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Access terms and conditions for ultra-fast broadband optical fibre lines for certain buildings in very high-density areas, notably those with fewer than 12 units

Arcep Recommendation of 14 June 2011

ARCEP Autorité de régulation des communications électroniques et des postes
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Regulatory Authority for Electronic Communications and Postal Affairs
Recommendation

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On the terms and conditions for accessing ultra-fast broadband optical fibre lines for certain buildings in very high-density areas, notably those with fewer than 12 units

Summary

This document sets out the terms and conditions for deploying and sharing fibre to the home (FttH) networks that the Authority recommends for certain buildings in very high-density areas, notably those with fewer than 12 units and business premises. The aim of this Recommendation is to make deployment for these small buildings easier, for which Arcep Decision No. 2009-1106 of 22 December 2009, on the terms and conditions for accessing ultra-fast broadband optical fibre lines in very high-density areas, did not set specific rules.

Because very high-density areas are heterogeneous, a distinction needs to be made for low-density pockets, which are chiefly made up of small buildings and single-family homes. In these pockets, it is preferable to move the concentration point higher up the network to guarantee the reasonable nature of the technical and economic terms governing access, as well as consistent and complete deployments, using a scheme similar to the one chosen for the remainder of the country, outside very high-density areas.

After having defined and characterised the low-density pockets within very high-density areas, this document sets out recommendations on the network deployment and sharing terms and conditions, respectively, for buildings located in these low-density pockets, then for buildings with fewer than 12 units located outside these pockets.

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1. Introduction

France's Law on the Modernisation of the Economy of 4 August 2008 (hereafter "LME") established the core principles governing the deployment of new fibre to the home (FttH) networks by imposing a set of rules on the operators involved in achieving the goals of guaranteeing lasting competition and encouraging investment. Through this Law, the legislator entrusted the Regulatory Authority for Electronic Communications and Postal Affairs (hereafter "the Authority") with the task of stipulating the technical and pricing terms and conditions governing these deployments.

It is within this framework that the Authority adopted an initial Decision[1] on 22 December 2009 whose purpose was to lay out certain terms and conditions for accessing ultra-fast broadband optical fibre electronic communication lines. In addition to general rules that apply nationwide, the Authority set out specific rules that apply only in the "very high-density areas" that it had defined[2]. As a result, 148 municipalities in some twenty metropolitan areas were defined as being "very high-density areas" due in particular to their housing density. The Authority also adopted a second Decision on 14 December 2010 setting the rules that apply nationwide, with the exception of very high-density areas[3]. The aim of this Recommendation is to provide additional details regarding the deployment of ultra-fast broadband optical fibre lines solely in very high-density areas. This document is neither prescriptive nor imperative in nature.

1.a. Recommendation to complete the regulatory framework in very high-density areas

Arcep Decision No. 2009-1106 of 22 December 2009 establishes, in particular, the general principles governing access to ultra-fast broadband optical fibre electronic communications lines installed in buildings in very high-density areas. Regarding the location of the concentration point, Article L. 34-8-3 of French Postal and Electronic Communications Code (hereafter "CPCE") requires access to be provided at a location that enables third-party operators' operative connection, under reasonable economic, technical and accessibility conditions. Moreover, the same article sets out the principle that access will be provided at a location outside private property boundaries, except in cases defined by the Authority. In accordance with the Law, Decision No. 2009-1106 of 22 December 2009 stipulates that, exceptionally, the concentration point "*can be located"* on private property only in the case of buildings constructed in very high-density areas that either have at least 12 units or business premises, or are connected to an accessible public sewage system that can be accessed via a tunnel that is itself "visitable"[4].

The Decision did not, however, set specific rules for buildings with fewer than 12 units or business premises (hereafter "units" or "households" for the sake of clarity). Regarding the technical and operational sharing terms and conditions for these small buildings, Decision of

[1] Decision No. 2009-1106 of 22 December 2009 *specifying, pursuant to Articles L. 34-8 and L. 34-8-3 of the French Postal and Electronic Communications Code, the terms and conditions for accessing ultra-fast broadband optical fibre electronic communications lines, and the instances in which the concentration point can be located on private property*

[2] The list of the 148 municipalities constituting "very high-density areas" can be found in Annex 1 of Decision No. 2009-1106 of 22 December 2009. It was established based on the different criteria listed on p. 16 ff detailing the reasons for the Decision.

