PacketFront®
The Future of Broadband. Today

Open-access networks

Enabling improved service-take-rate

Packetfront Response to the ARCEP RFI

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1 Executive Summary

Le présent document reflète la position que Packetfront, société suédoise spécialiste des réseaux d'accès large bande managés et automatisés, tire de son expérience internationale : pays nordiques, Irlande, Pays-Bas, Emirats Arabes Unis,…). Il s'agit autant de commentaires que de réponses au sens strict.

Toutes les questions ne sont pas du ressort de Packetfront, aussi nous ne traitons pas certaines d'entre elles. Après les réponses aux questions pertinentes, une présentation des réseaux ouverts est donnée, car il s'agit du concept clé des réseaux les plus modernes.

En effet, en France actuellement, l'attention est focalisée sur les aspects techniques de la construction des réseaux. Sans minimiser l'importance de ceux-ci, l'enjeu est bien de fournir des services à des abonnés qui payent pour cela. Or actuellement, les acteurs du domaine comptent beaucoup sur les opérateurs en place, notamment les plus importants d'entre eux, pour cela. En pratique, cela reviendra à terme à recréer des monopoles locaux – au mieux des oligopoles.

La constatation des pays scandinaves est que le critère principal n'est pas la densité d'abonnés, mais le coût de mise en place de la ligne. On dispose aujourd'hui d'outils performants et rapides pour installer les lignes physiques. On peut donc se trouver dans une zone d'habitat dispersé plus rentable qu'un centre ville où le creusement de tranchées pose des problèmes qui se traduisent par des coûts très élevés – en particulier pour déplacer ou sécuriser les autres réseaux. Dans tous les cas, l'infrastructure doit être mutualisée.

L'automatisation poussée de l'activation de nouveaux services et de nouveaux fournisseurs de services est un point clé pour obtenir un niveau de rentabilité satisfaisant – voire la rentabilité tout court. La réduction de coût résultant d'une telle automatisation déplace le churn, qui se situera alors entre services et/ou fournisseurs de service, sans remettre automatiquement en cause le fournisseur du réseau, la flexibilité ainsi apportée par permettant à l'opérateur de servir efficacement ses clients dans tous les cas. Une sorte de « dégroupage » s'effectue au niveau des services, plus du réseau.

Cela repose sur une « séparation » du réseau et des services, permise par l'architecture « réseaux ouverts », synthétiquement décrite aux chapitres 3 à 5 ci-après. Celle-ci ne remet pas en cause les réseaux existants, seules les interfaces de management (et de facturation) doivent être adaptées.

Le résultat d'une telle évolution : l'ARPU augmente car les abonnés disposent d'une offre plus abondante, et trouvent donc plus facilement des services correspondant à leurs souhaits. Partis d'une situation proche de la nôtre il y a quelques années, avec les mêmes tentations de reconstitution – ou de préservation – de monopoles, les pays scandinaves (et d'autres) nous montrent où se situe le véritable futur de l'offre de services. Disposer de réseaux ouverts augmente le nombre de fournisseurs de tels services.

Ce processus est clairement favorable à une concurrence saine, et in fine aux abonnés. Dans ce contexte, l'autorité de régulation peut significativement accélérer celui-ci grâce à une réglementation qui le favorise. Des renseignements plus détaillés sont fournis dans les paragraphes qui suivent (chapitre 2 pour les réponses aux questions du RFI).

2 Specific questions

Q1: do you think it is important to study in depth the way to share copper and coaxial – existing or under deployment – networks? If yes, with which objective and which rules?

When operators move to True BroadBand (Très Haut Débit) THD with a true open model allowing multiple service providers to deliver services over the same fiber ("mutualisation"), the market will increase pressure for services on existing cable infrastructures. This should be studied and possibly regulated although this study is not seen as a priority.

Q2: is the description given in the document (page 5) in accordance with your knowledge in terms of property and of capacity to re-use the existing pipes? Is this situation satisfying for you? Do you think the authorities have to take decisions in this area? Which ones, and with which legal structure?

With some "local/in-side building" cable infrastructures the specific ownership of cables and the right-of-way have proven to be of great importance. In some countries seen to be used as a means of raising obstacles by the traditional telephony operator.

