

**Alcatel-Lucent's response to the  
European Regulators' Group  
Public consultation on  
"Next Generation Access"**

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11 June 07

**Summary of Main Messages:**

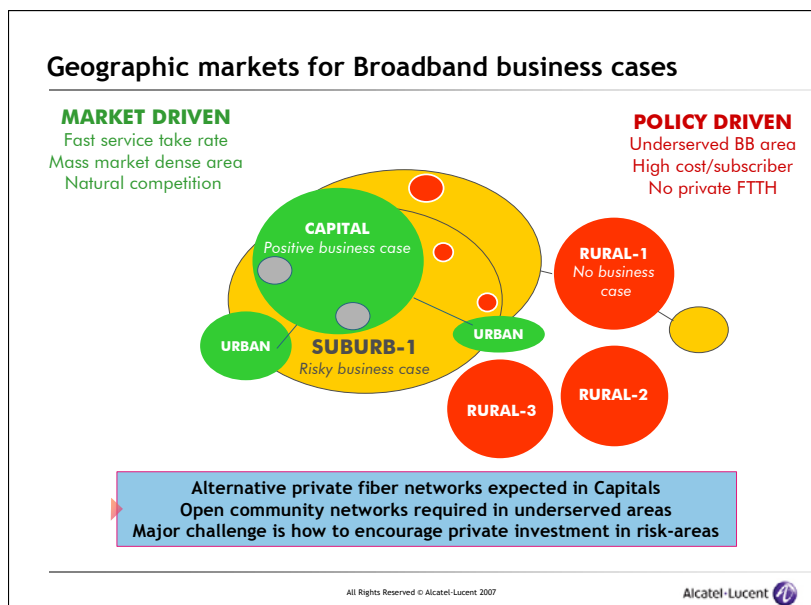
- The best place to ensure competition in NGA is at duct level.
- Only passive infrastructure is not replicable - multiple access networks in the same access area are feasible if the main barriers (civil works and indoor cabling) are resolved.
- As a first priority, indoor fiber cabling, especially for multi-dwelling units, should be made available on a fair and non-discriminatory basis to access providers. Vertical cable unbundling needs to be regulated.
- Contrasting competitive conditions in different geographic markets require different approaches to policy and regulation. Ducts and poles should be sharable in all markets.
- Fiber access topologies differ from copper and call for a new approach to sharing passive infrastructure. In particular, economically viable deployments require that Fiber Flexibility Points are made available within the fiber plant; such multi-carrier points of connectivity should also materialise the points of fibre unbundling over drop cables.
- NGA regulation must remain technology neutral - access and service providers will make use, progressively, of all types of architecture. These include FTTN, PON and Point-to-point FTTH.
- Wholesaling competition will change considerably in NGA environments where facility-based players will increasingly need to face service-based players for access to content and service differentiation.
- Regulated wholesale should be limited to bit-stream, while sharing premium features should be left to commercial negotiation.
- The unprecedented levels of investment needed to renovate passive infrastructure will require government support, and non-telecom players who will invest and create new forms of competition at infrastructure level.

## 1. Importance of Next Generation Access

- 1.1. A continued investment in new access technologies is essential for the future success of the EU as a whole. Today, Europe faces an urgent need to reshape its economy and society to meet the challenges of the 21st Century. It must improve competitiveness and productivity, whilst ensuring a sustainable future. Europe needs to adjust to the changing economic reality and has to modernise public services and tackle emerging challenges in areas such as mobility, health, aging, inclusion and teleworking. Ample and cheap bandwidth to all will be crucial to attain these targets. Currently Europe is lagging in this race, more particularly when compared to North America and some parts of Asia (Japan, Korea).
- 1.2. Given the size and importance of the challenge, NGA will require unprecedented dialog, cooperation and consensus between all stakeholders. To reach mass market, NGA has to rely on pro-active public policy, balanced access regulation and financial, as well as technical confidence from the private sector's investment community.
- 1.3. The migration to NGA is only partially a regulatory question in the sense that it also represents a basic political dilemma and a major challenge for government and policy makers. National economic priorities, linked to the performance expected of a new infrastructure, are clearly opposed to the time to market for NGA services that could be provided by the competitive market alone, where:
  - There is no reason for the private sector to invest beyond high ARPU areas with rapid, foreseeable return on investment, whereas,
  - Local communities cannot wait for "natural" market migration to NGA to protect or develop the territorial attractiveness needed for anchoring business.
- 1.4. To ensure this unprecedented upfront investment, the barriers to mass FTTX deployments must be lowered. This can be achieved by sharing part of the investment among all stakeholders and by having the most cost efficient approach to renovating passive infrastructure.
- 1.5. Early or strong intervention from regulators might discourage or limit investment in the NGA infrastructure by those who should see this as a means to create new business models or to replace aging business with new opportunities. Market-driven initiatives that are emerging should be encouraged.

