services in basket</i>
Productive efficiency	ECPR partial rule	<i>Efficient entry</i>	Retail prices excessive	Separate retail price regulation

Source: part of table by Cave (2001); italicised text has been added.

## 4 Access tariffs: dynamic analysis

The theory concerning the optimum setting of tariffs as described above refers to a static situation in which businesses do not invest or develop new technologies. This is not typical of the telecommunications sector, and dynamic considerations should play a role when determining access tariffs. Matters affected by access tariffs include: the (potential) profit of operators and thus possible entry to the market; investments in new technologies; roll-out of networks; maintenance and improvement of existing networks; etc<sup>39</sup>.

Cave<sup>40</sup> asserts that the logical conclusion of the static analysis – the best way to promote infrastructure competition is to apply high access tariffs – is incorrect, or at the very least too simplistic. In the first place, the dynamic process by means of which an entrant establishes a position must be taken into account (4.1). In the second place, the dynamics of competition between incumbent and entrant(s) does not support this conclusion (4.2).

“The notion derived from naïve and static analysis, that low access prices are bad for infrastructure competition and high access prices are good for it is mistaken – or at least over simplistic in the era where telecommunications markets have been newly liberalised.”<sup>41</sup>

### 4.1 Gradual roll-out replication of infrastructure

The first dynamic process that must be considered is the manner in which an entrant establishes a position on the market. Entrants that build an alternative infrastructure do so gradually. In the beginning, re-sale may be necessary in combination with a broad, inexpensive access offer. Cave states: “A policy of high access price in this phase of their activity may kill the entrant’s business model stone dead”. In later phases, network components that can be easily replicated (with relatively little economies of scale) can become more expensive and possibly be deregulated. Thus it is both a process of tariff development and a process of reducing the number of regulated access products over time. This advocates a type of start-up scenario in order to address the asymmetrical position of new entrants. As stated before, asymmetrical entrance regulation so that small entrants are protected and a reduction of the consumer surplus is avoided, is optimal in an immature market. The question is at what time start-up scenarios and asymmetrical regulation should be terminated. This point in time must be linked to a *market situation* (and not to a specific point in time). Applying criteria of this type can (negatively) affect behaviour on the market and must therefore be dealt with cautiously<sup>42</sup>.

Cave distinguishes between a situation in which the products are available to all potential entrants and one in which a distinction is made between entrants with their own infrastructure and entrants without. When infrastructure investors and non-infrastructure investors both have low-priced access, this may reduce the investment incentive at an early stage of the competition. Another question is how a different

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<sup>39</sup> See also Canoy et al (2002), page 10.

<sup>40</sup> Cave et al (2001), page 13.

<sup>41</sup> Cave (2001), page 13.

<sup>42</sup> Canoy et al (2002), page 13

access regime for infrastructure competitors as compared to services competitors relates to the principle of non-discrimination. The feasibility is also questionable considering the fact that it will not be easy to determine where the line should be drawn between the two different groups<sup>43</sup>.

Entrants that build an alternative infrastructure do so gradually. Apply start-up scenarios to address the asymmetrical position of new entrants.

Start-up scenarios and asymmetrical regulation should be terminated on the basis of the market situation.

## **4.2 Investments in infrastructure**

When analysing the competition between incumbent and entrants and among entrants, the incentives for investments and the influence of access regulation on those incentives are important. Two situations can be distinguished: investments in existing infrastructure and investments in new infrastructure.

### **4.2.1 Existing infrastructure**

With existing infrastructure, the incumbent has already invested (the costs of these investments are sunk) and the only decision that the regulator can influence is whether or not entrance will occur and, if so, whether this will be achieved by means of the entrant's own infrastructure or by means of access provided by the incumbent<sup>44</sup>. In this consideration, the effect of the decision on the incumbent's willingness to invest must also be taken into account. With existing (network) investments, the incumbent often has first-mover advantages based on its history as monopolist (e.g. client base, widely recognised name, etc.). Discussions then focus on giving incentives to second and subsequent entrants. Asymmetry between the incumbent and potential entrants may make temporary subsidies necessary in order to safeguard competition in the longer term. One way of doing this is to subsidise the price of the input of the second entrant's production process; this often pertains to the incumbent's network access services.

Moreover, access tariffs for existing infrastructure must be low considering the low risk and the limited capital expenditures<sup>45</sup> involved. The tariffs should reflect the advantages of scale and scope in order to stimulate investments in the most realistic points in the network. Entrants invest first in the network

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<sup>43</sup> A carrier select provider is often considered a services competitor but has some infrastructure of its own. These infrastructure investments are extremely small compared to parties that strive for a large-scale roll-out. Drawing a line will be difficult and partially arbitrary.