With a deployment of a new fiber infrastructure transporting services from multiple service providers, you will have to distinguish based on the ownership structure of the space (or more precisely: the right of way):

- Privately owned freestanding houses (single family): one fiber (by the property owner's investment) gives access to an increasingly rich marketplace for services, local, national, global. Local banks have been seen to develop standardized loans to finance this model. In some countries this has been subsidized by the public.
- Privately or publicly owned multi-dwelling units with rented apartments: again the property owners should invest. In some instances the legislation has allowed for specific, minor increases in the rental to finance the specific investment.
- Privately owned apartments in multi dwellings: the local joint ownership forum is the collective decision maker. The options could be influenced / incentivated by legislation.

The fiber infrastructure is the infrastructure of the information age – or knowledge-based age – and economy. The infrastructure should be generally deployed as a single infrastructure accessible to many operators. Parallel infrastructures are unheard of and hard to imagine. Therefore incentives and possibly obligation by law might be suitable.

Q3: which evolutions of the existing context related to the access conditions of the operators to the buildings would be efficient and properly dimensioned with the perspective of deploying broadband networks in France?

Fiber is a very high quality infrastructure with a long and promising future (100Mbps, 1.000 Mbps, 10 Gbps and?). Establishing the passive infrastructure is cumbersome and Capex-intensive. Parallel infrastructures by local quasi-monopolies will not offer an economically viable alternative: The infrastructure ***MUST*** be sharable. A huge number of options are suitable for laying fibers: water pipes, sewers, digging tubes, hanging cables in the air. This should be decided by local possibilities and analysis of cost of deployment and cost of maintenance.

It is important not to be seduced by density of potential subscribers, but take into consideration cost of laying fibers: in some rural areas there might be good economical reasons to "fill the digital gap" simply because of the need and the ease of deploying fibers.

Q4: sharing the end part of the fiber networks at the buildings bottom: is that a good mid term option? What are the conditions to ensure the effectiveness of such a sharing? What are the limits of the urban density, of the cost for accessing the civil works, of the cost for accessing the sharing point at the buildings bottom allowing such a sharing in reasonable economic conditions for a CLEC?

As mentioned it is not self evident that urban density is the optimal guide for selecting candidate areas for establishment of fiber networks: cost of deployment per unit (meter) plus cost of access to the access point is by far a better metrics that may be favourable to other areas than urban metropoles. Also socio-economic metrics should be applied to decide weather an area is eligible for fiber access networks.

Q5: what are the conditions for ensuring the effectiveness in the short term of a co-investment agreement between several broadband operators, also compatible with keeping a dynamic competition excluding the oligopoly or tacit combines attitudes in the mid and long term?

In the short term almost all active operators will conceive themselves to be "access operators" – this is a historical heritance. The maturity-process has proven (for instance in Sweden) that operators will develop into producers of services. And in consequence subscribers will move to paying for services proving to be valuable to them rather than paying for a theoretical bandwidth. Competition between operators will then be based on the quality of their service offerings and not on their strengths of negotiating with infrastructure administrators. Open networks will prohibit local, private oligopolies at a services level.

Q6: at the opposite of the analysis presented in the document (p.9), do you think it is possible to propose an offering of unbundling, i.e. of passive renting of a PON local loop, access by access? Does it make sense to impose to install fibers in excess to the operators deploying PON local loops, because of a possible future renting to an operator not having invested in this local loop? In which legal context do you envisage such an obligation?

As mentioned fiber is the infrastructure of the future. Technology of opening (sharing) fiber infrastructures will enable using PON, GPON and GPON and thus raise a strong demand for FTTH with no regards to the selected implementation.

One key aspect to a successful future of an open solution is ***a strong automation in control and provisioning of services and service providers***. A residential fiber network with multiple services by multiple service providers will show churn between services, thus automation is needed to keep OPEX low.

Q7: which new constraints will potentially be created by the transition from copper to fiber for unbundling a P2P local loop in the NRO? The answer can concern in particular the technical way and the costs of internal connections, cable heads, active equipment co-location or remote location, failure detection by testing continuity or echometry,…?

pm

Q8: in which conditions do you think an offering like bitstream is a good sharing solution for the fiber networks? Do the current technologies allow such an offering?

Bitstream will translate into what is generally known as “wholesale IP” in a modern, open, IP-based network. If the bitstream implementation enables differentiating individual services on a QoS-level, we see no hindrances.

