

## The Viability of Policy Separation of Liberalized Value-Added Services From Monopoly Infrastructure

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### 1. INTRODUCTION

The problem of policy separation of a liberalized upper layer of value-added services from a monopolistic infrastructure layer rests on political definitions of increasingly blurry boundaries. Liberalized VANs suppliers clearly benefit markets and the TOs with whom they compete. Infrastructure monopolies are more problematic, as they are clearly not sustainable in many network segments. To get effective and viable separation, one of two courses must be chosen. One is to reaffirm the infrastructure monopoly, divorced from the business of competing in VANs markets, to act as a unified bit carrier. This is unlikely to work. Technology advances such as ATM, INs, and desktop switching may help. Another choice is to rethink and strengthen interconnection policies, moving them in the direction of cooperative, rather than competitive efforts. This may, in the end, be too technologically complex. In either case, the incentives inherent in the system, and the information asymmetry between TO and market entrant must be addressed.

The rise of new regulatory bodies and new technologies have led to a significant rethinking of definitions of public and private networks, of added-value and infrastructure in the context of European telecommunications.

New and established players alike recognize that distinctions between public and private networks are arbitrary. All networks are "private": they are by definition closed systems. There cannot be an uncompleted link in an operating network. The "public" simply refers to the level of access granted to or ownership of such a network.<sup>1</sup>

As for infrastructure, the common transportation analogy should be abandoned: it is quaint to think of data files as trucks and voice traffic as (more numerous) cars, traveling through circles (switches), but almost anything can be a road for the right sort of vehicle. Roads are technologically far simpler (though perhaps as labor intensive); a much more limited range of environments can function as telecommunications networks. Road traffic does not imply a natural role for a systems integrator, a support for monopoly infrastructure provision.

The definition of infrastructure is central to the question of separation. If it consists only of physical network components: transmission conduit, switches and customer premises equipment, then the "value-added" layer begins with the addition of software to carry and switch traffic. This view implies that POTS, or simply switching should be thought of as adding value. (Value is added everywhere along the supply chain). Resellers of leased lines (such as the hundreds of "carriers" in the US) add value by dividing them among multiple

users.<sup>2</sup> The service is the same--bandwidth between points--but value has been increased, measured by the excess revenues above the cost of facilities rental. Taking this minimalist approach makes things clearer but does not help. Viewing POTS as a value-added service is largely an anomaly of regulatory battles waged between IBM and AT&T in the 1970s and ongoing in the EC today. While the slippery slope argument (that it is impossible to functionally divide the switching of voice services from that of data service, and hence both represent value-added to the communications process) has meant the reality in a nation such as the UK is often *a shared, arguably instinctive understanding, of the boundary between basic voice services and value-added services*. That liberalized upper layer boundary is often set (with numerous exceptions) beyond basic voice services.<sup>3</sup> *This is where politics and confusion set in. Are we talking about a technical definition: point of software control; a regulatory definition: point of control over services; or a business definition: what level of control will users pay for?*

## 2. AGREEING ON LIBERALIZED VANs

A clear need for new products to replace telephone service as the main engine of growth provides incentives to encourage innovation to monopoly infrastructure and VANs providers, to invite competition (admittedly tightly managed, and at the margins) into the market. Some feel that "Technology has bred more ideas than the market can absorb...nowadays the industry could meet almost any presently conceivable need with technology already on the market or in the lab."<sup>4</sup> VANs suppliers play a critical role in conceptualizing these needed new products.

- VANs suppliers often target niche markets which TOs overlook. In contrast, TOs and their suppliers excel largely at conceiving and implementing technologies which improve price/performance of existing core products.<sup>5</sup> For example, they are driving customized corporate networking solutions.
- VANs suppliers stimulate demand for network services in the developing world near saturation. (And as the French have argued in promotion of the Minitel, a macroeconomic level competitive VANs supply provides entrepreneurial stimulus to economy.)
- So long as the infrastructure monopoly holds firm the scope of VANs competition can be limited by the cost of bandwidth or interconnection. And even if the market moves from monopoly to oligopoly, carriers have common incentives sell installed bandwidth at premium rates.

The arguments need not be taken to a greater level of detail to make a strong case for a liberalization. This case may be lost on TOs, who are more defensive about the associated costs. The TO mindset views customer specific networks as an imposition on the neat ideal of maximum economies of scale, via uniform generic service offerings. TOs fear competition in their core products at lower unit cost, which require special attention and disrupt their operations-intensive organizations.<sup>6</sup>

### 3. QUESTIONS OF SUSTAINABILITY

While the VANs market is far from perfectly competitive for the reasons mentioned in the preceding paragraph, there is substantial entry by rival suppliers. A monopoly over VANs is not sustainable, implying by extension, that fragmentation of an infrastructure monopoly cannot be prevented, even in the most rigidly controlled environments.<sup>7</sup> The benefits of simultaneous experiments with many approaches (for example, private networking) which follow a more rigorous cost-justification basis should not divert attention from the historical reasons for infrastructure monopolies: cost, complexity, and public service.

