

Regulating Duct Access for NGA in Europe: Lessons from the U.S. Regulatory Framework

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Aside from Portugal, which has regulated access to the incumbent's ducts since 2004, most European countries are only now examining duct access as a potential new SMP remedy to help regulate next generation access (NGA) networks¹. Is duct access a "silver bullet" in terms of regulating NGA? Certainly not. Duct access represents the next-to-highest² step on the NGA ladder of investment (ERG, 2007, p. 50), and will not be an economically viable entry strategy for competitors in most situations. The remedy will prove useful in new residential FTTH roll-outs in urban areas, as shown by an ARCEP-commissioned simulation covering the city of Clermont Ferrand. ARCEP's data show that regulated duct access would permit a new entrant to deploy FTTH covering 79% of households *versus* 13% of households in a situation without regulated duct access (ARCEP, 2007, p. 21). The French competitive operator Free is currently seeking duct access as a part of its FTTH roll-out strategy (SCHAEFFER, 2007) suggesting that there is a need for this remedy at least in some Member States. Business-focused operators will continue to rely on regulated wholesale capacity services (bitstream or wholesale leased lines)

¹ In France duct access has been available *de facto* outside the SMP framework via requests by local authorities to share infrastructure. This access is in principle cost oriented (art. L45-1, CPCE).

² The highest step is digging.

to connect most customer sites to their networks, duct access being necessary to connect "on-net" customer sites. Residential-focused operators will also continue to rely on bitstream access to compete with the incumbent and build a customer base before moving up the ladder of investment toward fiber infrastructure build-out. While not a silver bullet, duct access helps solve a problem in an NGA environment, which is the difficulty of "unbundling" a fiber access line. Unbundling fiber is challenging from both an operational standpoint (how to unbundle PON?) and an economic standpoint (how to price fiber unbundling so as to encourage investment?). Duct access is less controversial. The remedy is feasible operationally: no one doubts that third party access to ducts is possible, the operational difficulties are linked to knowing where ducts are located and which ones (if any) are available for third party use. The remedy is straightforward economically: as a legacy infrastructure built during the monopoly era, ducts - like the copper local loop - justify cost-based access prices. (The pricing for new ducts is more complicated as we will see below.)

In the United States, competitive telecom operators have had regulated access to ducts since 1996. Cable operators have had access even longer. Importantly, no one today in the U.S. questions the utility of the duct-access rules. This article will describe the U.S. rules on access to ducts, conduits, poles and rights of way, putting those regulations in context with other regulatory measures in the U.S., particularly with regard to fiber. Europeans often cite the U.S. as an example of a regulatory framework with no mandated access for fiber. This is over-simplified. While it is true that the FCC has eliminated most unbundling rules in connection with FTTx networks, the U.S. framework is more complex than what Europeans may read in the headlines. Importantly, access to ducts in the U.S. at cost-oriented tariffs represents the underlying assumption upon which much of the FCC's pro-investment and facilities-based competition policy is based. After reviewing the U.S. framework, we will examine key issues that European regulators will face when introducing duct access.

Summary of U.S. regulations

In the U.S., different regulatory frameworks apply to (i) access to poles, ducts, conduits and rights of way, and (ii) access to network transmission and switching facilities and services on a wholesale basis. We discuss each of these frameworks in turn.

Access to poles, ducts, conduits and rights of way: Incumbent local exchange carriers (ILECs) and privately-owned electric utilities are required to make nondiscriminatory access to poles, ducts, conduits, and rights of way available to competitive telecommunications carriers, including fiber overbuilders, cable operators, wireless carriers and others (collectively referred to as CLECs). The rates for such access are tightly regulated under cost-based formulae administered by the FCC and individual state public utility commissions. This right of access removes a potential barrier to entry for CLECs that seek to construct their own facilities. ILECs' and electric companies' poles, ducts, and conduits are subject to unique pricing formulae that assign to CLECs specified, limited percentages of the net book costs of the asset, based on presumptions regarding the number of entities that could share the use of the poles and conduits/ducts, and the number and size of poles and conduits that incumbents own.