Q9: which offering for sharing the end part of their network has to be proposed by each operator to the other operators?

Potential subscribers will be interested in selecting services rather than service providers. Thus an operator should accommodate services from any operator accepting the terms and conditions set for delivering services on the network.

Q10: Do you think it is necessary to have an end part of the network access offering tariff control? Is it preferable to have each player totally free of determining its tariff? If there is a control, which principles do you suggest? Do these principles have to be extended to the co-investment agreements and under which form?

If real open access true broadband networks are implemented, these networks will work as marketplaces for services like in Scandinavia. Competition will regulate prices at that level. Two elements could be subject to regulation:

- pricing for the physical connection to the network should reflect the cost. Weather this should be the actual cost or an average over a group is a matter for discussion,

- the price of delivering a service over the open access network should be regulated as well through a calculation f the real cost of operating the service as compared to other services on the network.

Q11: between which limits do you think the reciprocity clauses have to be accepted for providing broadband accesses?

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Q12: the operators are invited to precise the characteristics of a hosting offering adapted for accessing a fiber local loop in the NRO: in particular type of the hosted equipment, size of the chassis and the racks, capacity and ground surface, size and number of optical heads.

Any proprietor should be able to recover the cost of the physical infrastructure, NRO or street closet.

Q13: what are the minimum characteristics of the connection boxes allowing the sharing at the buildings bottom? The answer can concern boxes size or structure, presence of optical connectors pre-installed on the fibers and related identification.

All components must be manageable and designed directly for the actual physical infrastructure. Also equipment (hardware) should be used in compliance with the physical conditions of the environment.

Q14: is the solution proposed by France Telecom pertinent in your mind? Which other solutions could be efficient and reasonable for the end customer, the co-properties and the operators? Which tariffing system do you propose?

It is beside the scope of this reply to criticize any specific implementation. However a general condition would be that any implementation should be enabling mutualisation at a household-level.

Q15: do you agree with the analysis done p. 15 regarding the type of the prior information to be given to the operators who are interested by the sharing offering? Is an info delay justified?

In a truly open access model (as described) a set of technical requirement could be described: connection to a Point Of Interconnect, description of the services to be delivered, description of specific end-equipment such as set top box.

Q16: do the 5 subjects listed p. 16 have to be standardized? Are there other needs? Do you consider the proposed workgroup led by ARCEP is a relevant suggestion?

Standardization at this level is probably not required. But if a model is adapted according to which a proprietor of a property can implement his own "home"-network both physical connectors and other OSI-network matters should be subject to regulation.

Q17: do you consider the sharing offerings of the players have to be regulated by the public authorities? If yes, which incentive process – statutory or legal – is the most relevant?

Experience from (for instance) the Nordic countries proves that a process of adaptation to the available open access network model will develop service providers. This process can be accelerated by regulatory initiatives.

Q18 (France Telecom) – 19 (Free) – 20 (NeufCegetel): how do you evaluate the offering proposed by (FT – Free – Neuf) in terms of general principles and operations conditions? As it is, do you think this offering is satisfying? In case of, which improvements could be proposed to this offering?

In general it is beside the scope of this document to criticise any specific offering and operation. Coppar-based infrastructures provide complicated operation-conditions for delivering triple play services (or even multiplay). In consequence the available offerings seem to be hard to describe and thus terms and conditions are very complicated (although the offerings to some extend are "best effort"). The terms and conditions are reflecting the inherent characteristics of the infrastructure: fiber will simplify and hugely increase customer satisfaction with the operator and the services delivered.

3 Open-access networks – an introduction

Open access networks are a boost for:

- service development and service-take-rate, efficient sharing of risks and revenues,
- efficient sharing of network resources,
- the possibility for end-users to choose among multiple service providers.

The business case for open-access networks looks promising. Broadband network owners and service providers around the world are discovering the financial benefits and the increased market efficiency associated with establishing open-access networks.

A fundamental distinction from traditional access networks is that in an open-access environment ownership of the actual network infrastructure is separated from the services – services from multiple service providers. This shared approach opens the possibility for and encourages service development – separated from all issues regarding the underlying technical platform, on which the services are delivered. In other words, the network becomes a habitat in which a diverse flora of services can thrive. Such an emphasis on service development is exclusively to the benefit for the continuous development of the broadband access society, and it benefits all parties involved: network owners, service providers, as well as end users.