Networks support as a set of services, of highly differentiated commodities, not a single service or market. Network markets benefit from the presence of competitive VANs suppliers, (a relatively recent and limited phenomenon) as well as efforts of TOs.<sup>8</sup> In this broad spectrum, the TOs are the only ones with a (near-complete) picture of the costs and issues of all the disparate network submarkets.<sup>9</sup> The driving force behind models of network fragmentation, network tipping, or segmentation, is that the median network service cannot accommodate all users. But this view of centrifugalism, of traffic specialization, of the movement of networks away from a core service or center, focuses primarily on the specialization of providers, not the concurrent specialization of infrastructure monopolists. Users are returning to public network-based solutions as competition among VPN suppliers and bandwidth-on-demand promises reduce networking costs. (especially as the highly variable cost of a key component, leased lines falls). Hence, the *flexibility* of public systems (all too often absent from theories of network evolution) provides a clear path out of the specialization-generalization conundrum. Not all monopoly carriers are sluggish bureaucrats.<sup>10</sup> There is a countervailing trend of specialization *within* the public network, as CPE functionality migrates to the PSTN.

The liberalized upper layer is where the greatest profit margins and business development incentives are. Accordingly, the EC is backing off cost-based or cost-oriented tariffs as a hard and fast rule. Ramsey (value of service) pricing is needed to fund development of new applications for services like ISDN and to stave off competitors. Network economics are becoming three dimensional: tariffs are calculated in distance, time and also in bit rate--*new parameters of choice are emerging at the upper layers, which touch the infrastructure as well.* A world of pure bit carriage by comparatively dumb networks has already begun, though this direction may be reversed in the battle between ATM and intelligent networking decides.<sup>11</sup>

TOs themselves can be as dynamic as entrepreneurial VANs suppliers, leveraging their resources and unique position from which to extend what entrepreneurs invent to the wider market. This has already happened where competition has galvanized TOs, (BT, and the French, Dutch, German, and Spanish carriers have shown tremendous progress). Moreover, TOs need not be the source of all creative ideas to be dynamic. External forces are pressing them to innovate alongside the VANs entrepreneurs. Other forces on the TOs include:

- **Equipment suppliers**, for whom the TOs represent by far the largest customers, need to sell new products and work through shortening product life cycles.
- **Regulators**, who by extending the like of the TOs historical mission have increased pressure for customer satisfaction and profitability.

- **TO's themselves**, who are in the midst of a dual cultural change which has profound implications for their future form - they are facing up to both liberalization of domestic markets and the necessary globalization of operations.<sup>12</sup>
- **Users**, whose increasingly sophisticated demands are finally receiving closer TO attention at the very point they are becoming a competitive threat to TOs.

The TOs view their market position as secure, as new configurations of hybrid networks still show a continued reliance on public infrastructure. How does one capture the dynamism of the liberalized upper layer - of the VANs providers, suppliers, users, etc.—in a monopoly infrastructure? Does one need to? There is clear reason for liberalizing the upper layer, despite TO objections yet there is still some hope for TOs. Now we examine the experience of *uniting* the layers, and whether bundling creates superior value for customers.

#### 4. INTERCONNECTION AND INCENTIVES

An important point often lost in the debates over liberalizing infrastructure monopolies is the lack of a solid conceptual or legal argument for forcing a non-monopolistic firm to interconnect its competitors.<sup>13</sup> Once monopolies are lost, interconnection becomes more difficult. Why should TOs be required to serve their competitors as customers, especially if they are not acting in part as public trustees? What kind of service can those competitors expect to get? Under ONA, those competitors have been given a choice of the status quo or paying higher tariffs to develop innovative offerings.<sup>14</sup> With ONP, the TOs have only just begun to price access in a more cost-oriented direction, and have slowed the implementation process through the ONP Committees and ETSI.<sup>15</sup>

The resistance to providing economic interconnection for rivals is understandably powerful and diffuse, coming from shareholders, government regulators, unions (protecting jobs) and often short-sightedly equipment manufacturers. New entrants pale in influence, and users straddle the fence because they cannot afford to be entirely hostile to the TOs, on whom they still rely. New entrants who still rely heavily on TO plant leave the TOs in control of market direction (BT is the Dutch PTT's largest customer). The difficulties of creating a web of interoperable systems, a network of networks, through interconnection

There is an added danger that interconnection may reduce competition by encouraging co-operative linkages -- suited to today's accepted business wisdom of specialization in "core" activities -- rather than end-to-end rivalry. The TOs are relatively happy to allow a competitive supply of VANs so long as they retain control over terms of network access and so long as there are only partial or specialized network solutions in the market, the separations process will rely on interconnect policies. Interconnection needs to be rethought. Can the process move from an extension of TO market power to progressive, cooperative effort not dominated by a single entity? Does this demand an industrial policy concerning access charges imposed from above. The political struggle over interconnection has not been pressed upon the main operators, nor has it been presented as beneficial and in their interest. *This is the starting point for the debate -- in the present system, separations are contentious because no one has an incentive for interoperability.* This is partly due to capture of the regulators by the TOs, and also reflects the TOs aggregation of technical expertise about the network.