Rates vary significantly from place to place within the U.S. These formulae generally yield annual rental rates that are well below the Total Element Long Run Incremental Cost (TELRIC) based prices that apply to unbundled network elements: broadly speaking, somewhere in the range of 7.00€ to 15.00€ per year per pole and 0.70€ to 2.30€ per year per meter of ducts in underground conduits. There are no geographic limitations on the availability of such facilities at regulated rates. ILECs and electric utilities must provide information regarding their poles and ducts, and must grant access to requesting CLECs within 45 days of receiving a request, unless they can show that access is inappropriate due to lack of capacity, safety concerns, or other generally applicable engineering standards. ILECs and electric utilities are subject to strict nondiscrimination requirements: while they may reserve duct or pole space for their own future needs, they may do so only for their core utility services and not for their future provision of competitive telecommunications or video service. CLECs have recourse to enforcement procedures before the FCC and state public utility commissions in disputes over denials of access, the rates that duct or pole owners may charge, and the reasonableness of other terms and conditions. In the case of the FCC these proceedings often take 12 to 18 months to resolve.

Access by competitors to ILECs' network facilities: The FCC has liberalized or eliminated regulation for many categories of ILEC network facilities and wholesale services to which CLECs seek access. This deregulation is particularly pronounced in the area of next generation network facilities. Table 1 below summarizes the FCC's complex variety of access and pricing regimes for different types of network facilities and services available to competing operators.

First, the FCC imposes no regulation on the ILECs' wholesale broadband Internet access services, deeming them "information services" that are outside the purview of telecommunications regulation. The FCC also has removed the ILECs' obligation to offer other operators access to the underlying transmission facilities that they use to provide broadband Internet services – e.g., FTTH, FTTB, and FTTCab facilities used to serve mass market consumers. The ILECs can withhold access to these services altogether, or may sell them at prices that are not constrained by any regulatory provisions. (One significant exception is that when ILECs replace legacy copper loop facilities with fiber, they must continue to offer CLECs the equivalent of a single voice grade circuit over that fiber at TELRIC rates.)

Second, in response to a petition for forbearance filed by AT&T, the FCC recently decided to eliminate economic regulation of the ILEC's high speed data transmission services purchased primarily by large enterprise business customers – i.e., Ethernet, optical networking, Frame Relay and ATM. The FCC has indicated that it intends to grant similar relief to other ILECs. In theory, these services must still be made available on a wholesale basis to other operators at just, reasonable, and nondiscriminatory rates and terms, but in practice the FCC eliminated the regulatory mechanisms that CLECs could invoke to enforce these obligations, such as the filing of public tariffs listing the terms and conditions of the services. (Note, however, that for a 3-year period, AT&T remains subject to certain regulatory conditions imposed in the context of its 2006 merger with BellSouth. Verizon is subject to somewhat broader forbearance provisions, but the FCC has signaled an intent to harmonize the rules for AT&T, Verizon, and other ILECs.)

Third, ILECs remain obligated to offer "special access" services – including most high-capacity (DS1 and DS3) fiber loops and backhaul facilities in time division multiplex (TDM) format – under nondiscriminatory public tariffs to competing operators, as well as to enterprise end users. However, the ILECs have considerable flexibility as to the pricing of these services. There is no cost-based pricing requirement for ILECs' special access services. In general, a system of price caps applies: the weighted average price for a basket of services must be no greater than the price during a previous year, with adjustments for inflation and productivity. But in metropolitan areas where facilities-based competition is present or beginning to develop – determined, under the FCC's rules, by the number of CLECs that have established fiber collocations in ILEC central offices – the ILECs qualify for additional pricing flexibility. In these areas, ILECs are permitted to offer special access services at volume and term discounts, and under individually negotiated "contract tariffs." In areas deemed the most

competitive, ILECs can remove certain special access services from price caps altogether.