In order to increase the service-take-rate, attractive and valuable end-user services are important. A challenge for many service providers is to raise each customer's "consumption" of broadband services (in other terms, grow the ARPU). An open-access network is a catalyst to service development, and combined with end users' ease of use, this caters for an increased service-take-rate, and thus improved ARPU.

An open-access network lays the foundation for:

- Service development, which has a positive impact on service-take-rate and thus on ARPU for both network owners and service providers.
- A shared approach to the risks and revenues associated with ownership of network infrastructure, including sharing the revenues from the increased service-take-rate.
- A possibility for end users to choose services from whichever service provider of their choice – anytime.

This document describes the reasons for deploying an open-access network. What are the implications and how does it affect service innovation? It also presents some of the basic technical requirements for the underlying network platform.

4 Why open access?

There are many aspects to consider when discussing an open-access network and an open-access business model. Some aspects are related to business while others are technical. It is important to incorporate business aspects right from the beginning when planning a broadband network that is to be capable of providing open access. Business should determine technology, not the other way around, where the business needs to adapt to limitations in the technical platform. Some of the most commonly highlighted advantages of an open-access network are listed below.

4.1 Sharing the risks and revenues

The investment associated with delivering a specific service to the end users has traditionally resided with the service provider. No-one else is prepared to deploy a broadband network that will be exploited by someone else for service delivery – unless it is an open-access network. The split ownership ensures that investment in the open-access infrastructure is moved from the service provider to the network owner. This is exactly the reason for building an open-access network – the network owner bears the investment for the infrastructure, and charges the service providers for its use. The network owner is analogous to an owner of a highway, and the more service providers that use it, the higher will be the revenue of the network owner.

4.2 Service provider boost

In an open-access environment there will always be room for both established service providers and for newcomers to establish new and enhanced services.

For the network owner it is significant to attract service providers who provide attractive services, since an open-access network without valuable services is not worth anything in the eyes of the end user. Marketing campaigns to attract the most prestigious, high-profile service providers are important in this phase. A cost-efficient network platform for service administration is vital and may be an absolute requirement from a service provider in order to consider the network for their service distribution.

Service providers with a widely recognised brand-name will attract other providers, and the open-access network will become admirably positioned as a “hyped” network, with service providers lining up to join it.

4.3 Service development and service differentiation

In an open-access network where the platform architecture allows control and management on a service level, service development is encouraged, resulting in extended service variation. These new and enhanced services may come from service providers who are already part of the network or by completely new providers.

Service differentiation and service packaging are efficient ways of extending the service offering, which can be used to customize services and address certain end-user groups.

Service development is an important prerequisite for a well-functioning open-access network, as this grows the number of services available for the end users to subscribe to, in other words it is vital to grow the service-take-rate.

4.4 Increased service-take-rate

One of the goals of broadband access players is to increase the amount of services that each end user consumes – known as the "service-take-rate".

Consider an example in which a person spends $60 on broadband services. The ambition is to make this person increase his/her broadband consumption and spend at least $100 on broadband services. How can this be achieved? One method to reach this is by increasing the number of services available for the end user to subscribe to. This can be achieved through service development, service differentiation and/or service packaging, as is mentioned above.

An open-access environment encourages a higher manifold of services, and this stimulates end users to spend more on broadband services. The increased spending on broadband services could come from services that they previously obtained somewhere else, or it could come from broadband services that they did not even consider earlier such as e-learning, e-health, home surveillance, etc. It is the goal of the service provider, and network owners, to displace an end user upwards in the staircase shown in Figure 1.