One recent paper from Cable & Wireless proposed a changing framework for interconnection, based on standard PSTN and leased line tariffs, indexed to the degree of service universality.<sup>16</sup> However, the authors admit that cost allocation problems are increasing, and suggest that the move to broadband networks may change the generally stable relationship between carriers, suppliers, and then customers. Following this line of thinking, there appears again to be two paths to making greatest use of the existing infrastructures. If interconnect policies can be established to encourage duplication, then the thorny policy questions of cost allocation are only temporary ones. Perhaps the Japanese approach? Or, if interconnect tariffs are set indexed to publish PSTN tariffs, there is probably less chance that benefits will be passed on to consumers (since incentives are increased for all parties to keep PSTN tariffs high) but a greater likelihood that the "public" network will be used.

## 5. LINES IN THE SAND?

What are the criteria for separate layers? One is whether services are infrastructure independent or transparent. If not, (as is usually the case) then their existence is determined by how networks are structured - standards, interfaces, architectures. The ability to define criteria for network access furthers the already tremendous market power of infrastructure prov. Even in the UK, where this situation is changing, new service providers still depend inescapably upon BT's technology decisions. This is the crux of a nasty dilemma. Guaranteed an infrastructure monopoly, the providers have little incentive to upgrade the network without competing for the value added portion. And as is well understood, the more it is allowed to provide, the less incentive it has to allow others to do the same. Standards interoperability, a common network architecture are all subject to political forces. Only applications for which there is a proven demand are exceptions to these rules. In Europe, political programmes such as RACE had to lead only where others would follow, and were shifted by political fiat towards funding applications experiments, after working to publicize the merits of advanced communications networks. The RACE example underscores the fact that regulation only poorly anticipates demand for services. Proactive standards in advance of investments in technology development, such as GSM, may lead to later problems. The dividing line will always be capricious, depending on the investment paths ahead of, and constituencies behind each service. This is so even in the much-heralded competitive UK market, where Oftel's pronouncements from on high show that the market is far from being "deregulated." Mercury's creation, RPI-x, the Duopoly Review decision, and so on were all products of intense political negotiations.

One possible solution is to have performance targets, such as a detailed schedule of infrastructure upgrades, which all providers would then refer to. Such attempts at forecasting have a mixed history at best.<sup>17</sup> An added danger highlighted by forecasting problems is the lack of applications developed to date to take advantage of the existing infrastructure. ISDN investments in France and Germany have shifted towards funding applications development. In the US CATV is the only broadband service which has interested the mass market. Most traditional telecommunications service providers have been criticized for standing too far from the needs of the user, but without taking the supply-side approach TOs may not be positioned to satisfy rapidly expanding and shifting user requirements. TOs need to anticipate market behaviors which have made ISDN slow to take off while increasing traffic and profitable installations dramatically through fax services. This is another old dilemma, which brings out

the contradictions between complexity/uncertainty on one hand and system stability on the other. There is no way to accurately forecast the future evolutionary path of the network, and yet there are numerous parties with a tremendous investment in maintaining its stability and growth.

Had there been a massive investment in broadband in the last five years, the results would have been disastrous -- a platform with few applications to run over it, with users clamoring for lower tariffs and greater flexibility for their own specialized needs. Indeed, capital budgets have been falling. Users in Europe have not yet decided whether to be telcos themselves or to nudge TOs in a more efficient direction. As users win the freedom to pursue other options, mapping out long-term infrastructure investment will become even more problematic. They will want a secure public access network as a primary, not a secondary resource, as voice VPNs grow in prominence.

Many, if not most, firms already rely heavily on public networks alongside their own private systems, at least for backup. More efficient private networks would require fewer leased lines, (and reduce TO revenues), but using public network based systems, for shared backup facilities also provides cost savings. In many cases, the costlier status quo will be favored over the uncertainties inherent in new and less well tested systems.

Even where capacity is provided by two or more public access carriers -- smaller carriers are often simply reselling lines leased from the dominant provider. Mercury's success has come as much from second sourcing for BT customer as from undercutting BT tariffs. While BT cannot prevent the former, indeed may not want to, (it gives them a backup as well) it has attacked the latter via rebalancing, shifting the burden onto rental and connection charges for residential consumers.

Private VANs providers cannot afford to pay more to TOs for enhanced functionality they do not need, or that replicates their own business; they need to mix and match network functionalities. More important rivals may prefer to share in the TOs economies of scope rejecting a separation which leaves them paying for every basic service element individually if a bundled, yet flexible service comes at a lower price. As flat growth in voice telephony leads TOs to search for new revenue streams, they become ever less likely to relinquish VANs opportunities to private suppliers. Unsurprisingly European TOs are eager to expand the definition of reserved or universal service to encompass more than basic voice telephony, to contain attacks from competitive access providers or regulators. But these political definitions poorly recognise the impact of new functionality in the network. For example, ISDN creates a problem in the integration of voice, a reserved service, and data, a liberalized service, on the same indistinguishable conduit. ONP is raising similar sticky problems. The advocates of unusual service regimes advance several powerful arguments:

- The public service goals of universality require a system of social subsidies. Monopoly provision, it is argued, is needed to fund them. Any alteration of this arrangement raised the difficult issue of withdrawing "acquired advantages" from established players.
- Fragmentation of service provision saps the critical mass of revenues needed to fund development of advanced broadband infrastructures, which require long-range deployment schedules.
- Existing investments (funded by taxpayers) must be amortized. New providers are not eager to assume the cost burdens of serving all users who want access to their service.