[3] Decision No. 2010-1312 of 14 December 2010 *stipulating the terms and conditions for accessing ultra-fast broadband optical fibre electronic communications lines nationwide except in very high-density areas*

[4] By linguistic convention, and in order to make the document easier to read, these exceptions will be identified by the expression "buildings with more than 12 units," and the buildings not concerned by this exception will be identified by the expression "buildings with fewer than 12 units."

22 December 2009 had set forth a wide range of possible technical solutions:

> *"The technical solutions that operators have examined thus far for small buildings in very high-density areas include, for instance, grouping lines from several buildings or single-family dwellings at a concentration point that can be located on the side of the building, in a standalone NAP, in a civil engineering room, in a street cabinet or at the optical splitter. Operators are exploring these different solutions that present their own set of constraints in terms of the necessary permits, infrastructure availability, operational schemes and costs."*

At this stage, however, operators have not yet converged towards common operational solutions to provide access to these small buildings' lines at a concentration point.

In accordance with the Arcep Decision of 22 December 2009, in spring 2010 several operators published offers for accessing ultra-fast broadband optical fibre lines that they had already deployed or planned to deploy in very high-density areas. Under the regulatory framework, these offers were required to give third-party operators the ability to help finance these deployments in exchange, notably, for long-term access rights to the infrastructures. Most of the access offers published by operators in spring 2010, for scheduled deployments in very high-density areas, did not include a detailed definition of the terms and conditions for accessing lines in buildings with fewer than 12 units, and only mention a plan to be determined at a later date. Initial feedback from these small buildings also reveal wildly disparate situations, resulting in local cost differences of up to 1:10, and so creating a threat to the economic viability of deployments for these buildings.

It therefore seems advisable that operators begin immediately to deploy optical fibre networks in all buildings, regardless of size, and in the entirety of the municipalities in question. The last paragraph of CPCE Article L. 34-8-3, introduced by the Law of 17 December 2009 on eradicating the digital divide, specifies that, "*to achieve the objectives set forth in Article L. 32-1, and particularly to ensure consistent deployments and uniform coverage in the service areas, the Authority can specify, in an objective, transparent, non-discriminatory and proportionate manner, the access terms and conditions provided for in the present Article".*

The need for a consistent deployment appears all the more fundamental given the fact that these small buildings account for a large percentage of the households in very high-density areas. Very high-density areas are in fact home to just over 6 million[5] households or business premises, 3.5 million of which are in buildings with more than 12 units (58%) and 2.5 million in buildings with fewer than 12 units (42%). Of these 2.5 million, 750,000 are households located in individual buildings. Very high-density areas are home to 1.2 million buildings, of which 1 million buildings with fewer than 12 units, which means that individual buildings represent 75% of buildings with fewer than 12 units[6].

Through this Recommendation, the Authority aims to facilitate fibre to the home network deployment for small buildings and for residential neighbourhoods in municipalities located in very high-density areas. The goal is to provide all operators with sufficient clarity to enable them to undertake economically viable, uniform and consistent deployments in the entirety of municipalities in very high-density areas.

An initial assessment of the implementation of this Recommendation will be performed,

[5] The figures cited in this paragraph are INSEE figures from 1999. These are the only quantified data available on the number of units in buildings.

at the latest, one year after its adoption to be able, if necessary, to assess the need and opportunity to amend Decision No. 2009-1106 of 22 December 2009.

1.b. A recommendation to stimulate deployment in very high-density areas

As underscored by Decision No. 2009-1106 of 22 December 2009, *"the location of the concentration point (either inside the building, or higher up the network from subscribers, typically on public land) to a large degree determines third-party operators' actual capacity to connect to the infrastructure (i.e. building) operator's network, and so to provide services to its residents"*. It also points out that "*the size of the concentration point and the density of the area in which it is located, determines the economic equation tied to operators' deployment costs in the horizontal portion, on civil engineering infrastructures"*. The degree of sharing and the relevance of the concentration point's location, which determine the deployments' viability, depend essentially on two criteria: first, the number of households connected to it and, second, the density of the area in which it is located.

These two criteria create a distinction between buildings, depending on whether they contain more or fewer than 12 units, but also forces an assessment of the households' location within more or less densely populated geographical areas. This is why an analysis of the relevance of the concentration point's location could be based, within very high-density areas' municipality, on the definition of more or less densely populated geographical "pockets".

The distinction of geographical sub-sets within very high-density areas' municipalities is entirely in keeping with the spirit of Decision No. 2009-1106 of 22 December 2009. Far from perceiving very high-density areas as a homogenous block, this Decision states that if the municipal mesh offers major assets, its heterogeneity must not be overlooked:

"The municipality's geographical mesh is unambiguous and provides stakeholders (operators, local authorities, building managers) with greater clarity. It naturally encompasses potentially disparate geographical realities (shared buildings/single-family dwellings), but private operators' deployments are by and large announced for a municipality as a whole, notably for reasons of critical mass and clarity of operations".

