
ON THE FRONTIER OF DEREGULATION: NEW ZEALAND TELECOMMUNICATIONS AND THE PROBLEM OF INTERCONNECTING COMPETING NETWORKS

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1. INTRODUCTION

The world's telecommunications infrastructure, once the exclusive preserve of government or private monopolies, is rapidly moving toward competition. The growth of competition, however, cannot be equated with deregulation. On the contrary, far from eliminating regulation, the rise of competition seems to have intensified it. As the number of players increases and competition moves into one market after another, telephone company prices, practices, and services come under increasing scrutiny from regulators, users, and the courts. In Britain, Australia, and Hong Kong, for example, new regulatory agencies have been created to cope with the transition to competition. During the 1980s, the authority of the U.S. Federal Communications Commission (FCC) has been extended into entirely new areas. In addition to rate regulation, the FCC has become involved in telephone numbering, the unbundling of network components, the implementation of equal access technical conditions, and monitoring network reliability. Without a doubt, the FCC's Common Carrier Bureau is a much larger and more active participant in today's telecommunications marketplace than it was in, say, 1950.

There is an important difference, however. Where before regulation focused on rates and profits, under the new competitive regime regulation finds its justification largely in the need to define the technical and economic relationship between competing networks—a relationship which can be encompassed by the term *interconnection*. Interconnection is critical because few of the new networks are stand-alone entities. They must establish access to the existing public telecommunications network in order to be viable. Increasingly, regulators have been called upon to adjudicate and coordinate this relationship.

Regulating interconnection opens up a Pandora's box of technical, economic, and regulatory problems. Interconnection of competing operators is seldom possible through the purchase of pre-existing types of service from the incumbent. It usually involves new forms of access and interoperability for which no established market or prices exist.

Technical standards ensuring compatibility among the networks must be established. Prices for various kinds of interconnection arrangements must be set. The new operators' status in the general telephone numbering plan must be defined. Last but not least, interconnection with new carriers, which generally leads to competition in some but not all network segments, must be reconciled with the established carrier's obligation to provide universal service.

As noted before, in most nations interconnection issues have been, or are being, resolved via regulatory processes. Only one developed country, New Zealand, has attempted to make the transition to telecommunications competition without an industry-specific regulatory body playing an active role in the process. This chapter assesses that unusual and radical experiment. New Zealand is unique because it attempted to leap directly into a completely open and deregulated marketplace for telecommunications. There are no legal restrictions on entry and very few regulations placed upon the incumbent. Most significantly for this study interconnection of competing networks was initially handled within a unique institutional and legal context. No regulatory agency with the power to define, enforce, or mediate an interconnection agreement was created. Interconnection was treated as a commercial negotiation among the parties to be interconnected, although the government did impose an obligation on the incumbent monopoly to interconnect with its competitors on "fair and reasonable terms." These facts make New Zealand's experience with telecommunications deregulation and competition especially worthy of investigation.

This chapter attempts to contribute empirical and theoretical insights to current telecommunications policy debates through an in-depth analysis of New Zealand. The chapter is divided into three sections. Section 2 discusses the significance of interconnection in telecommunications policy in theoretical terms. Section 3 contains empirical data and a narrative analysis of the New Zealand situation. Section 4 attempts to draw some general conclusions about the implications of New Zealand's experience for interconnection policy in a competitive telecommunications industry.

The empirical evidence focuses primarily on two issues regarding the results of New Zealand's experiment. First, what kind of interconnection agreements between the Telecom Corporation of New Zealand (the incumbent monopoly) and its competitors emerged from this deregulated environment? Second, how effectively, or ineffectively, has competition in telecommunications services functioned in the absence of regulatory oversight of interconnection? In answering these questions, the chapter shows that competition in toll markets has functioned in a surprisingly effective manner despite the absence of equal access and regulatory oversight. In the local marketplace, however, interconnection negotiations have led to long delays and litigation. This has seriously undermined New Zealand's attempt to banish regulation from telecommunications altogether. In an attempt to cope with these problems, New Zealand's policy makers are gradually backing into regulation.

Most economists involved in the New Zealand debate agree that additional regulation is the only way out of this impasse. This chapter attempts to put forward an alternative view. It shows that structural interventions, such as divestiture or nondiscriminatory resale, can provide a more direct remedy for the incumbent telephone company's market power. Structural remedies are preferable because they leverage the power of market forces to erode monopoly power. They avoid the information-gathering and monitoring costs of

traditional rate regulation, and are more precisely targeted at the causes of monopoly power.