<sup>44</sup> Armstrong (2003), page 34.

<sup>45</sup> Analysys (2003), pages 34/35, identifies four elements that play an important role in determining the tariffs for access to the existing infrastructure: risk that is associated with the investments, nature of the costs, advantages of scale and scope, situation on the capital market. With existing infrastructure, the risk is low because the investments were already made in the past and the demand (voice services) is stable. The capital expenditures are low because the existing infrastructure is to a large degree embedded, and the revenue can cover the other, primarily variable, costs.

components where the advantages of scale are smallest<sup>46</sup>. Access tariffs for facilities such as transport, long distance networks and switching should be relatively higher than the access tariffs for the unbundled local loop, which has enormous advantages of scale. Finally, tariffs for access to existing infrastructure must be low considering the stimulating effect this has on *complementary investments*. A low tariff for the unbundled local loop, for example, can result in investments in the local loop network and in related equipment such as DSLAMs. Unlike the static reasoning that low access tariffs lead to few infrastructure investments, empirical evidence indicates that low access tariffs have led to many (complementary) infrastructure investments<sup>47</sup>.

Low tariffs for access to existing (not yet replicable) infrastructure may lead to many (complementary) infrastructure investments.

### 4.2.2 New infrastructure

New infrastructure investments have a different risk profile and costs than investments in existing infrastructure. The risk is much greater because the demand for the new service is not yet known. The capital costs will become more important in relation to the operating costs. Both aspects must be reflected in the access tariffs. Higher access tariffs reimburse investors for the risk taken, but also reduce service competition. This is particularly damaging if infrastructure competition is unlikely. Nevertheless, relatively high access tariffs can be justified from a cost perspective (risk premium, capital costs) and with reference to patent practice. Patent theory and practice show that when future profits are permitted, there is a reward for the party that invests successfully. The patent, which creates a temporary monopoly position, is the carrot that encourages investors to invest - the larger the carrot, the greater the willingness to invest. This principle can also result in a race to invest in the telecommunications sector in order to get hold of the carrot<sup>48</sup>. It is important to give investors the confidence that ex-post profits will not be skimmed of by regulatory intervention. If this confidence does not exist, investors will be hesitant (see also Section 5).

New infrastructure can be divided into complementary and replacement investments. It remains to be seen whether complementary investments (e.g. DSLAMs) should be regulated, even at a high tariff. Entrants can invest in these facilities themselves if the basic access (e.g. to the local loop) has been realised. With replacement investments (e.g. fibre-optic local loop), the capital costs involved in the investment are often extremely high. Experience has shown that access conditions have a strong effect on the investment decision. The enormous capital costs, risks, restrictions on the capital market and advantages of scale make it improbable that entrants will also invest in the same infrastructure if the incumbent is investing in it. This is an argument in favour of establishing service competition through access. If the incumbent expects that access will be regulated<sup>49</sup>, the expected return of such an

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<sup>46</sup> The advantages of scale, and thus the entrance barriers, increase the closer the network elements are to the end-users. For transmission, the scale advantages of international connections are smaller than for the local loop. Competition will occur earlier on the international connections. A smaller entrant (less scale) is better able to justify these investments. The advantages of scale for transmission are also greater than for switch equipment (Analysys (2003), page 30).

<sup>47</sup> Cave et al (2000), page 50.

<sup>48</sup> Both Cave et al (2001) and Analysys (2003) use this argument.

<sup>49</sup> Or, if access is not regulated, the end-user tariffs will be regulated on a level that kills investments incentives.

investment decreases and the incumbent might decide not to invest. In order to break out this vicious circle, the risk involved in investment projects of this type can be shared. This can be achieved by means of joint investment in infrastructure (ex-ante infrastructure sharing) or, if one company invests, other companies are only given access if they pay for a fixed share of the investment (ex-post infrastructure sharing)<sup>50</sup>. It should be noted, however, that one network held jointly by a few players affects competition. There is no infrastructure competition and service competition can be weakened because an end-user who switches to the competitor still generates income based on the margin of the joint network company.

Make a distinction between infrastructure that already exists and new infrastructure to be established. Cost-oriented tariffs are recommended for the first group. There should be a mark-up for the second group in order to stimulate an investment race between operators.