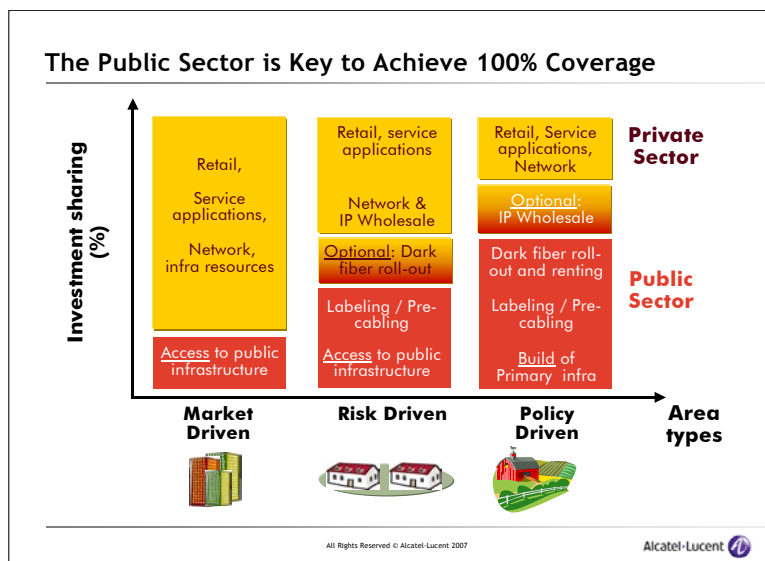
## 2. Investment Profile and Government Support

- 2.1. NGA networks necessitate bringing fiber closer to the end user. It is acknowledged that the civil works represent the bulk of the investment needed, as well as the main bottleneck for replicability. Having fair access to this passive infrastructure should therefore be the main objective of any regulation. Only the passive infrastructure of an NGA is not replicable. Multiple active networks, even with different technologies - enhancing the fairness of competition - can cost-efficiently share the same passive infrastructure.
- 2.2. Many policy makers, regulators and industrial investors concur that the levels of investment required to deploy new access lines is a permanent entry barrier for new entrants, i.e. a “natural bottleneck”. However, a number of community projects, notably the City of Paris, are today demonstrating the contrary - i.e. if the cost of passive infrastructure is lowered to the right threshold - the private sector, even the smaller new entrants, will invest in NGA, including the passive infrastructure part. Moreover, there is reason to believe that in both market and risk-driven areas, with sufficient ARPU potential (e.g. SME parks) to secure return on investment, several competing fiber-based networks are sustainable in the same access area, provided that civil works are facilitated, shared and/or co-funded.
- 2.3. Access conditions to such passive infrastructure should be based on clear geographical market criteria - distinguishing **market-driven** dense urban areas, from **risk-driven** suburban, secondary city, small town or semi rural areas and from **policy-driven** isolated, under-served areas. Such an approach takes into account both political objectives to develop GDP based on next generation ICT, as well as regulatory objectives to defend both end-consumers and competitive markets, while encouraging innovation and investment.



## SUMMARY OF POLICY AND REGULATION FOR DIFFERENT GEOGRAPHIC MARKETS

- For areas where there are already two operators addressing end-users with separate access infrastructure (Cable+ILEC), there is not a high need for specific policy or regulation. Public investment is marginally required.
- In the other cases, the most important aspect is the possibility for any operator to access ducts and poles in the access loop, as well as dark fiber in buildings (where it will be difficult to deploy multiple fiber overlays). Public financing should be restricted to enable the national availability of such infrastructure (where private sector investment will be insufficient)
- Sharing dark fiber in the access loop becomes an option, in order to maximize investment opportunities, in some low-density areas. It is proven now (in particular by the studies for sharing fiber in French buildings), that technology-agnostic mechanisms can be implemented to share dark fiber. Sharing dark fiber should be done after mediation with various network operators and retribution of the over-investment/infrastructure provisioning taken by the sharing body.
- Sharing based on IP wholesale can be considered for low-density non-competitive areas, where one or no operators' plans to deploy in the coming years. Public authorities could in this case invest in the full operating network (e.g. through a public-private partnership).