Operators' deployments also align with neighbourhood-based approaches to rollouts that are performed "pocket-by-pocket," but rarely building-by-building. An FttH network deployment is based either on a point-to-point architecture, or a consistent tree structure right up to the optical connection node (OCN). Operators deploy their horizontal networks along streets by scaling them for every building in the street, and not for just a few. As a result, the coexistence of two totally different deployment architectures in the same area, or in the same street, to factor in buildings with more than 12 units, on the one hand, and buildings with fewer than 12 units, on the other, would tend to be both costly and inefficient. For a given pocket, it is therefore advisable to have a consistent architecture, for both buildings with more than 12 units and buildings with fewer than 12 units.

In accordance with the existing regulatory framework, operators planning to install a concentration point on private property – pursuant to the exception provided for by Decision No. 2009-1106 – must ensure that the technical and economic terms of access are indeed reasonable. In some cases, including for buildings with more than 12 units, operators could be required to place the concentration point higher up the network, i.e. outside the private property boundaries.

To avoid overcomplicating the regulatory framework, and ensure that it remain clear and

applicable for all stakeholders (operators and local authorities), it appears necessary not to multiply the types of geographical sub-sets with different deployment architectures.

These observations lead to the conclusion that it would be advisable, first, in very high-density areas, to identify less densely populated pockets with a large number of small buildings. For the sake of clarity, these pockets are referred to as "low-density pockets" (Part 2).

Second, greater clarity is required on applying the provisions set by the regulatory framework, notably with respect to assessing the reasonable nature of the technical and economic conditions governing access, for network deployments in these "low-density pockets" (Part 3).

One final purpose of this document is to clarify the terms and conditions for accessing ultra-fast broadband optical fibre lines for households in small buildings located in very high-density areas but outside "low-density pockets" (Part 4).

The recommendations set forth in this document pertain only to future deployments, and do not call into question vertical or horizontal deployments performed since Decision of 22 December 2009 came into force, notably in low-density pockets.

In any event, in accordance with CPCE Article L. 34-8-3 and Article 2 of Arcep Decision of 22 December 2009, these existing deployments must guarantee access under reasonable technical, economic and accessibility conditions, enabling third-party operators' operative connection.

These recommendations are therefore aimed at buildings for which the optical fibre network installation agreement will be signed beginning one month after this Recommendation is published.

1.c. Recommendation drafting process

Under the aegis of the Authority, as part of a working group on operational aspects and sharing processes, operators conducted trials on and assessments of the different options for implementing network sharing in buildings with fewer than 12 units and business premises. Multilateral meetings have been held every month since summer 2010.

In autumn 2010, drawing on the wealth of insights provided by this work, the Authority's departments sent all of the stakeholders (particularly operators and local authorities) a questionnaire to elicit their feedback on the different possible scenarios for these small buildings. The Authority also consulted all of the players involved in the GRACO (forum for discussion between Arcep, local authorities and operators) working group on ultra-fast broadband access.

Drafted in the first half of 2011, this Recommendation was also subject to a public consultation that ran from 7 April to 4 May 2011.

2. Identifying low-density pockets in very high-density areas

2.a. Choosing a base mesh density to define low-density pockets

Requisite characteristics of the mesh density

The first step is to define the criteria used to identify "low-density pockets" inside very high-density areas. To achieve this, the Authority, in concert with the stakeholders involved in optical fibre rollouts, opted for an easily identifiable infra-municipal mesh density.

Establishing an infra-municipal mesh density creates the ability to guarantee that each low-density pocket is situated entirely within very high-density areas, and thus subject to a single regulatory framework. Under the terms of Decision of 22 December 2009, very high-density areas' boundaries are set according to the borderlines of 148 municipalities.

Second, the choice is consistent with the mesh density that operators employed when launching their calls for co-investment in very high-density areas, as part of their shared network offers published in spring 2010.

Third, an infra-municipal mesh density guarantees a complete and coherent partitioning of the municipality. It is indeed vital that partitioning concern every geographical area (and every household) in the municipality to avoid coverage gaps. A coherent partitioning also avoids any overlaps.

Fourth, the ideal mesh density must be sufficiently fine to accurately delimit low-density pockets, without creating different treatment for overly small pockets, which could result in widely heterogenous deployments and high processing costs for operators, which runs counter to the stated objective.