### 4.3 Forward-looking costs

Access tariffs based on forward-looking principles in order to address dynamic considerations are common practice among regulators in Europe. With forward looking principles costs incurred by the incumbent at the time of the investment are not taken into consideration<sup>51</sup>, but rather the costs that would be involved if the same service was provided on the basis of today's and tomorrow's technology. The forward-looking principles therefore take account of cost reductions achieved in the course of time as a result of technological developments. Use of the latest technology also gives the potential entrant the right make-or-buy decision. A tariff based on historical costs is usually higher<sup>52</sup> and will sooner result in a 'make' decision.

Applying forward-looking principles can mean that the incumbent supplying the access service based on 'old' technology does not make a profit or even incurs a loss. This stimulates the incumbent to continue to invest in the network on the basis on the then available technology<sup>53</sup>. Furthermore, the lack of profit on access services may stimulate denial of access. The incumbent may use delaying tactics and exaggerate technical and quality problems. Another problem involved in applying forward-looking principles is that this information cannot be found in the incumbent's financial records. Therefore, much more information and expertise is required in comparison to an approach based on historic costs. Forward-looking tariff determinations will therefore continue to require significant regulation effort, and this is not in keeping with the concept of an increasingly 'hands off' regulator<sup>54</sup>.

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<sup>50</sup> By means of risk sharing, the risk of hold-up as discussed in Table 1 is alleviated.

<sup>51</sup> Backward-looking tariff principles such as historical costs do this.

<sup>52</sup> Technological developments have resulted in enormous cost reductions. Wages, however, have increased significantly. A forward-looking tariff may be higher than a backward-looking tariff if the wage costs represent a large share of the costs.

<sup>53</sup> In practice the financial possibilities of the incumbent should be taken into account. As no profit is made, the incumbent should use its financial reserves or use the capital market to be able to make the investments.

<sup>54</sup> Canoy et al (2002), pages 11/12.

Forward-looking tariff principles have advantages over historic cost based tariffs, but also have limitations and problems.

#### 4.4 Summary of dynamic analysis

The dynamic analysis contradicts the static conclusion that high access tariffs are the best way of promoting infrastructure competition. In order to promote infrastructure competition, easy and inexpensive access must be provided to infrastructure that cannot (as yet) be replicated. What can or cannot be replicated changes in the course of time. With beginning competition, a broad inexpensive access offer is necessary. The investments of the entrants are at that time complementary to the network of the incumbent. Over time, when entrants continue to roll out, infrastructures of the entrants can become (partial) substitutes for the incumbent's network.

In a longer term, access tariffs must be based on costs. In the short term, start-up scenarios with asymmetrical measures to stimulate entrants are justifiable. The introduction of tariffs that are temporarily lower than the (forward-looking) costs can be an additional stimulus for infrastructure competition if this promotes investments in complementary infrastructure. Applying temporarily lower tariffs conflicts directly with the incumbent's interest, and the incumbent will attempt to apply a high price for non-replicable resources. A price of this type has a negative effect on the entrant and/or makes it less probable that an entrant will invest in resources that cost less and are easier to replicate.

**Table 2: Summary of regulation principles depending on investment type**

<i>Investment type</i>	<i>Characteristics</i>	<i>Regulatory approach</i>	<i>Comments</i>
Existing infrastructure	Low risk, low fixed costs	Low initial access charges, rising over time	Promotes service-based competition initially, then a migration to facilities-based competition
Complementary new infrastructure	High risk, medium fixed costs	Access may not be necessary	As long as access to existing infrastructure is low cost and high quality, can lead to partial facilities-based competition
Replacement new infrastructure	High risk, high fixed costs	Infrastructure sharing (ex-ante and ex-post) to share risk	Increased investment incentives, leading to service-based competition over shared infrastructure

Source: Analysys (2003)

## 5 Certainty and non-tariff elements

Tariffs are not the only variables that are important to investments in infrastructure. The regulator can reduce uncertainty with respect to the regulatory regime and can affect non-tariff aspects of access offers.

### 5.1 Certainty

Ex-ante incentives to invest in infrastructure depend, among other things, upon the *expectations* regarding ex-post regulation of access (tariffs)<sup>55</sup>. Both the investments by entrants in alternative infrastructure and the investments by the incumbent to maintain and improve the network depend not only on the *current* access regime but also on the *expected* access regime. A regulator must provide clarity with reference to: objectives of the access regime; tariff structure principles; possible tariff development; sunset clauses, etc.