2.4. A mass market NGA across Europe by tomorrow - i.e. in policy driven and potentially risk driven areas - requires government investment, coordination and active support today. The private sector cannot finance the full deployment cost of NGA alone; the EU public sector (government, regional and local communities) should assume a lead role in setting favourable conditions in order to facilitate mass migration to fiber connectivity within timeframes compatible with other, competing world regions (Northeast Asia, North America). This could be reflected concretely by updating the “Universal Service” Directive into a “Universal Access” Directive, enshrining a new role for public funding in underserved areas.

2.5. Policy needs to find ways to enable and encourage government to assume a new “facilitator” approach in stimulating private sector investment in

new content, applications and very high-speed broadband networks. In “risky business case” areas, in particular, local communities and NGA operators will look for a balanced trade-off between policy coverage objectives and infrastructure facilitation.

- 2.6. As a priority, initial focus should be on lowering the cost of the passive infrastructure (civil works/trenches/ducts) by using public policy to ensure development of open access duct and dark fiber rollout and sharing rules - because:
  - Passive infrastructure goes well beyond telecom sector scope and regulation (largely involving utilities, municipalities, public works companies, PPP consortiums);
  - Scalable cost reduction/optimisation requires nationwide consultation / planning / coordination and pan-industry synergies;
  - Rights of way can be considerably simplified, harmonised and reviewed to the aim of lowering the overall cost of investment in NGA.
  - Local communities should ensure infrastructure inventories to report on all water, sewer, gas, electricity ducts and poles available for fibre deployments in their respective geographic areas.
- 2.7. The most inductive infrastructure policy to ensure competitive NGA markets is by facilitating “duct (and pole) sharing”. If required, the open provision of passive infrastructure should be defined as a separate wholesale access market spanning all aspects of infrastructure development: coordinated civil works, planning, installation and maintenance of manholes, shelters, street cabinets, and ducts/poles. Such open provision should also encompass utility and municipality resources.
- 2.8. Once passive infrastructure facilitation is ensured, a first major factor of cost reduction is achieved, and the main barrier for new entrants is considerably diminished. If sufficient passive infrastructure is made available, at the right time, at the right place and at reasonable cost, then “replicability” of fiber access networks becomes feasible, and “any efficient access operator” can and will invest in optical active equipment and in their own fiber in cases where no dark fiber is available.
- 2.9. Open access to passive infrastructure in the public domain should be completed by fair, non-discriminatory, transparent drop and indoor cabling rules over the private domain (e.g. multi-dwelling unit cabling and sharing). Benchmarking and acknowledging best practice for connecting end-user premises should become a highly visible EC mechanism used to encourage NGA migration in Europe. Alcatel-Lucent supports the creation of an EC/EU “broadband@fiber connectivity” label to promote and certify end-to-end connectivity for very high-speed end-users.
- 2.10. As noted, a key aspect of Access policy and regulation is to ensure the possibility for any operator to access ducts, trenches, dark-fiber deployed in the private domain (indoor cabling, residential and business parks), and where it is difficult to implement several overlay fiber cables. Private real estate, landlords and other housing or business park owners and investors need incentives to open access to standardized fiber deployments.

### 3. Technology and Topologies

3.1. In most cases, all FTTX technologies will be needed to achieve nationwide coverage of very high-speed access. Moreover, migration to NGA is by definition a long-term process leaving time for important access technology upgrades. The expansion of FTTH/FTTB coverage will largely depend on infrastructure facilitation, whereas fiber-to-the-cabinet solutions will also evolve over time to a Fiber-to-the-user solution, typically by replacing the active cabinets with passive fiber flexibility points or by replacing the copper DSL equipment in the cabinets with fiber termination equipment.