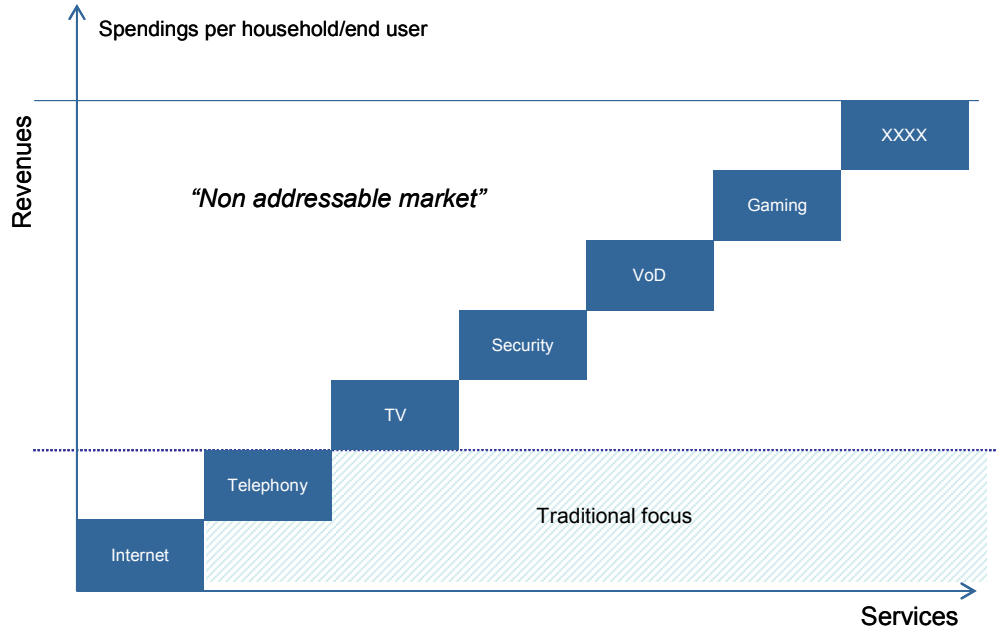

Figure .1 Spending on broadband services per household/end user. The aim is to displace the end user up the staircase, making them increase their spending on services from their broadband connection.

4.5 End-user flexibility

The introduction of end-user flexibility is a commonly highlighted advantage of open-access networks. “Lock-in” is avoided. (“Lock-in” describes the situation in which an end user can subscribe only to services provided by the network operator, who in most cases is the only service provider in the network. This is often the case in traditional access networks.) End users are given the possibility to choose from a variety of services from a multitude of providers, and this opportunity in itself will attract both new services and new service providers.

4.6 Influencing local and regional development

The socio-economic influence of an open-access network should not be under-estimated. In an environment in which third party service providers are given access to a common infrastructure, organisations with local interests might see an opportunity to offer services with specific connection for a community or a region, such as the edited highlights of a local football game. This contrasts with the situation in metropolitan areas, where the large concentration of potential end users will most often attract service providers with a more national or global focus.

The “digital divide” becomes clearly visible in such circumstances, and the open-access network concept may tilt the balance from rural stagnation to rapid local development. Local communication within the boundaries of the open-access network is inexpensive, and local government will thus be able to offer invaluable support to local business by establishing such an open and neutral platform for communication.

5 Key features of an open-access network

The characteristics of an open-access environment are that it must be open to many service providers and it must be neutral in terms of competition. To fulfil these characteristics, requirements are put on the network platform that carries the services. Two of the most important factors are how to achieve sufficiently efficient administration of services throughout the network, and how to allow for efficient routing of traffic.

5.1 Efficient service administration

The first of these factors concerns the administrative system. This system in an open-access network handles the mapping of services to end users. The service mix is highly individual, and the system must be able to reconfigure subscription in a manner that is both secure and efficient. Cost efficiency is one important aspect here. The comprehensive number of configurations involved when end users activate, deactivate and/or change their service subscriptions need to be performed with a high level of automation. A manual handling of the processes involved with configuration would be far too time consuming and thus expensive. The administrative system controls traffic and reports usage to the service providers, who subsequently charge the end-user. Security and other technical features are also important. The system should be able to control all traffic streams through the open-access network and prevent any unauthorised use of services.

It is important that the system can support control at service level, control at access level is not optimal for an open-access network. An administrative system that allows fine-grained control of services in the network will make it much easier to manage service differentiation and packaging, as this requires manageability per service, e.g. change of bandwidth for one service should not affect the available bandwidth for another of the services the end user subscribes to. If control can be supported only at access level, this may result in changed service parameters for one service when the service configuration profile for another service offered over the same access line has been adjusted.