Fifth, it is important that it be easy for all of the stakeholders involved in these deployments, both operators and local authorities alike, to identify these mesh densities. Which is why it is vital that the choice of partitioning be publicly available.

Lastly, the infra-municipal mesh density must be as consistent as possible with the network deployment rationale. In very high-density areas, however, the vast majority of these deployments are performed on France Télécom (Orange) civil engineering infrastructures, which are structured around splitters and street cabinets. It is therefore important that the portioning be as consistent as possible with the existing civil engineering footprint.

Relevance of using IRIS system units as the base mesh density

All of the expected qualities for determining the most appropriate infra-municipal mesh density led the Authority to opt for IRIS ("*Ilots regroupés pour des indicateurs statistiques* = aggregated units for statistical information[6]"). Given the objective and relatively indisputable housing and business mesh densities defined by France's National Institute of Statistics and Economic Studies (INSEE), it appears that the IRIS mesh density is the most apposite for satisfying all of the criteria listed above. This is a partitioning of the most populated[7] municipalities in the country into "neighbourhoods" with a population of around 2,000. There are around 16,100 IRIS in France. According to the IRIS database published by INSEE on 1 January 2008, there are 4,921 IRIS in France's very high-density areas, each with an average 1,267 households.

The relevance of the IRIS mesh density in terms of information availability, its compatibility with municipalities' borders and the relatively consistent nature of its buildings, must nevertheless also be assessed as a pragmatic approach to network design. In particular, the IRIS system cannot be systematically superimposed on the service areas for France Télécom copper local loop network street cabinets, as it is based on an administrative rather than a topological division of the civil engineering network. To guarantee efficient rollouts, a degree of flexibility

[6] http://www.insee.fr/fr/methodes/default.asp?page=definitions/ilots-regr-pour-inf-stat.htm

[7] Only municipalities with a population of at least 10,000 and most municipalities with a population of 5,000 to 10,000 will be divided into "IRIS" units.

will be required to guarantee the greatest possibly consistency between the IRIS mesh density and the existing civil engineering topology.

In conclusion, it is recommended that the IRIS system be used as the base mesh density to define very high-density areas' "low-density pockets". To ensure as optimal a local division as possible, notably compared to the footprint of deployed civil engineering and the building typology, some small adjustments could be allowed, after having informed the affected stakeholders.

The adjustments that the Authority considers reasonable are listed below, at the end of Section 2.b.

2.b. Choice of criteria that characterise low-density pockets

Choosing the parameters used to characterise low-density pockets

After having defined the base mesh density of low-density pockets, the next step is to define the criteria that make it possible to determine whether an IRIS unit belongs to a "low-density pocket", in very high-density areas' municipalities.

A preliminary analysis suggests that two dimensions can be taken into account:

- "vertical density", i.e. households' distribution based on the size of the buildings;
- "horizontal density", i.e. the territory's housing concentration.

The process of characterising low-density pockets should make it possible to identify, first, the areas with low vertical density – as is the case in chiefly residential neighbourhoods – and, second, the areas with low horizontal density – as is the case in areas where buildings are spaced wide apart, so households are far from one another, which requires longer network access lines to be installed to connect them.

Vertical density could be assessed using the ratio of the number of households in individual buildings to the total number of households in the IRIS. Here, it should be noted that there is a strong correlation between the number of buildings with fewer than 12 units and the number of individual buildings per IRIS unit.

Horizontal density, meanwhile, could be assessed according to the number of households per km² or to a metric measuring the length of the civil engineering. The first solution seems easier to implement, and more closely aligns with employing IRIS units as the base mesh density.

The combination of these two criteria would create the ability to target areas composed chiefly of small buildings, while eliminating areas where the presence of a certain number of large buildings or a tight concentration of buildings results in a large number of households and a high density.

The Authority thus proposes to use a combination of a minimum ratio of households in individual buildings and a maximum ratio of households per km² as the criteria for characterising low-density pockets.

From a practical standpoint, calculating these two ratios could be based on INSEE infra-municipal data from the General Census of 2007. The corresponding database, called "IRIS –

Housing[8] – 2008"[9] is the most recent, providing the required data for each IRIS unit.

Definition of the relevant threshold for characterising low-density pockets

The Authority proposes that the IRIS units accounting for more than 15% of households in individual buildings and fewer than 5,000 households per km^2 be qualified as belonging to low-density pockets. At the conclusion of an impact study and sensitivity analysis, these thresholds emerged as being the most relevant for defining areas that require a greater degree of sharing to guarantee an economic equation that is sufficient for several third-party operators to be connected operatively to the different concentration points.