3.2. Technical and economic limitations dictate new deployment architectures for Fiber that will not map one-to-one onto the legacy copper infrastructure.

- Fiber cable requires more careful handling than copper and more room for patching and cross connecting. A complete one-to-one mapping of a classical copper plant to a fiber plant is therefore not economically viable or technically justified. In most cases, it would lead to unrealistic large optical distribution frames (ODF) if collocated with the legacy copper MDF.
- Economically viable scenarios for NGA therefore require that dedicated per-user lines are restricted in length, not only for copper (Fiber-to-the-cabinet restricts the per-user copper loop to about 1km max.), but also for fiber.
- Although point-to-point fiber loops up to 60km are feasible as stand-alone, transforming a complete area with such a radius to fiber would lead to unrealistic fiber cable handling situations at the central point of connection.
- Placing the ODF at the MDF, as suggested in the ERG Consultation document (i.e. where the DSLAM is located), is only economically efficient and physically viable for small Central Offices with short copper loop lengths. In most cases, however, the number of households per MDF, especially in dense areas, is too high to allow for effective management of the fiber. In addition, it is likely that existing ducts in certain areas will not provide sufficient space to accommodate so much fiber.

3.3. Economic, realistic point-to-point fiber deployment scenarios restrict the dedicated per user part of the fiber loop to about 3km. This fiber handling problem can be solved in three distinct ways:

- Putting active fiber terminating equipment in the field (fiber-to-the-cabinet/FTTC with point-to-point fiber from the cabinet). This can be combined with FTTC (i.e. Copper from the cabinet to the homes).

- Deploying optical splitters in the field (PON technology). This requires installing Fiber Flexibility Points (FFP's) with splitters in the field. These could be located at the street cabinets. In dense urban areas with predominance of MDU's, these FFP's can also be located at the basement of buildings.
- Moving the fiber terminating equipment closer to the end-user (pt-t-pt), by having a denser network of sites to deploy fiber-terminating equipment. In situations where small Central Offices with short copper loops are in place, these can be reused. In other cases, new locations closer to the end user must be found.

3.4. From the above, it follows that the question of physical unbundling is not fully transposable from a copper to a fiber passive infrastructure and that a new approach for access regulation is needed.

#### 4. Regulatory aspects - Infrastructure sharing

4.1. Although Alcatel-Lucent recommends caution with regulating the NGA, it is clear that there is a role for the regulator to safeguard open access to public infrastructure and to stimulate competition in NGA. This has to be achieved for all deployment scenarios.

4.2. A well-balanced regulatory framework for NGA can provide considerable security for financial risk and encourage private sector investment, contributing to NRA objectives for encouraging new end-user services, innovation and competition. The primary purpose of such a framework should be to complete and accompany, from the competitive market perspective, EC and Member State initiatives to encourage migration to NGA.

4.3. The focus of regulation should be on passive rather than on active infrastructure. All ducts and poles should be sharable, whereas vertical cabling in buildings or across residential/business private domains should be accessible at the most appropriate point of drop line concentration (generally determined by density).

4.4. If infrastructure (ducts) is readily made available (80% of cost in rural/50% in urban) - any operator can climb the investment ladder.

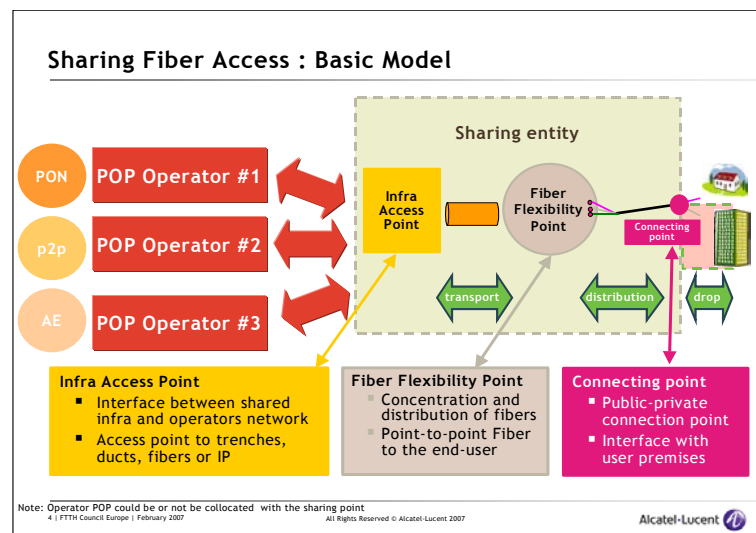
4.5. Regulation for sharing dark fiber between operators can be considered in order to maximise investment in lower density, non-competitive areas. Technology agnostic mechanisms are feasible and applicable for operators investing in point-to-point access as well as in point-to-multipoint (PON), or any combination of the two. Sharing of dark fiber should be established after mediation with the various investors involved and some form of financial compensation for the over-investment introduced by this.