- Infrastructure providers typically do not offer to rewire the nation. They look either to make use of existing facilities such as cable television networks, or to wire urban business corridors with MANs and WANs where concentration of users is greatest.

Eastern Europe provides an exceptional case: advanced services are being deployed with little reference to largely obsolete and unreliable monopolies, but again, no one provider can rewire over a dozen nations alone. A pure transmission infrastructure might be controlled by a number of relatively equal smaller specialized VANS suppliers, with a centralized firm offering basic voice services and selling bandwidth. Rival infrastructures seems less likely. Indeed, to put the debate in its proper context: most nations -- developed as well as developing -- cannot afford one viable infrastructure. The US and UK, embarrassment of riches, are talking about multiple infrastructure alternatives. (Note that the US market is unusual in the separation of TOs from CATV provision, (unlike Germany, France, Japan and so on). *Have we overestimated the benefits of alternative infrastructures, especially the cost savings over tried and true technologies and architectures? Is this a money pit, similar to the new technologies which were touted in the 1970s and 1980s?* The virtual invocation of the mystical benefits of competition so often heard in the US has not reached Europe, despite proselytisers of every stripe (most commonly the Union Jack). The costs of competition come down to the simple economics of constructing alternative infrastructures.

The Eastern Europe example highlights a critical problem: Where will the capital needed to construct alternative infrastructures come from? The myth of a recession-proof telecommunications sector is gradually showing its face: users are demanding action on inflated tariffs, which do not reflect productivity gains, and the recession is limiting spending on services, as well as forcing TOs to grow less dependent on national infrastructures, entering more speculative and competitive global markets. Suppliers' order books are always one year behind. What regulators approved cannot necessarily be extended in linear fashion into more turbulent and uncertain times (we see this reflected initially in the equipment industry, in the pressures faced by all the major CO vendors).

An added pressure is the sunk costs in plant, which suggests that changes in technology and markets cannot easily displace existing infrastructure. The lessons of the UK market, where infrastructure competition was introduced a decade ago, are highly instructive, and outline the fundamental economic reality of infrastructure provision. Barring any solutions as much delayed as discussed -- ISDN, IBN's, convergence, fiber-to-the-home, PCN, GSM, radio tails, DBS, cable telephony, and whatever else is on the horizon—local loop competition is developing only slowly, in pockets. Mercury has been building its network for ten years, yet still hands over 50% of its calls to BT. CATV telephony (where the UK is considered in the vanguard) also faces similar pressures. The teleports and CAPs in the US are targeting only high volume users which cost justify plant investments. This experience shows that VANS services which have mass market aspirations are likely to remain dependent upon lines leased from TOs. Competitive efforts in local loop provision are backed by a fraction of the investment already made in the current network. Some believe that a massive writeoff of existing plant is imminent, but this would cripple TO financing. Hence, TOs must protect infrastructure investments, and resist separation of layers, unless assured a role in both areas.

Another issue worth raising is whether today's infrastructure is already obsolete. The TOs are clearly not prepared for a rapid depreciation of existing plant: they cannot afford to absorb such losses as future returns become less certain, squeezed between the pressures of

global recession and technology advances (where workstations may soon replace CO switches). Is there a middle ground in deploying advanced functionality for preemptive cost-savings? Cost-savings are glimmers of such discontinuous changes which may make the task of separation easier. It is now possible to program a PC to perform the same function as a PBX, to switch traffic, such as providing public access to control over the switching function of the infrastructure. So long as that control is embedded in the CO switch, separation will never be complete. Part of the functional problem is that there are no dumb services or primitive systems. "Intelligence" has always been diffused, as various parts of telecommunications networks adopt and develop it. These are not developments which policy-makers can easily anticipate, and the linear quality of R&D and technology developments may prevent radical advances from being deployed.

An optimistic scenario, based on exponential improvements in computing technology, anticipates intelligent services which are infrastructure transparent by adjusting to the architecture over which it travels. This is beyond the current capabilities of expert systems, but might be simplified by flexible workstation-based switching. INs create a dilemma because they both simplify and complicate the issue of separation: the more logical functions embedded in remote locations, the more control needs to be exercised over the network by a single entity, (not necessarily a TO) to ensure interworking. This brings us finally to the third driver for INs; they are a "revenue protection investment strategy." Even if they bring greater devolution, there is still a natural role for a systems integrator, and that entity cannot simply provide pipes without having some expertise in plumbing. Indeed there is a strong argument for allowing TOs to provide liberalized services as an incentive to upgrade and deploy advanced networks.