A regulator can provide certainty by:

- announcing regulation principles *before* decisions are made. Operators thus know the access conditions when they want to make investment decisions. The regulation factor and the related risk can therefore be more easily estimated;
- sticking to the principles as formulated and applying these consistently. The regulator may have an incentive to review a previously determined principle. Suppose the regulator applies the principle: high access tariffs for access to networks that are still to be established. If the regulator compels access based on costs *after* the network has actually been established, the operator will continue to use the network (sunk costs). However, the regulator loses all credibility. Publication of clear regulation principles by a regulator that is not credible is useless. The regulation risk does not decrease. Principles must not be modified without due cause or due warning, and should not be modified hurriedly.

### 5.2 Access offers

In addition to tariffs, the flexibility, availability, service levels and response periods play an important role in make-or-buy decisions. An increasing lack of clarity regarding the access offer is more likely to result in 'make' decisions of new entrants. Certainly when 'make' is not yet realistic, damage will occur. Complementary investments can also be postponed because access to crucial parts of the incumbent's network is not guaranteed. Regulatory practice in the Netherlands has made it clear that setting of tariffs is often only one of the obstacles to be overcome. In a mature market, parties themselves would agree on the operational details of access products. However, the incumbent supplies (certain) access products only because it is forced to do so, and can use operational details to delay and to (temporarily) refuse access to entrants. The access conditions can also be used to raise costs for entrants, thus strengthening the incumbent's position. This might force regulators to become heavily involved in non-tariff aspects of access offers.

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<sup>55</sup> Cave et al (2001), page 5.

## 6 Conclusions and regulatory implications

This section describes the possible actions for the regulator in order to make operational the suggestions in this paper.

1. Investments focus on the long term. Regulation must provide market parties with long-term clarity in order to improve certainty and predictability. This can be done by actively propagating an ex-ante policy; by indicating clearly for each individual decision which criteria were applied to reach the decision; or combinations hereof. These assessment criteria must be applied consistently both in terms of content and over time, and may not be modified without cause.
2. Competition does not materialise without active regulation. Major differences between incumbent and entrants justify asymmetric measures. Entry barriers that obstruct competition must be dealt with directly as much as possible. However, if there are no alternatives, it may be necessary to take the asymmetry into account by means of the access tariffs.
3. Infrastructure competition is the objective. Important fixed costs and ensuing economies of scale mean that infrastructure competition is usually not a realistic alternative in the short term. Service competition is:
  - An alternative if infrastructure competition is highly unlikely to occur;
  - A step in the direction of infrastructure competition.

Service competition requires proper and reasonable access tariffs and conditions. Access tariffs that are too low, certainly if they are not based on known policy objectives, may obstruct infrastructure investments. Thus the level of the access tariffs is crucial.

4. Cave<sup>56</sup> concludes that there are two possible alternatives for stimulating infrastructure competition via the access tariffs:
  - The simplest solution is to apply “..uniformly cost-based access – for example long-run incremental costs of an efficient operator augmented by some modest mark-up. The level of prices must strike a balance between providing adequate incentives for the incumbent to invest and providing interconnection services to entrants at the start of their operation at a price which does not destroy their business model. “
  - A policy that is more difficult to implement involves the application of time-dependent access tariffs, were the mark-up on incremental costs is increased over time. This policy stimulates entrants both during the start-up phase when they have little infrastructure of their own and during a gradual rollout.

The second method is more flexible and offers more possibilities for actually establishing competition by means of start-up scenarios.

5. Looking at regulation in the Netherlands, a mix of these two types is often applied. Although an increasing tariff structure has not been explicitly chosen, some access tariffs have been higher

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<sup>56</sup> Cave et al (2001)

than LRIC plus mark-up<sup>57</sup>. This mix is a result of the different objectives. In the Netherlands, regulation is in part designed to achieve the following: efficient entry<sup>58</sup>; entry stimulation;<sup>59</sup> stimulation of infrastructure investments<sup>60</sup>; indirectly limiting the end-user tariffs<sup>61</sup>; providing the right investment incentive<sup>62</sup>.

Access tariffs are not the only available instruments. There are more instruments, for instance the direct regulation of end-user tariffs. In the future the regulator should make clear choices regarding its objectives and prioritise when necessary. The regulator should also realise that there are several instruments that can be used to reach the chosen objectives.

In its individual decisions, the regulator in the Netherlands has taken the issue of infrastructure and service competition into account. These considerations must, however, be made systematically and consistently<sup>63</sup>.