4.6. To ensure multi-operator capabilities, NGA introduces two new critical network design & optimisation points in the outside plant, i.e. shared



“infrastructure access points” and “fiber flexibility/management points”:

- The **Fiber Flexibility Point** (also known as the “fiber management point”) - is where fiber line concentration can be determined and optimised depending on end-user density, field characteristics, and competitive market status. This FFP is needed in any access architecture, be it point-to-point or point-to-multipoint, since it is not economically feasible to deploy individual fibers to all households end-to-end, and some form of concentration is needed. The FFP can take the form of a Fiber Patch Panel, where drop fibers are connected to per-provider feeder fibers or cables. In the case of PON, the FFP will contain per-provider passive splitters. In the case of point-to-point, it will be used for patching.
- The **passive Infrastructure Access Point** - is where different access providers can connect to a shared outside plant.



4.7. The “replicability” of active elements over new NGA networks can and should be enabled wherever possible, in particular in market and risk-driven areas, in order to:

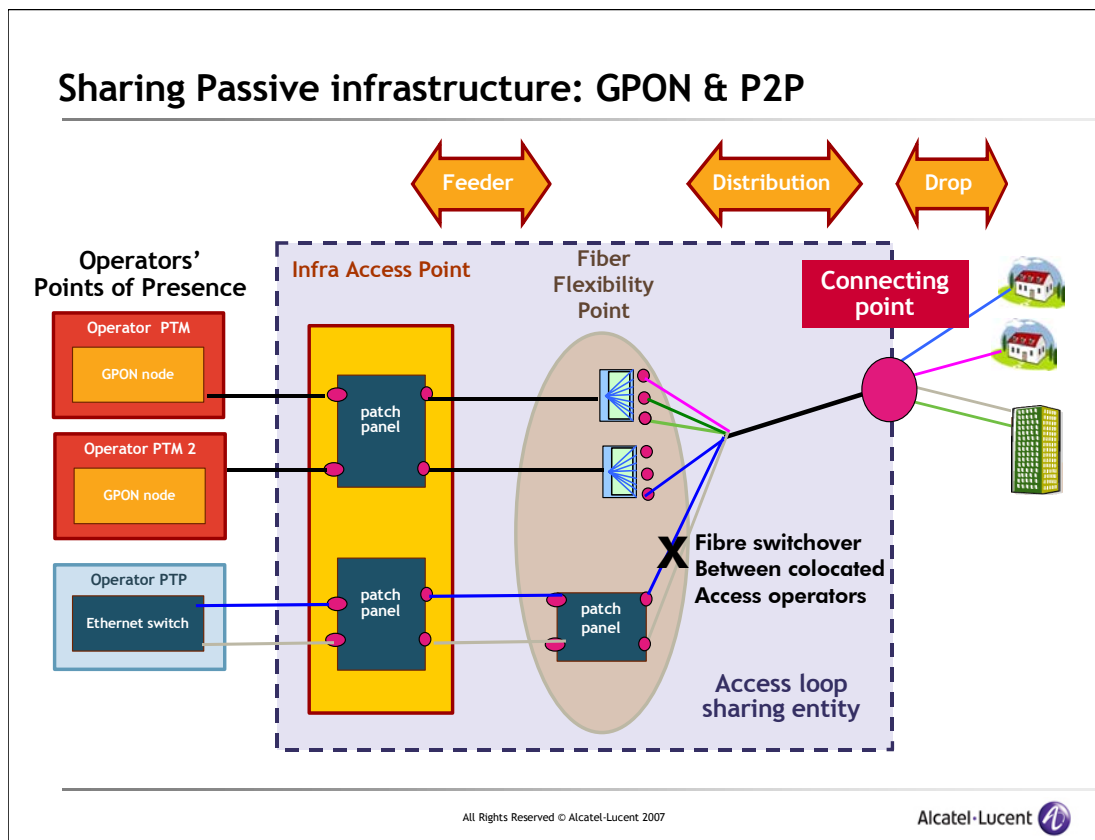
- Meet the need for economies of scale and scope, in both edge and access, which can only be achieved provided that upfront costs for non active network elements are largely co-financed;
- Accommodate the fundamental change in the focal point of competition (and consequently of investment), which becomes the “media and content” bundle that can be offered by network providers, service and application providers alike. The major new potential bottleneck for NGA competition will be access to content. These new inroads should be the means by which the considerable investment in NGA investment can be regained.
- Take into account normal engineering practice, i.e. over-provisioning of ducts and dark fiber, which, enhanced by sharing rules for multi