The FCC's stringent TELRIC pricing standard based on forward looking economic cost now applies only to low-capacity facilities (voice grade copper loops) used to provide legacy voice services, and to wholesale DS1 and DS3 circuits in geographic areas where not much competitive entry has occurred or is likely to develop in the future. By law, ILEC facilities are considered unbundled network elements (UNEs) subject to TELRIC pricing only where CLECs would be "impaired" without access to such facilities. The FCC has found no "impairment" for DS1 and DS3 transmission facilities in ILEC wire centers where a certain number of CLECs have established fiber collocations – *i.e.*, where actual competition exists – and/or where line densities meet specified thresholds such that a "reasonably efficient" CLEC is presumed to be capable of deploying its own facilities – a proxy for potential competition. In these wire centers, the ILECs must offer DS1 and DS3 transmission as special access as described above, but not at TELRIC rates. Further, in a few cases the FCC has granted ILECs' petitions for forbearance from even these limited TELRIC requirements in wire centers where facilities-based competitors have garnered a significant market share.

CLECs are permitted to purchase any ILEC retail services at a wholesale percentage discount off retail rates. However, many CLECs contend that this type of offering – a discounted retail service rather than a form of facilities access – does not afford a practical basis for effective competition because it forces CLEC offerings to replicate those of the ILECs, effectively preventing CLECs from offering differentiated services, products or bundles. The FCC effectively has rejected the concept of "bitstream access" – a regulated wholesale product combining high-speed access links with data backhaul services to enable CLECs to provide high speed services over ILECs' broadband networks. As discussed above, the FCC has largely eliminated ILECs obligations to provide competitors access to most high speed loop and backhaul network facilities at regulated rates. Indeed, even in the context of legacy voice networks, the FCC eliminated ILECs' obligation to offer TELRIC-based access to a virtual combination of all the elements in the ILEC network, including loops, switching and backhaul (the "UNE-Platform"). The FCC held that such access at TELRIC rates would be anticompetitive because it would deter CLECs from constructing their own network facilities. The FCC also repealed a requirement that ILECs offer "line sharing" – *i.e.*, access to the high frequency portion of the copper loop, so CLECs can provide DSL services to customers who continue purchasing voice service from the ILEC.

Table 1 - Regulatory framework for wholesale access to ILEC network facilities

<i>ILEC Network Facilities and Services</i>	<i>Regulatory Framework</i>	<i>Geographic Market Analysis for Deregulation</i>
Broadband Internet access and associated loop transmission (e.g., fiber loops used to serve mass market users) Dark fiber	No common carrier regulation; subject to generic antitrust and competition law.	Deregulated nationwide.
High speed data transmission services used to serve enterprise customers, including Ethernet, Frame Relay, ATM, and Optical networking (OC-n)	"Non-Dominant" – ILECs must provide access at "just and reasonable" and nondiscriminatory rates, but no tariffs or other regulatory mechanisms are in place to enforce these requirements.	Deregulation throughout AT&T's service area in response to AT&T petition; similar deregulation likely for other ILECs in the near future.
DS1 and DS3 fiber loops and backhaul in TDM format, in most markets	"Special Access" – ILECs must provide access under published tariffs. Regulated rates are subject to price caps (not cost-based). In markets where specified collocation thresholds are met, ILECs can obtain varying degrees of broader pricing flexibility (e.g., volume and term discounts, contract tariffs, elimination of price caps).	By metropolitan area – different degrees of pricing flexibility are granted depending on the number of CLEC fiber collocations with ILECs and extent to which CLECs use backhaul from providers other than the ILEC. (Note: Regulatory framework is under active review and may change in the near future.)
Voice-grade copper loops in most markets DS1 and DS3 fiber loops and backhaul – only in certain wire centers with relatively low line density and few CLECs collocated in central offices	"Unbundled Network Elements" – ILECs must provide access at low, forward-looking Total Element Long Run Incremental Costs (TELRIC) closely overseen by regulators.	By wire center – depends on extent to which CLECs are "impaired" without access to such facilities. FCC found no impairment (<i>i.e.</i> , special access pricing instead of TELRIC) in wire centers where competition has developed (usually measured based on fiber collocations), and/or wire centers with sufficient line density that a "reasonably efficient" CLEC should be able to deploy facilities.
Poles, ducts, conduits and rights of way	A detailed cost-based pricing formula applies.	Not deregulated anywhere.