By grouping same-type IRIS, these thresholds make it possible to form consistent low and high-density pockets, in accordance with the stated objectives. With these thresholds, 23% of households located in all very high-density areas' municipalities would be classified as low-density pockets.

In addition, the Authority stresses that, although the criteria used to characterise low-density pockets do not factor in business premises, residential and business premises located in the same IRIS should be treated in the same manner, grouped together under the name of "households" for the purposes of this Recommendation.

Determining the list of IRIS in low-density pockets

It is important that the definition of the criteria chosen to characterise low-density pockets not result in the creation of a mosaic of small and non-contiguous low-density pockets. Such a configuration would indeed make processing, hence rollout costs, significantly more complex. It would, for instance, be both economically and technically inefficient to qualify an IRIS unit located in the city centre and surrounded by high-density IRIS as a low-density pocket.

Consequently, in cases where the strict application of the criteria leads to manifestly inefficient rollout conditions, from both an economic and technical standpoint for certain IRIS, adjustments could be made on a case-by-case basis.

Examples of such instances might include:

- in a situation where a low-density pocket is made up of a single, isolated IRIS surrounded by high-density IRIS (and vice-versa), the qualification of that IRIS could be re-examined;
- municipalities or metropolitan areas that are composed largely of low-density pockets or, on the contrary, situated almost entirely outside these pockets, could in some cases be treated more efficiently in a uniform fashion;
- for certain unusual IRIS, e.g. that contain a park, the proposed criteria may not reflect the actual building density.

The need for possible flexibility when setting low-density pockets' borders

[8] In INSEE databases, the term "unit" (i.e. household) does not include business premises. This is without prejudice to the equal treatment of residential and business premises located in the same IRIS.

[9] This choice makes it possible to avoid potential future changes to the IRIS's contours, and the possible disappearance of variables in future databases. In future, the Authority could, if necessary, investigate the opportunity of using a new INSEE database as its reference.

By and large, the choice of IRIS mesh density involves maintaining a degree of flexibility in their processing, to ensure more efficient, hence less costly, rollouts.

In particular, it appears that the situation where the border of a low-density pocket, e.g. the border between two different types of IRIS (low and high-density, respectively), is located in the middle of a road or a group of buildings, could result in inefficient deployments. When an operator deploys its network along a street, it typically aims to connect the buildings on both sides of that street. Using a completely different deployment architecture on either side of a street could be expensive and inefficient. Annex 1 of this document provides an illustration of one such situation.

If it appears that, in principle, the IRIS mesh density provides the best partitioning of municipalities, it may nevertheless be advisable in certain instances to adjust these borders slightly, to avoid clearly inefficient rollouts which would undermine the goal of achieving consistent and uniform nationwide coverage, set forth by the legislature. To ensure that these amendments do not call into question the use of the IRIS as the base mesh density, which would result in increased complexity and even a lack of predictability, they should be limited and include (or exclude) buildings located on the other side of the street when that street is the low-density pocket's border.

In addition, it is recommended that an infrastructure operator wanting to make such an adjustment in a low-density pocket's border, inform the affected stakeholders prior to any deployment, i.e. at a minimum:

- the operators on the list provided for by CPCE Article R. 9-2;
- the municipality(ies) in which the IRIS in question are located;
- the local authority or group of local authorities managing a regional digital development blueprint, as defined in Article L. 1425-2 of the Local and Regional Authority Code (hereafter "CGCT") when it exists;
- when applicable, the competent local authority or group of local authorities as defined in CGCT Article L. 1425-1.

It is also recommended that the infrastructure operator send this information to the Authority every three months.

2.c. Creation of a technical advisory committee managed by ARCEP

The need to allow for a degree of flexibility when defining low-density pockets could, in some cases, create a degree of unpredictability and additional significant delays in the iterative cooperation mechanisms between the different stakeholders involved (operators and local authorities).

For the sake of predictability, Arcep will therefore create a Technical advisory committee of operators, local authority representatives and, if needed, qualified experts, to recommend a detailed map of low-density pockets for each of very high-density areas'148 municipalities. The committee will meet on a regular basis, and will gradually examine each municipality based on an initial proposal by Arcep departments, which will be sent to all members at least 10 days prior to each meeting. Once the discussions regarding a given municipality are complete, Arcep will publish the map of that municipality on its website, along with the recommended determination of low-density pockets' borders.

The goal is for the committee to have recommended a precise map of low-density pockets for

every municipality that was the subject of a call for co-investment, and for which deployments are planned in the short term, by the end of 2011.