operator access to passive infrastructure, will remove any leveraging of market power e.g. from access networks to other markets (cf. as an example, infrastructure sharing practice in the mobile access domain).

4.8. It is the passive infrastructure part of the NGA that cannot be “replicated” – this would neither be desirable for the sake of the public interest nor financially feasible on any mass-market scale. Volume-wise, a major market for NGA investment and return can be expected to develop in the sector of public works/civil engineering, and clear competition rules will be needed to avoid conflict between policy objectives, commercial broadband priorities and infrastructure renovation in its own right (which will increasingly include stakeholders and business models foreign to telecom sector regulation).

4.9. The following figure illustrates the possible equipment of infrastructure shared between three access operators located at different sites, using different architectures (PTM, P2P), and the possible switchover of an end-user connection at a shared fiber flexibility point. It should be noted that the IAP can be located at the FFP or even closer, at the connecting point (e.g. at the basement of an MDU) in very dense areas.



4.10. The policy maker should ensure that ducts between Infrastructure Access Points and Fibre Flexibility Points have enough capacity for competing operators to deploy new cable, taking into account the economic aspects discussed above.

4.11. As a conclusion on passive infrastructure sharing regulation, Alcatel-Lucent believes that legacy unbundling rules (market 11) should remain limited to the existing copper loop for the following reasons:

- It is too early in market development to impose remedies on market players that still lack visibility (there is no significant number of end-user fiber lines deployed) and ex ante unbundling obligations might hinder or prevent, rather than encourage, the mass-market investments expected from the private sector;
- The topology of fiber access networks can differ considerably compared to legacy PSTN access networks, in particular the ODF might not be best located at the same locations as legacy copper MDFs, but preferably at fiber flexibility points located much closer to end-users.

## 5. Regulatory Aspects - Wholesaling

5.1. The infrastructure-sharing framework suggested above should ensure the necessary levels of competition, where different players will compete on the capabilities of their access networks and service bundles. The need to be able to distinguish commercial offers at these levels (bandwidth capabilities, service bundles, service quality and differentiation) is primordial for the success of NGA.

5.2. Imposing wholesale requirements on these new networks must be done with the greatest care, as it could enable unfair competition, in the way that non-asset based competitors could compete on an equal basis with those who have invested in their own network.

5.3. Imposing wholesale on an equal basis between service providers in the NGA could lead to new access monopolies, as there is no motivation for new players to build their own access infrastructure and one access network can serve all needs. This is already witnessed in some city nets, where the city assigns a single access operator, blocking new players from investing. Wholesaling, alone, is therefore not sufficient to rectify situations where the access infrastructure has been funded by public money.

5.4. In case regulators impose a strict separation between access network providers and service providers, the only means for access providers to compete will be based on offering the lowest price, leading to a negative investment spiral and a “commodity” type of business, with little or no incentive for innovation.

5.5. Imposing some form of wholesale can be appropriate where the NGA transformation by the SMP leaves the competitive copper provider with some stranded investment. This wholesaling should however be restricted to rebuilding the lost capabilities and not extending it to the full capabilities of the NGA.

5.6. In any case, NGA wholesale offers should not prevent any access network operator to invest in specific premium features in his network nodes that

enable him to differentiate his service offering when compared to competitors using his network. Such premium features would only be made available to wholesale customers on a negotiated basis

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