Self-financing for new services is equally problematic. New entrants cannot drop usage charges too much since most traffic still terminates on the existing operator's lines, and hence incurs interconnection charges. Residential consumers are not ideal revenue generators: UK distribution circuits are used on average 10 minutes/day. This underscores the need to shift the focus on TO investments from new services to the cost savings rationale inherent in efficient network upgrades.

## 6. THE ROLE OF INDUSTRIAL POLICY

Industrial policy is a necessity as well as a reality for most nations.<sup>18</sup> Market fragmentation has its downside for innovation in services, and coordination is especially important during developmental phases. Of course, many innovations begin outside the public sector and are absorbed only when their scale becomes noteworthy.

This does not prevent VANs suppliers and private network managers alike from taking on an adversarial stance towards the TOs. INs, ATM and IBNs can all be portrayed as a plot to deprive large users of uncomplicated leased lines, interconnection rights and the ability to configure network solutions independent of the TO (though in reality they may provide the most cost effective networking solutions, depending on the scale economies).

Another problem comes from the often overlooked cross-elasticities of demand, which cloud purists' vision of broadband networks. Since before the ISDN concept was born in the 1960s, it has been taken as an act of faith that integrating services over a single transmission medium was beneficial (and indeed, the vanguard of corporate users are after voice and data integration today). Yet the virtues of chaos are not often presented alongside convergence

scenarios, and economic models still view new service revenues without reference to loss of existing revenues. The assumption of a zero-sum game would shipwreck many a grand vision, such as the common 1991 prediction of 10 million UK PCB subscribers by decade's end.

## 7. COMPLEXITY AND NETWORKS

Complexity and stability are increasingly at odds in the modern network, which challenges the ability of engineers to hold together an increasingly untenable patchwork of technologies. Standardization is still problematic and politicized yet more critical than ever in maintaining a fragile interworking system with exponentially more points of risk.

*Vulnerability, survivability, reliability, quality--are these concepts anathema to modern telecommunications networks? Will our technical prowess outrun our ability to solve complex problems? Or are there new network architectures, solutions, technologies which can limit these risks? The breakdown of the cost-sharing coalition so eagerly celebrated by free-marketeers might be quickly reversed once the price of deploying a stand alone quality service is realized.*

Are intelligent networks a solution? Based on modular software, INs will support decentralization and open more of the network to users, while at the same time protecting the physical infrastructure from intrusion by placing less secure software further from the digital CO switch. This evolution anticipates competition in software based services, viewing networks as enabling platforms which can be desegregated to individual software components. INs express a real need to simplify network switching software and services introduction, and to improve quality (a prime product differentiator of competitors).

Software complexity discourages experimentation with new services, given the time required to deploy new service concepts. It also skews investment priorities towards services which directly lead to new capacity of connections, as opposed to rationalization and improvement of internal facilities management. Another driver for INs is the need to offset rising data processing costs of TOs, now half of switching equipment spend. A prime asset of new operators such as MFS, Teleport, or WilTel is their manageable size. New services need close monitoring of profitability and technology, intrinsically difficult in TOs with many overheads and piecemeal billing systems.

Segmentation advocates often fail to recognize that both networks and users have little tolerance for complexity.<sup>19</sup> The convergence of interests--the TO's need to develop software engineering capability and their customers need more flexible software-defined systems-- must lead to simplified, more fault-tolerant networks, which allow faster services introduction.

Yet future network architectures represent quantum leaps in complexity. GSM requires tremendous amounts of data transmission alongside the voice signal. As seen in the UK, a single software error can ripple throughout the public access network and halt operations in seconds. Are multiple federations of networks prepared to handle these massive increases in complexity when the current system is struggling under the tremendous burden of performing a more limited task?

As the number of plant owning competitors--especially mobile operators--increases, the number of interfaces will grow more than linearly. The problem becomes more difficult still if several networks are used in sequence for a single call. (Interestingly, this is a problem which currently favors single-sourced panEuropean networks).

## 8. INFORMATION ASYMMETRIES

One issue which complicates not only competitive provision of infrastructure, but also the viability of a separate liberalized upper layer is the persistent information asymmetry between the main network provider and new entrants.

In the US, the decomposition of the local access network under ONA sought to stimulate competition in markets for local switching and transport. Unbundling encouraged more efficient and widespread use of scarce network resources. But this process is often seen as adversarial to the TO, demanding it relinquish what it has (and has invested in) to share its most profitable businesses with others. Any positive view of this process must include the carrier perspective, as they currently control the network resource. Without cooperation, unbundling, ONP, and competitive VANs markets will be gained only through a long uphill battle, and the opportunities for carriers to thwart the process are many and well-known. It is critical for new entrants to know the type and cost of functionality available to them. For example, European users have long complained about TO reticence to discuss and commit to long term network evolution plans. Private network deployment might be seriously altered if TOs were more forthcoming to large users about budgets devoted to broadband services. Yet it is unfeasible to mandate access to data on network development, given its commercial value.<sup>20</sup> Carriers cannot be required to file plans of modernization and technology deployment for any given time frame - and realistically be expected to follow them. And could a regulator penalize a TO for changing strategy midstream, preventing adoption of an unforeseen but beneficial new technology?