3. Definition of terms and conditions for accessing lines in very high-density areas' low-density pockets

To guarantee that, in the previously identified low-density pockets, operators are able to access the concentration point under reasonable economic and technical conditions, the Authority hereafter proposes a set of conditions regarding the size of concentration points, requests for dedicated equipment, as well as mechanisms for coordination between the parties. The Authority stresses that these recommendations concern FttH network architecture and the methods used to deploy these networks, but do not call into question the methods used for the calls for co-investment and cost-sharing implemented on a municipality-wide scale in very high-density areas since the start of 2010.

3.a. Size of the concentration point

From a concrete standpoint, the reasonable nature of the economic conditions for connecting to the concentration point depends on the deployment cost per household passed for optical fibre. This cost is broken down into a shared rollout cost on the network downstream from the concentration point, and a connection cost for each operator upstream from the concentration point. It therefore appears that the main parameters to determine the economically reasonable nature are, first, the distance that operators need to cover from their local point of presence (where their backhaul equipment is installed) to connect to the concentration point by deploying their own parallel optical fibre networks and, second, the number of households that are potentially accessible from the concentration point (i.e. its size).

The main disadvantage of a small concentration point are the increase, on the one hand, of fixed installation costs per connectable household and, on the other, of operating costs when the number of concentration points are multiplied. However, a relatively large minimum size, like the one chosen outside of very high-density areas, does not seem reasonable in these low-density pockets, given the greater chances of saturating civil engineering in very high-density areas and the more restrictive conditions surrounding the installation of larger concentration points.

As a result, The Authority concludes that the minimum size of a concentration point of 300 households would be appropriate in most cases. Such a size would not create disproportionate constraints, regardless of the technology (G-PON or point-to-point) that operators want to deploy in low-density pockets.

Moreover, certain other terms and conditions proper to less densely populated areas, such as the existence of a remote connection offer, do not seem necessary in these low-density pockets located in very high-density areas. The prior existence of multiple operator points of presence in the affected municipalities means a smaller increase in the backhaul costs, with the decrease in the size of the concentration point compared to less densely populated areas.

To ensure a deployment tailored to the widely disparate situations encountered in low-density pockets, stakeholders should be given a certain degree of flexibility. In certain exceptional cases, a concentration point smaller than 300 households could be more efficient, while maintaining an economic equation that enables several third-party operators to be operatively

connected. For instance, a copper network street cabinet that has been upgraded to provide faster connections could, under certain conditions, be overhauled at a later date to install an FttH concentration point. In such a case, the infrastructure operator would need to consult with the other stakeholders in advance on the opportunity to locate the concentration point farther down the network, and be able to justify its choice. The consultation mechanism chosen could be part of the one proposed in Section 3.e.

In any event, when the optical fibre network rollout is an overhead deployment, it appears that it would not be technically and/or operationally possible to deploy several cables successively using existing infrastructures, i.e. the overhead structures. It would therefore be preferable, except under special conditions relating, in particular, to the housing and network structures, that the concentration point be located upstream from the overhead deployment's service areas, so that third-party operators be able to connect to it under satisfactory conditions.

Lastly, if at the time of this Recommendation's publication, the infrastructure operator has already deployed an optical fibre network up to a point located downstream from a 300-household concentration point, the Authority invites that operator not to increase its network density through additional rollouts, and install the concentration point as high up the network as possible, without it undermining existing deployments.

3.b. Reasonable nature of a request for a dedicated fibre

Article 5 of Arcep Decision No. 2009-1106 stipulates that the infrastructure operator must grant all reasonable requests from operators to benefit from dedicated fibres for each household. As this request is considered to be reasonable in very high-density areas, when the concentration point is located near to or inside buildings, multi-fibre installations are now becoming the norm.

In light of local building and population density characteristics, the viability of operators performing dense parallel deployments in low-density pockets seems questionable. This analysis led the Authority to propose the solution detailed below, based on increased sharing, with a concentration point higher up the network, covering at least 300 households.

It nevertheless appears that connecting a point-to-point multi-fibre network up to a concentration point for several hundred to several thousand lines would be vulnerable to civil engineering infrastructure saturation issues. The deployment of a multi-fibre network downstream from the concentration point would also have an impact on the concentration point's volume, which thus creates additional constraints on the installation of this equipment locally.

During the public consultation, the vast majority of stakeholders, and notably operators, did therefore not express an interest in obtaining a dedicated fibre in low-density pockets.

As a result, the reasonable nature of a multi-fibre configuration seems hard to establish as a general rule in low-density pockets. It therefore appears that the infrastructure operator will not be able to grand requests for a dedicated fibre as those requests seem, *a priori,* unreasonable in low-density pockets.