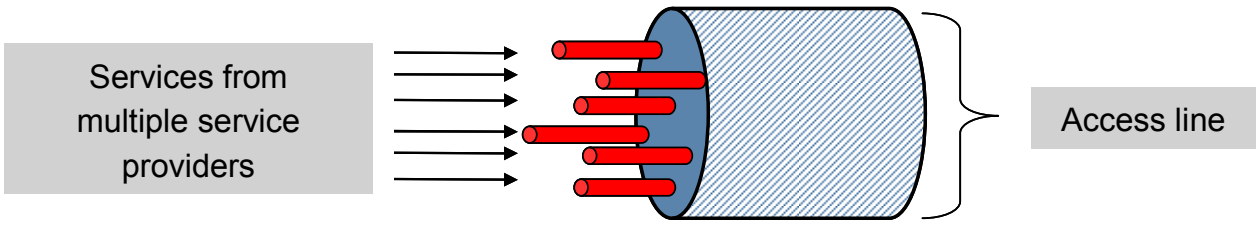

Figure 2. The ability to control each individual service from each service provider – instead of the whole access line – is important for the possibility to develop and differentiate the services.

The system also needs to keep an eye on aggregated traffic as well as individual bandwidth allocation and usage, it must report any deviations and raise an alarm at the network control centre when this is needed.

Few, if any, products and system tools in the networking industry have been designed with these specific requirements in mind. It is therefore vital to evaluate whether a technology really has the potential to satisfy these expectations, and it is vital to study any implementations that are available, before deciding which vendor to choose.

The telecommunications system can be looked upon as a large number of interconnected networks, as can the Internet. An open-access network can be regarded as one of these, an independent network connected to several other networks. The most significant difference between an open-access network and a traditional access network is that the open-access network is designed to act as a transit area for traffic from many service providers, traffic directed at individual end users.

An open-access network merely acts as an extension for other services, and it should therefore be as transparent as possible. Furthermore, it should be possible to handle a very large number of reconfigurations in the open-access network, since each end user in the network will have the opportunity to create relationships with several different service providers. This rapidly becomes a very demanding task. Conventional tools for network management and traffic shaping have been designed for traditional public networks or enterprise use, and are usually not well-adapted for the demands of open-access networks. Public network tools may contain advanced billing features, but are usually customized to fit the internal structure of one large operator network. Enterprise tools may have advanced features for traffic shaping and ensuring the quality-of-service (QoS), but these tools seldom have billing functions.

The appearance of open-access networks has given birth to a new type of administration tool, developed especially to offer easy set-up and mass-scale configuration of many services from different sources, while being at the same time able to handle real-time billing based on several different metrics. These tools have been customized to fit the role played by a network owner responsible for the day-to-day operations and maintenance of the network.