Under the current system, users have to check on TOs to follow present paths, but TOs restrict VANs suppliers via choice of protocols, technologies, etc. Indeed some TOs have only marginal incentive to develop strategies at all, or to reveal them to competitors. (This does not forestall them working in a proprietary manner with equipment suppliers, or service providers with whom they have alliances). In many cases, they have an incentive, often from the political sector, to develop certain strategies without regard for market conditions.<sup>21</sup>

Regulators also face a similar asymmetry, and are often handicapped as mediators. As one example, Oftel's information asymmetry may be small, but the administrative, rather than judicial system of policy-making does little to expand public knowledge about the British process. In the US, the asymmetry is lessened by data exposed in legal proceedings, but even the world's largest regulatory apparatus, the FCC, relies heavily upon the industry for critical data.

## 9. IS THERE HOPE FOR A PROGRESSIVE POLICY?

The larger question is - could (or would) the public network play a role as the platform which stimulates a new applications software industry? Can the PC model, with a single operating system supporting a host of applications, be applied to telecommunications networks? Much depends on whether the TOs are dragged kicking and screaming into this venture, or whether they see it as a strategic opportunity to further entrench themselves in the local loop transmission market, ceding some tightly managed competition in the value-added sector. (This also relies upon whether they see their infrastructure monopoly as sustainable. Most do.)

Liberalization of the VANs layer need not address the question of breaking the infrastructure monopoly - (*indeed, the argument here is that VANs providers have much to*

*gain from that monopoly, depending on the terms of separation and access - and vice versa).* With commercial or cost-oriented access charges, a shared monopoly system could be maintained, made easier by intelligent networking and variable bit rates.

Are there some regulatory or policy options which have been overlooked in achieving a viable separation? The basic thrusts behind separation are: 1) the need for VANS liberalization to unleash the benefits of a dynamic sector; 2) the economic logic of interconnection, though practical experience with it has not seen much progressive or cooperative effort, and 3) the treatment of the network as a huge and complex enabling resource, some of whose functions are best run by one entity, over which providers need fair and secure influence.

The main arguments presented thus far are: The infrastructure monopoly should not be defined even so broadly as to consist of all transmission paths. There is vigorous competition in toll networks in the USA and a clear demand for competitive LAN interconnect, MANs and WANs. It cannot even be confined to all local paths since there is ample competition in some areas, especially dense urban business districts, and radio access may help other areas. But duplication of plant is often inefficient, and new technologies unpredictable. A market test has its shortcomings. New entrants need regulation to provide effective interconnection, to subsidize if you will, their start-up costs. The information asymmetry and market power of TOs must also be addressed.

The viability question therefore concerns curbing monopoly power, to draw nearer to that platonic ideal, the level playing field. Two sets of solutions are presented here. The first continues the network monopoly, the second embraces fragmentation and non-sustainability. The monopoly ideas are geared towards divorcing infrastructure providers from service providers, and base the need for separation on the fair provision of capacity. The second set are based upon reforming the interconnection process, and achieving fairness through threats of exit and competitive entry.

### **9.1. Retail / Wholesale Separation**

This proposal identifies a boundary between network operations and customer-facing activities. What is needed is a single network operator, not involved in services, to wholesale distribution plant on a fair basis to retailers. The wholesaler, freed from dealing with retail customers, can more readily embrace the principle of cost-savings and operational rationalization than TOs currently do.

This dichotomy plays to strengths in designing and building advanced networks on a mass scale and (still in Europe) weaknesses in marketing. It has the added advantage of focussing them on technology R&D than customer satisfaction. All retailers could hold a non-dominant share in the wholesalers providing joint incentives to deploy state-of-the-art technology. Obviously, this will not be an easy task, but the above dichotomy would free competitors from making the heavy investment needed to replicate TO plant.<sup>22</sup> The separation also reflects a boundary between low-labor intensity network deployment and maintenance (which will be largely through remote reconfiguration), and high labor intensive (and added-value) at the point of the customer interface.

### **9.2. Unified Bit Carrier Scenario**

Advances in voice compression and increasing service integration suggest a scenario in which a common bit carrier could satisfy most user needs. Much like with the

retail/wholesale separation, this carrier would only be allowed into the business of wholesaling distribution plant. This is the clearest path to an IBN if that is the policy goal. Arlandis<sup>23</sup> has noted that this can also shift functionality to CPE through Open Architecture Receivers, though cooperation is essential to make such a system work. If all providers do not agree to sustain the network, it will inevitably face competition and the process of disintegration will begin anew.