6. This EPN contains the economic considerations in finding a balance between competition in infrastructure and services, such as:
  - Considering the form of access, is the imposition of obligations desirable? Yes, if the access is one-way. Perhaps, in the case of two-way access and access to bottlenecks.
  - Is it easy to replicate the infrastructure? If so, then no access or access with relatively high tariffs. If not, then easy and inexpensive access.
  - Does the access relate to existing or new infrastructure? If it already exists, then strictly on (forward looking) cost-based access. If it is new, a mark-up as a reward for investment risk.

Following on from this EPN, these economic considerations should be translated into a practical consideration framework that can be applied to individual decisions.

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<sup>57</sup> Infrastructure investments, for example, are stimulated by regulating originating less stringently than terminating.

<sup>58</sup> Because a lump sum or taxation is not possible, the access tariff includes a mark-up for fixed costs in order to ensure that only entrants that are more efficient than the incumbent actually enter the market.

<sup>59</sup> Incumbent and entrants asymmetry approach, for example, by means of correcting the terminating tariff for wholesale-specific costs.

<sup>60</sup> Difference between originating versus terminating.

<sup>61</sup> The end-user tariff regulation was relaxed in July 2002 because easy, less-expensive access would put end-user tariffs under pressure.

<sup>62</sup> See, for example, the policy with respect to local interconnection tariffs.

<sup>63</sup> It must be clear why for example transit does not require regulation because the national network layer is sufficiently competitive, while the incumbent is forced to provide 'national origination'. Or, how local loop unbundling, bitstream access and line sharing are related and what the different investment incentives are.

## 7 How to proceed?

Certain conclusions and regulatory implications can be implemented immediately while others require further elaboration.

### 7.1 Elaboration

Both the investments by entrants in an alternative infrastructure and the investments by the incumbent to maintain and improve the network depend not only on the current access regime but also on the expected access regime. At the moment, OPTA does not have a transparent policy providing clarity with respect to: objectives of the access regime; tariff structure principles; possible tariff development; sunset clauses, etc. The economic policy note indicates that there is room for improvement in this area and can be regarded as a first step.

A consistent framework of criteria to be applied in the case of individual decisions is lacking. The EPN provides a number of specific measures that can be applied, but further development of a unambiguous framework seems advisable.

### 7.2 Immediate implementation

Based on the EPN, a number of criteria can be identified that must be made when considering infrastructure and service competition. These criteria should be further detailed/supplemented. In any event, with future decisions, guidelines, etc., the following must be addressed: objective; instrument; type of access; infrastructure replicability; old versus new infrastructure; start-up scenario; removing obligations; conflict with the past.

1. What is/are the **objective**/objectives of the access measure?
2. Why is an access measure the best **instrument** for achieving this objective?
3. Considering the **type of access**, can the imposition of obligations be unequivocally explained?
4. Substantiate why the infrastructure cannot be (easily) **replicated** and what the consequences are on the tariff structure.
5. Substantiate if the infrastructure in question is **new or old** and what the consequences are on the tariff.
6. Apply a **start-up scenario** to address the asymmetrical position of new entrants.
7. Indicate the conditions/market situation in which the asymmetrical regulation will be **removed**.
8. If the considerations result in **conflicts with the past**, this must be explicitly addressed. The deviations must be logical and explainable on the basis of principles. Principles may not be deviated from without good reason.

These criteria should preferably be referred to with every decision so that decisions can be compared and so that the considerations are made more visible to the outside world.

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## Economic Analysis Team

The **Dutch Independent Post and Telecommunications Authority (OPTA)** regulates the postal and telecommunication markets in The Netherlands. OPTA is an independent executive body that commenced its activities on 1 August 1997. OPTA's mission is to stimulate sustained competition in the telecommunications and post markets. In the event of insufficient choice OPTA protects end-users. OPTA regulates compliance with the legislation and regulations on these markets.

OPTA has committed itself to improving the economic reasoning on which strategic choices are made so that market parties have a clear understanding of what to expect from OPTA now and in the future. In 2003 the OPTA bureau was complemented with the **Economic Analysis Team (EAT)** headed by the Chief Economist. EAT is responsible for developing economic reasoning and stimulating discussion on key issues within the telecommunications and postal markets. To achieve this, EAT produces two kinds of policy notes – short discussion papers. *Economic Policy Notes* focus on economic issues and principles. *Regulatory Policy Notes* focus on strategic economic issues in specific regulatory fields.

With its products and activities the Economic Analysis Team expects to add value to the economic debate in Dutch telecoms and post. For further information visit [www.opta.nl](http://www.opta.nl) from where you can download EAT publications.

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