Least
regulationMost
regulation

The only narrow form of bitstream access in place – the requirement that ILECs offer CLECs a voice grade channel when they replace preexisting copper loop plant with fiber – is expressly limited to access to voice services, and is unavailable for high speed offerings. The FCC has justified

its deregulatory approach on the basis of the facilities-based network deployment and competition that has already developed, as well as the potential for additional facilities deployment and retail competition that could emerge in the near future. Cable operators, wireless carriers, and other CLECs have constructed last-mile network facilities that support competitive retail services in many parts of the country. Until recently, cable operators had a larger share of retail high speed Internet services than ILECs, and ILECs are steadily losing market share for voice services to wireless carriers and other CLECs. The FCC also believes that relieving the ILECs of obligations to share their network facilities with competing carriers will increase the ILECs' incentives to build next generation broadband networks. In addition, the FCC's deregulatory approach is premised upon creating economic incentives for CLECs to construct their own networks rather than relying on those of ILECs. In essence, the FCC has taken the view that CLECs can and should ascend the "ladder of investment" without using too many "rungs" that depend on the use of ILEC facilities. Under this theory, it is thought that CLECs, as well as ILECs, will more rapidly deploy next generation facilities by taking a "leap" on their own rather than climbing gradually up a "ladder."

Key issues in Europe

As noted in the introduction, duct access is not a regulatory "silver bullet" for NGA in Europe. It is one remedy among many others. Duct access represents the next-to-highest step in the ladder of investment (ERG, 2007, p. 50), and will be of little use if effective wholesale remedies at lower levels of the ladder do not permit operators to enter the market and consolidate their customer base as they make plans to build out fiber. The long-standing existence and non-controversial nature of the duct-access remedy in the U.S. suggests that the remedy is feasible, although the application of the remedy in Europe will not be problem-free.

I *nclude electric utility infrastructure?* A threshold question is whether to include in an access regime non-telecom utilities, such as electric utilities. The U.S. regime from the outset included electric utilities within its scope, because in the 1970s the key issue was for cable companies to get access to poles, and poles are generally controlled either by the electric utility, by the incumbent telephone company, or by both. The Canadian regime permits access to ducts and poles of telecommunications carriers only, a limitation that was recently identified as a serious drawback of the Canadian

law (TPRP, 2006). The Portuguese law requires access to ducts and poles of the "concessionaire of the telecommunications public service" as well as to those of other "entities under the tutelage, supervision or superintendence of bodies of the State, Autonomous Regions or local authorities". Access to the former must be granted at cost-oriented prices, whereas access to the latter need only be granted under non-discriminatory terms.