What are the practical dimensions of relegating the TOs to per bit carriers? Given the choice of providing profitable margin software-based services, or maintaining a physical infrastructure, operated on common carriage principles, who will choose the latter?<sup>24</sup> A physical infrastructure enterprise cannot be carved out without discussing who might be interested in running it. It would surely face stringent regulation, its tariffs closely monitored (especially as the service upon which all other providers would rely). Bit carriers, even one which can accommodate any service, offer only limited business opportunities: More bits may equal more money, but profit margins remain slim. For example, international carriers are having difficulty in profiting from underseas cables, as users simply lease bandwidth for in-house applications rather than purchasing higher profit VANs.

On the other hand, it offers a vehicle for a carrier, with public service aims, to stimulate the economy. Most European carriers remain state-owned. Such a carrier would get industrial policy support in the form of subsidies. However, the pure bit carrier solution implies a closed environment, as pieces of such systems cannot be removed if total costs are to be recouped. This latter argument is that of the US RBOCs, that greater entry into VANs (i.e. CATV and information services) markets is needed to cost justify the deployment of a broadband networks.

The interim step towards either of these proposals would likely be separate subsidiaries with stand-alone accounting through its history in the US should dissuade others. Until carriers are split from service provider, the viability of separation without anti-competitive behavior flourishing is at best doubtful, and Europe TOs seem especially unlikely to relinquish their historic role as service providers.

### **9.3. Interconnection**

This solution begins by conceding that MANs, WANs, and radio tails all lead to full infrastructure competition. Since the argument goes, service providers cannot be easily split off from carriers (especially where the unified model has 150 years of institutional history and inertia behind it), the onus shifts onto those who determine and manage interconnection policy. It may invite wasteful duplication of resources, made all the more scarce by recession in key markets, but this market-oriented choice is implicit in interconnection policy.<sup>25</sup> As in other scenarios, the more effective system of protection needed would only work under a cooperative effort.

In Europe there is a unique opportunity to condition entry into new markets by offering a portion of network capacity for anyone else to use, gaining proportional access to TO networks. This would require some up-front investment (a goal of regulators) and also guarantee access for the new provider, overcoming TO objections. New providers have argued that reciprocal access is too onerous a burden, but it could be applied to players with domestic monopolies (or de facto monopolies) elsewhere, accepting the clear trend of an oligopoly. This puts the greatest barriers in front of the large players, but gives them a guarantee that investments will not go wanting for access. For those which can afford it,

entry will have a clearly stated cost. Smaller flexible VANs providers have the edge in that they can piggyback on any carriers capacity so long as their service is differentiated enough not to threaten the carriers' revenues. Good examples are the service consortia like SWIFT and SITA, which could be opened to competing services but reach far more customers. They might also form alliances with larger carriers to jointly gain entry.<sup>26</sup>

#### 9.4. Status Quo

The system we have is the easiest to criticize, and in many ways reflects the worst of both worlds. De facto infrastructure monopolies which also participate in liberalized upper layer services are the villains of a well-known and unsavory story. France Telecom's claims aside, in Europe at least they have not proved overly responsive. If infrastructure provision is only partly competitive, then the nature of interconnection tariffs will determine the scope for competition, and the story there is equally unpleasant. A choice is needed between support for a bit carrier, which provides and operates infrastructure on wholesale terms, and encouraging unlimited duplication of plant with a reliance upon rejuvenated interconnection policy and access charges to open access to competitive providers.

### 10. 10 YEARS ON: A PREVIEW OF THE NEW WORLD OF TELECOMS ORDER?

Whichever path is chosen, the nature of the process must change for separation to be viable. Instead of determining a monopoly through legislation, or tinkering with the present system of interconnection, a system must be devised to provide all parties with a common incentives to support a single network resource, rather than bemoan its shortcomings. This carrier will in turn have an incentive to serve as many parties as possible. Technology is bringing this possibility nearer. Users have shown a willingness to pay higher tariffs for similar services offered over competing networks. They would pay an even higher price (though they might not have to) to keep an efficient, flexible and open network platform afloat.

- A unified bit carrier could be funded through access charges, based on the contributions of providers, who pay for carriage, and their rival networks who pay interconnection charges.
- This carrier could herald a return to the public service mentality which nurtured engineering excellence within the monopolies, within an organization run on competitive terms to serve all users of network capacity.
- Movement towards a broader oligopoly where the sharing of a few groupings of network resources is supported by cooperation for a monopoly infrastructure.

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## ENDNOTES

<sup>1</sup> Access need not move only towards publics. Many networks are designed to exclude. And public access to privately owned networks remains as a major stumbling block in EC debates over ONP; Europe's TOs argue that they should gain a reciprocal right of access to the network of any private provider for allowing access to their networks. This would clearly be a crippling blow to new entrants, and provide the same sort of disincentives to innovate as are imbedded in the tariffing policies under ONA.

<sup>2</sup> International simple resale reflects the fact that value can be added to a service without changing the actual nature of the service in the least. Fractional use of leased lines are another classic example.

<sup>3</sup> For example, ISDN systems which integrate data and voice complicate the liberalization of the former in the environment where the latter is considered a reserved, or monopoly service. This particular problem has been a driving force for voice liberalization in the EC as data over voice and ISDN services have been considered within the ONP context.