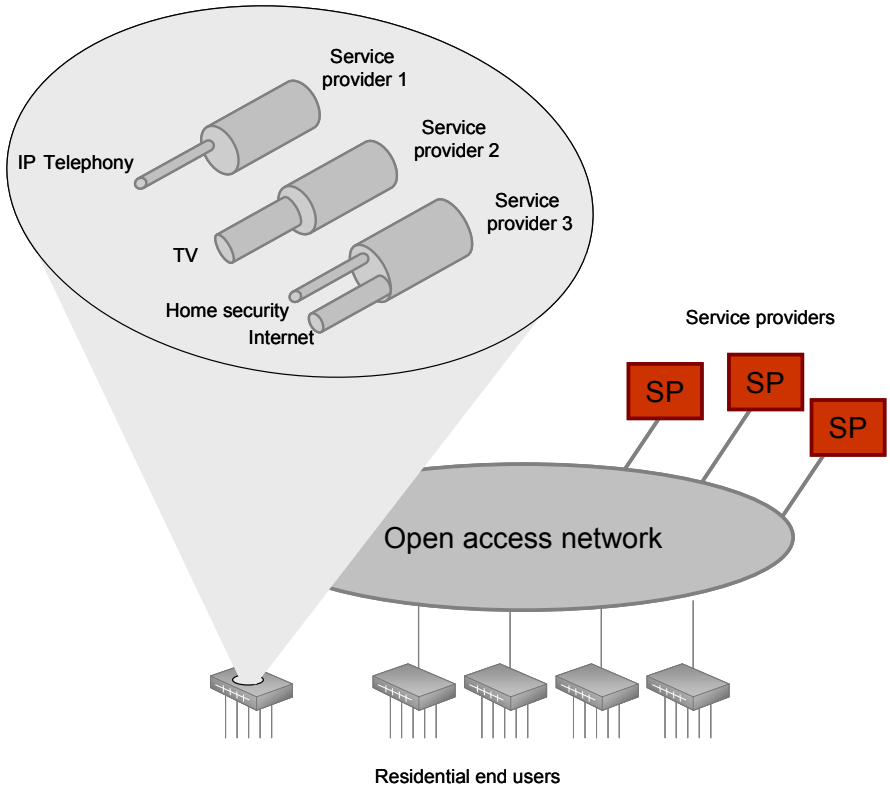

Figure 3. Administration of an open-access network is a highly demanding task. The administrative system in an open-access network must be able to handle a very large number of end users and for everyone of them it must configure an individual mix of services from different service providers. This must be done in a highly secure and efficient way, while at the same time keeping control of technical parameters, such as the available bandwidth.

5.2 Local routing

The second important factor in an open-access network concerns routing, and its optimization. Local traffic in the network should normally be routed locally in order to achieve the highest possible efficiency. This contrasts sharply with most routing currently performed at the operator level, which is based on the idea of independent operator networks interconnected with others via centralized peering or presence at certain Internet exchange points.

This will not be an issue for two end users in the open-access network communicating with each other who are customers of the same service provider. Problems may arise, however, when they are customers of different service providers. The traffic in this case will normally be handled as transit traffic, which is "up-linked" via a gateway to the sender's service provider network. An exchange between the providers will take place "somewhere else", and the traffic will then be sent back into the open-access network and to the receiving end user via the other provider.

6 IP in an open-access network

Internet technology and the Internet protocol play a key role in nearly all modern network infrastructures. Open-access networks are no exception. The beauty of IP is that it separates underlying network infrastructure from higher level services – and creates an unequalled level of flexibility for the network owner. This means that we can in practice attach any physical cable or radio interface to the network that uses signalling that follows the rules of IP. The same applies for IP services, which will run on any network based on an infrastructure that uses IP.

This flexibility is critical for open-access networks, and the use of IP technology creates an enormous advantage for such networks. The advent of IP telephony and advanced methods for IP streaming of video content has made it possible to use IP as a general technology for distributing triple-play services (Internet, telephony and TV).

6.1 The importance of local routing

The possibility to perform local routing between end users, independent of their Internet service provider, is an important part of the open-access network concept. Routing local traffic along the shortest path, which may cross traditional administrative boundaries, is evidently more efficient than the procedure in which each service provider routes all traffic into its own backbone network, for exchange with other providers at some central peering point.

In the extreme case, end users who are physically close neighbours in the open-access network may send bandwidth-hungry video streams between each other only to find that their traffic has been sent to a remote, regional (or even national) peering point, and then back again. This introduces a delay, it may exceed bandwidth limitations for the end-users, and it is not an efficient use of network resources.

There are several technical solutions for local routing between end users in an open-access network. The important point to make here is that local routing is possible, even mandatory, for local traffic even if the traffic passes between different service providers. This feature will stimulate local use of the network, and it will in the long run optimize traffic load across both the open-access network and the service-provider networks.

7 Summary

An open-access infrastructure provides a networking environment in which service development, service differentiation, and service packaging are encouraged. These opportunities will become reality provided that a network platform designed with this in mind is available, and – even better – the services will be delivered in a cost-efficient manner.

The larger variety of broadband services offered will stimulate end users to consume more services, thus improving the service-take-rate, and the ARPU. The simplicity with which end users can activate services will further stimulate their broadband service consumption.

All services, independently of the service provider that offers them, are delivered over a shared infrastructure, owned and operated by an independent network owner. The shared risk/revenue approach allows a separation of the network infrastructure from the services, which is a prerequisite for the open-access business model.

The most critical question is, without doubt, administration. No open-access network will function properly without the support of a well-designed control and administrative system. This must be designed for the purpose. It must be able to handle a large number of services from several service providers, address them individually to a mass population of end users, and it must operate in a reliable and secure manner. It must be capable of handling usage statistics on an individual, per-service scale, in order to deliver correct basic data for billing. Few, if any, general management platforms are currently capable of this, which paves the way for another type of platform designed with this in mind.