The Portuguese approach is attractive, but could be difficult to implement in countries that have separate regulatory authorities for energy and electronic communications. If access to ducts is based on traditional market analysis and SMP methodology, non-telecom entities may indirectly be included in the scope of the analysis because they may offer substitutes to the ducts controlled by the incumbent telecom operator. A market analysis might conclude that the incumbent operator does not hold SMP because ducts are available from an electric utility. In a market where the incumbent telecom operator does not have any legacy ducts at all (because it buried cables directly in the ground, for example), market analysis could find not only that the incumbent telecom operator does not hold SMP in the market for ducts, but that an electric utility holds SMP in the market for ducts. This could lead to the unsatisfactory result of the NRA finding SMP on the market yet not having the authority to impose remedies, because the entity identified as holding SMP does not fall within the NRA's jurisdiction. A more practical approach to market analysis may be to include ducts in a broader market for telecom access infrastructure, which would include not only metallic loops or fiber, but also ducts. This is the approach proposed recently by ARCEP (ARCEP, 2007, p. 26). The decision of whether or not to include non-telecom entities within the scope of the regulation might be left to the choice of national governments. In some countries, such as those with a unified regulator responsible for all networks, it might be feasible to include electric utilities within the scope of the obligation, whereas in other countries the solution might not be feasible.

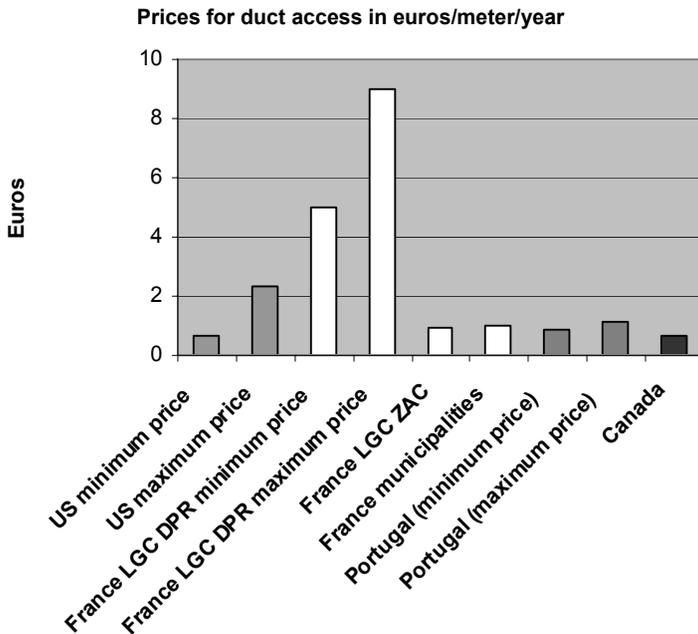
Non-discrimination: The U.S., Australia and Portugal have detailed non-discrimination rules to ensure that the incumbent operator treats third party operators no worse than it treats itself in connection with duct access. In the U.S., an ILEC or utility typically must make available maps of existing ducts, and conduct site surveys to determine the availability of ducts to respond to a particular request, all within strict deadlines. Importantly, an ILEC or electric utility may not reserve ducts for itself unless the operator or utility has a precise and documented build-out plan for that particular route. Portugal has rules limiting PT Comunicações's (PTC's) ability to reserve space for itself, including a rule requiring PTC to leave at least 20% of the

internal area of each conduit available for use of other operators (ANACOM, 2004). The Australian Competition and Consumer Commission has developed a detailed code to help operators deal with access requests in a non-discriminatory manner (ACCC, 1999).

In the context of NGA roll-out, ensuring non-discriminatory access to ducts may be the most challenging job for European NRAs. Duct access is a new remedy in many European countries, and as with any new remedy it may take several years for the incumbent to translate the principle of non-discrimination into effective operational procedures. It took time to develop such procedures for LLU, and there is no reason to think that duct access will be different. The incumbent will naturally consider information about the location and availability of existing ducts as strategic in light of the incumbent's own NGA roll-out plans. The incumbent may also be concerned about confidentiality vis à vis other operators already using the ducts. Problems like this have been overcome in the context of collocation and LLU. As noted by OFCOM, there will be practical difficulties for the incumbent in locating contiguous ducts in good condition (OFCOM, 2007, p. 53), but the U.S. example suggests that these difficulties can be overcome. Perhaps the trickiest question for regulators will be to determine under what conditions the incumbent can reserve excess duct capacity for its own future NGA roll-out needs. The incumbent will be under pressure internally to preempt existing duct capacity, even in situations where there is not yet a documented build-out plan for that geographic area. Here, too, the operating procedures put into place in the U.S. may serve as an example. To ensure effective non-discrimination in dealing with duct access, European regulators may find that some form of functional separation is needed, or at a minimum operating procedures that simulate functional separation by ensuring that both competitive operators and the incumbent have access to the same information at roughly the same time. In some countries, operating procedures for provisioning LLU come close to achieving effective non-discrimination. If duct access can be included in the existing LLU procedures, it may be possible to avoid more intrusive functional separation measures, although functional separation should always be available as a fall-back remedy.