<sup>4</sup> Page 19, Harper, John, *A 21st Century Structure for UK Telecoms: Competition Without Fragmentation*. London: CommEd Publishers, 1991.

<sup>5</sup> Little, A.D., "Issues and Options for Telecommunications in Europe," 199G2010. Report prepared for the Commission of the European Communities, 1991.

<sup>6</sup> Service Grandes Comptes, Telekom Contact and Unisource all represent a massive cultural shift from where Europe's TOs stood five years ago. Even the BT-MCI alliance would have been unthinkable in that context.

<sup>7</sup> There is yet considerable reason for scepticism: the tremendous promise of today's new technologies bear striking resemblance to a similar "plethora of new technologies," the "alphabet soup" much heralded by the FCC and others throughout the mid-1980s in support of broadcast deregulation. How many of those services, besides CATV, have come to fruition? Even the most promising of technologies, such as DB, have had little impact on the market.

<sup>8</sup> The TOs deserve some credit for their current status, whether attained through skillful manipulation of the regulatory and political process, or through internal engineering excellence.

<sup>9</sup> See for example a 1987 GAO report which claimed that the FCC had the resources to audit local telcos only once every 16 years. The problem is even worse in Europe, where BT is perhaps the only European TO with a complete financial picture of its operation. Perhaps the strongest hope for changing this is the intense financial scrutiny of TOs by investment bankers assisting privatization's.

<sup>10</sup> France Telecom's technology choices aside, they have shown that monopolists can mobilize resources to develop high-quality networks and services, though others question the wisdom of this strategy. Ergas (1992) argues that political imperatives often forced network deployment in an inefficient direction.

<sup>11</sup> This is the battle of the big switch versus the smart box people. ATM allows users to customize their use of bandwidth without being constrained to the channel data rates of the network transmission scheme.

<sup>12</sup> Kramer, Richard and Aine NiShuilleabhain, "Monopoly Market Structure," from *Telecommunications, Limits to Deregulation: Proceeding of the 7th Conference on Eurocommunications Policy Research*, Burke VA: IOS Press, 1992.

<sup>13</sup> This of course presumes that one is largely following the neoclassical economic view which privileges unfettered competition. The reality, especially in Europe, is that state intervention is a first principle, therefore violating the "law" of perfect competition. Government can rarely avoid picking winners and losers in the marketplace.

<sup>14</sup> Levine, Henry, "R.I.P. ONA," Unpublished paper, 1991.

<sup>15</sup> Kramer, Richard, "Service Provider Strategies for Europe," unpublished document, 1992.

<sup>16</sup> Page 278, Solomon, Jonathon and Dawson Walker, "The Interconnection Imperative," *Telecommunications Policy*, May/June, 1993.

<sup>17</sup> Elton, Martin, "Integrated Broadband Networks: Assessing the Demand for New Services," Unpublished Working Paper, New York: CITI, 1992.

<sup>18</sup> We should not forget that industrial policy and state intervention were part of the Founding Fathers' tradition, much in line with Colbertist thinking. As Alexander Hamilton wrote in 1791, "capital is wayward and timid in lending itself to new undertakings, and the State ought to excite the confidence of capitalists, who are ever cautious and sagacious, by aiding them to overcome the obstacles that line in the way of all experiments."

<sup>19</sup> New applications also portend unforeseen usage patterns. France Telecom's Transpac network crashed in 1985 when Teletel services were introduced on a wide scale. The packet switching technology used by Teletel was designed for constant connections between mainframes, and the rapid shifting among services by users overloaded the software, causing network paralysis. Does a similar set of problems await GSM or PCNs, ATM and SOIKET; all largely untested on a mass market scale, creating a considerable burden on the unified network?

<sup>20</sup> For an example from the US, see the discussion of the battles over the Customer Proprietary Network Information as described in Levine, 1991.

<sup>21</sup> Ergas, Henry, "France Telecom: Has the Model Worked?" Paper presented to the Royal Norwegian Council for Scientific and Industrial Research, 29 January 1992.

<sup>22</sup> Page 22, Harper, John, *A 21st Century Structure for UK Telecoms: Competition Without Fragmentation*. London: CommEd Publishers, 1991.

<sup>23</sup> Arlandis, Jacques, "Convergence Between Telecommunications, Computing and the Media: Visions for the Future." Montpellier: IDATE. Unpublished paper, 1992.

<sup>24</sup> Even for the most bureaucratic of PTOs, international dissemination is where the interesting business questions, as the glamour and money, lie. Witness Belgacom's roll out of its Global VPN services, while domestic users go poorly served. The best hope there might be is to get POs to voluntarily jettison their carriage business as Pacific Telesis has proposed.

<sup>25</sup> This also reflects a major difference between ONA and ONP, elaborated in Kramer 1992.

<sup>26</sup> Solomon, Jonathon and Dawson Walker, "The Interconnection Imperative," *Telecommunications Policy*, May/June, 1993.