3.c. Uniform treatment for buildings with more than 12 units

To guarantee uniform treatment within low-density pockets, it seems preferable that the entire network deployed in these pockets be shared under equivalent conditions, and this regardless of the size of the building in question. Although Decision No. 2009-1106 of 22 December 2009

authorises it as an exception, it seems economically inefficient for the concentration point in buildings with more than 12 units to be located at the foot of the building, whereas other households in the pocket are accessible from a point higher up the network. This type of inconsistent treatment of the area would run the risk of cancelling out any savings in deployment costs created by sharing, and result in sub-optimal occupation of the civil engineering in these pockets.

3.d. Deployment completeness

To help ensure that these deployments are complete and to contain costs, an operator deploying a concentration point in a low-density pocket should anticipate the future connection of every building in the concentration point's service area, when it comes to scaling the concentration point and the network architecture.

In addition, as with deployments outside of very high-density areas, the infrastructure operator could offer to outfit buildings in the concentration point's service area that are not yet equipped with fibre. This offer would cover both connection to the horizontal network and installing vertical equipment on the building's riser. The offer could target third-party operators wanting to steer deployment towards certain specific buildings, or individuals wanting to ensure their building is connected.

These precautions seem useful to avoid having an infrastructure (i.e. building) operator register large service areas for concentration points whereas, in practice, it would confine equipment of the service area to only a selection of buildings, e.g. the most lucrative buildings, or those where the operator has the biggest market share.

As with the obligations set forth in Decision No. 2010-1312 of 14 December 2010 on deployments outside very high-density areas, it is recommended that every operator deploying a concentration point in a low-density pocket anticipate the future connection of every building in that concentration point's service area, so that every building can be connected to its horizontal network supplying the area, and all of the access lines thus be grouped together in same concentration point.

3.e. Deployment consistency

Generally speaking, given the average size of IRIS units, a low-density pocket, which is itself made up of one or several IRIS, should incorporate several concentration points. As a result, as with the obligations set forth in Decision No. 2010-1312 of 14 December 2010, it is recommended that an operator wanting to install a concentration point and deploy its network in part of the pocket, verify that the concentration point's service areas are interconnected, in a way that enables the pocket's incremental, consistent and potentially complete fibre coverage.

It is therefore recommended that the infrastructure operator performing rollouts in a given concentration point's service area ensure that its rollout plan provide for the future coverage of households in the remaining concentration points' service areas. The infrastructure operator will ensure that the proposed divisions satisfy these conditions on a whole number of contiguous IRIS, or at least in the IRIS in question. To this end, as with deployments outside very high-density areas, the operator could consult with the affected third-party operators and local authorities, in other words, at a minimum:

- the operators on the list provided for by CPCE Article R. 9-2;
- the municipality(ies) in which the IRIS in question are located;

- the local authority or group of local authorities managing a regional digital development blueprint, as defined in Article L. 1425-2 of the Local and Regional Authority Code (hereafter "CGCT") when it exists;
- when applicable, the competent local authority or group of local authorities as defined in CGCT Article L. 1425-1
- and Arcep, to keep the Authority apprised.

Stakeholders will be given a sufficient response time, to express their possible disagreement.

It is therefore advisable that the infrastructure operator commit to paying more heed to discussions with the affected parties over these rollout plans, and local authorities in particular. In the case of a disagreement with one of these parties over the chosen engineering arrangements, the infrastructure operator will be required to justify its choice using relevant elements that demonstrate that its plan makes it possible to establish satisfactory competition conditions and uniform coverage of the territory.

4. Deployments outside very high-density areas' low-density pockets

Buildings with fewer than 12 units in very high-density areas located outside low-density pockets do not constitute a perfectly homogeneous category that would make it possible to recommend a single operational arrangement for accessing ultra-fast broadband optical fibre lines. However, the vast majority of stakeholders (operators and local authorities) underscored that, if this Recommendation were to include too many sub-categories to address every housing variable, it would be far too complex to implement.

This Recommendation will therefore confine itself to listing the achievable solutions for determining terms and conditions for these small buildings to access ultra-fast broadband optical fibre lines.

4.a. Location of the concentration point

Pursuant to Decision No. 2009-1106 of 22 December 2009, the concentration point cannot be located within the private property lines of buildings with fewer than 12 units that are not connected to an accessible public sewage network that can be accessed through a tunnel that is itself "visitable". This therefore implies sharing, at a minimum, conveyance to the buildings in question. Several solutions are available for hosting the concentration point, each with its own set of advantages and disadvantages.