Dispute resolution: As with any access dispute, disputes regarding access to ducts should be submitted to fast and effective dispute resolution before the NRA. FCC decisions in pole and duct access disputes have helped operators develop detailed operating procedures to deal with access requests on a non-discriminatory basis.

Pricing: Because they are part of the incumbent's legacy network infrastructure, existing ducts should be made available to third parties at cost-oriented prices. Cost-orientation is already included in the Portuguese law, and in the recent BNetzA decision on backhaul duct access in Germany. In the U.S., the pricing formula for duct access is also cost-based, yielding a result in many cases below TELRIC prices. A more difficult question arises in connection with the pricing for new ducts built by the incumbent in connection with network upgrades. Here pricing rules must take into account the need to encourage efficient infrastructure investment and the need to assure a proper reward for risk-taking. Pricing rules for new ducts should encourage the incumbent to build more ducts than are needed for its own business, and also encourage competitors to co-invest at the building stage (and therefore share the risk) instead of waiting for the ducts to be built by the incumbent and then requesting access.



The pricing for access to new ducts may also depend on whether the new ducts rely on existing rights of way of the incumbent, or consist of a completely new development. The pricing for the former might be lower than for the latter. For completely greenfield investments, a form of symmetric regulation at non-excessive and non-discriminatory prices may be appropriate. The role of municipalities will also affect pricing of new duct

investments. Variations in the price for ducts may also result from differences in geography and local property values. In the U.S., prices may vary from 0.69€ to 2.31€ per meter per year. In Canada, a single rate applies of 0.65€ per meter per year. In Portugal, the rate depends on the thickness of the cable, but for a cable occupying 9 cm², the rate would be 1.14€ in Porto and Lisbon, and 0.89€ per meter per year elsewhere. In France, where currently no SMP regulation exists, the rate varies from 1€ per meter per year (rate offered by municipalities and by France Télécom where it has not paid for the construction), to between 5€ and 9€ per meter per year (rate offered by France Télécom in other cases).

Conclusion

Based on the U.S. experience, cost-oriented access to ducts, conduits and poles appears to be a feasible remedy to facilitate NGA build-out in areas where good quality ducts are available. When implementing the remedy in Europe, ensuring non-discrimination will be the biggest challenge for regulators given the natural tendency for the incumbent to reserve available duct capacity for themselves. Functional separation may be necessary if non-discrimination cannot be achieved through other less intrusive means. The pricing for access to legacy ducts should be cost-oriented, whereas the pricing for access to newly-built ducts might be higher to encourage investment. Because duct access is the next-to-highest step on the ladder of investment, other wholesale remedies (eg. bitstream access, wholesale leased lines, dark fiber in some cases) are necessary in Europe to permit competitors to climb the ladder of investment, and to permit operators focused on the business market to have cost-effective access to off-net customer sites. The U.S. has eased price regulation on many fiber-based wholesale inputs, particularly in geographic areas where competition is present, removing in effect many of the intermediary rungs in the ladder of investment. Cost-based access to ducts remains immune, however, to this deregulatory trend.

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47 United States Code (USC) § 224.

47 United States Code of Federal Regulations (CFR) § 1.1409(e): Formulae to determine reasonable rates for cable operator and telecommunications provider use of ILEC and other utility poles and conduits.