The first possible solution is to locate the concentration point for these buildings in the civil engineering room. Here, the Authority offers the reminder that the draft analysis Decision on the market for accessing infrastructures that make up the local loop (Market 4), submitted to the Competition Authority for opinion in January 2011, stipulates that:

> *"[…] when sharing the last mile of optical fibre networks in very high-density areas, it is possible that a set of small residential buildings will have multi-fibre connections from a concentration point located on public land. Under the supposition that this concentration point would not enable optical cross-connect, installing it in a civil engineering room becomes a viable option, as service calls to this concentration point remain a rare occurrence. As a result, France Telecom should allow these multi-fibre concentration points without optical cross-connect to be hosted in its civil engineering rooms".*

The constraints tied to civil engineering rooms do therefore not appear to allow for the

installation of a cross-connect mechanism where service calls would be a regular occurrence. This solution does not appear to be possible with single-fibre installations. With multi-fibre installations, however, this type of concentration point could not be a regular network share point for operators wanting, for instance, to optimise their network occupancy when using PON technology. These operators will therefore need to install a network share point at another location. In addition, maintenance processes for this type of solution still need to be defined. This hosting solution could, however, be used when the installation of urban furniture is prohibited, or is impossible for technical reasons.

The second possible solution is locating the concentration point for these buildings in a street cabinet or a machine room. This solution, which seems the easiest for welding, cross-connect and maintenance operations nevertheless has two drawbacks: the first is the availability of the ducts bringing the building's lines to the cabinet or machine room, which is not necessarily guaranteed. The second concerns the difficulties and costs tied to obtaining permits to install street cabinets or machine rooms in what is generally a heavily occupied urban environment.

The third possible solution is locating the concentration point for these buildings in a standalone network access point. This solution has similar restrictions to the previous one in terms of obtaining permits. Moreover, operators indicated that these NAPs are vulnerable to deterioration and vandalism. Operators also pointed out that these are very expensive solutions, as the per-socket cost of the boxes and connectors remains very high.

The fourth possible solution for these buildings is to locate the concentration point on the side of the building. The accessibility challenges for this solution, particularly those tied to accessing a unit installed high off the ground, nevertheless render service calls difficult. In addition, authorisations may need to be obtained from all of the managers of the buildings whose façade will be used, which will undoubtedly create delays in the deployment process. Lastly, the per-socket cost of this solution remains high, albeit typically lower than the cost of a standalone network access point.

In any event, for the same reasons as in low-density pockets, when an optical fibre network is deployed overhead, it would be preferable – except under special conditions tied to the housing and network structure – that the concentration point be located upstream from the overhead installation's service area, so that third-party operators be able to connect under satisfactory conditions.

4.b. Reasonable nature of a request for a dedicated fibre

First, outside low-density pockets, the reasonable nature of a request for a dedicated fibre could be assessed in relation to the goal of achieving a consistent deployment between buildings with more than 12 units outfitted with multiple fibres, and the remaining buildings.

Moreover, for buildings with fewer than 12 units located outside of low-density pockets, the concentration point will typically be located near to the foot of the buildings. As a result, installing multiple fibres per household in a building would entail limited additional costs. Added to which, these potential additional costs should be assessed in light of future prospects of lower costs thanks to the steady industrialisation of deployments.

As with buildings in these areas with more than 12 units, multi-fibre installations also help reduce the number of service calls any given operator will need to make on other operators' equipment, thereby reducing responsibility issues. This configuration also has the advantage of future-proofing the technologies, leaving open the possibility for each operator to upgrade their

network independently.

This configuration therefore appears advantageous for the competition dynamic and for end users: it gives stakeholders end-to-end independence and avoids having to reintroduce complex installations in each building, as was the case with unbundling, which could require strict regulation. From an end-user standpoint, installing additional dedicated fibres would make it easier to switch operators, without losing service, and to subscribe simultaneously to multiple operators' services, which could help bolster the development of new use cases. For condominiums, residents and businesses, this option should also limit operators' service calls in the long run, particularly at the concentration point located in civil engineering rooms or on the outside of the building.

In conclusion, the Authority believes that the infrastructure operator should grant reasonable requests for a dedicated fibre that are made before the lines are installed which, generally speaking, should result in the use of a multi-fibre solution for the sharing of ultra-fast broadband optical fibre lines in buildings with fewer than 12 units in very high-density areas outside of low-density pockets.

4.c. Size of the concentration point

There is no recommended size for the concentration point, which will vary depending on the different sharing solutions (e.g. available room in civil engineering premises, or accessibility restrictions).