2. INTERCONNECTION IN TELECOMMUNICATIONS POLICY

2.1 The Economics of Interconnection

The interconnection problem has its roots in three basic economic characteristics of networks. The first, and most fundamental, is that two-way telecommunication networks do not provide a single service but are collections of many different services. This is the problem of *heterogeneous output*. Second, the value of a telecommunication network to its users generally increases as the number of users bundled into a network increases. This is commonly known as the *network externality*, but could be better described as the existence of significant *demand-side economies of scope* among the multiple outputs of the network. Third, telecommunications network markets, like information markets, suffer from an *appropriability* problem. Those who obtain access at one point of the network are able to resell access to all parts of the network, unless restrained by regulations or business policies.

2.1.1 Heterogeneous output

The existence of *heterogeneous output* is fundamental to the analysis of telecommunications markets. A household or business subscriber to an established telephone network is acquiring access to millions of other users who have also joined the system. From an economic point of view, each individual connection between users is a separate and distinct output or service.¹ It is only the supply and demand-side economies that can be achieved by joining them together that results in a single network.

It follows that adding users to a network increases its *scope*, not its scale. This apparently simple observation has radical consequences. Most formal economic analysis of industrial organization applies to firms which produce a single, homogeneous output. In telecommunications networks, on the other hand, each pairwise connection represents a different market, and the number of markets involved is enormous. Although the network is technically integrated, the markets served are discrete. How, then, to analyze competition and the competitive process?

2.1.2 Demand-side economies of scope

The value of a telecommunication network to its users generally increases as more users join it. Economists typically treat this as an “externality,” because the decision whether or not to join a network affects the value of the network to other users and not just the person making the decision. For the purposes of this chapter, however, it is more important to note that connecting additional users to the network adds *complementary* goods, allowing existing users to achieve *demand-side economies of scope*. That is, connecting additional users allows existing users to enlarge the number of people they can call (thus adding utility) without any additional investment in terminal equipment, and without an additional subscription to another network. The alternative would be two or more unconnected

systems, which would require expenditures on additional equipment and/or service subscriptions for users who wanted to reach everyone.

The presence of demand-side economies of scope has a powerful impact on the competitive process. In the United States, early telephone competition eventually led to monopoly because users demanded convergence on a single system.² Telephone monopoly came not from supply-side efficiencies, but from the desire of users to achieve demand side scope economies through consolidation of local exchanges. Readers familiar with the standards/network externality literature will recognize this as a typical outcome of “standards” competition. Once a single system exists and, as in most economically developed societies, connects the bulk of the population, the network externality gives the incumbent telephone companies enormous market power. Without interconnection to the established network, the value of start-up networks is extremely limited, because they can offer only a small number of connections to their customers. The substantial capital requirements of duplicating the scope of the incumbent is part of the problem. Even if it were not, however, a new entrant would be economically unattractive to most users unless everyone switched to the new network at once, because the competitor’s customers would have to maintain subscriptions to both systems in order to maintain access to all of the subscribers on the old system. Economists who have studied network externality phenomena refer to this as the problem of “inertia” or “lock-in” (Farrell and Saloner, 1987; David, 1985). In short, incumbent networks have market power simply by virtue of the fact that they are the incumbent, and not because they offer better service or lower prices. For this reason, a network with a large established scope has little or no incentive to interconnect voluntarily with smaller competing networks.³

It is possible to exaggerate the inertial power of the network externality, however. The fact that the telecommunications network consists of a huge collection of markets and not one market means that it is possible for subsets of users with specialized needs and/or a high concentration of traffic among themselves to migrate to alternative networks. Historically, new networks offering a distinctively new technology or type of service have been able to succeed without interconnection to the incumbent. Also, when large segments of the market remain undeveloped or unserved, it is possible for newcomers to enter and survive without interconnection, even when the incumbent is much larger. Indeed, in newly developing markets, such as computer networks or computer equipment, competition between separate and incompatible networks or technologies has had many positive effects.⁴ Moreover, compatibility and interconnection in these industries is evolving gradually through market transactions, without much government intervention. This is because no single company enjoys a commanding control of the entire market.

2.1.3 Appropriability

A final word about *appropriability*. The existence of multiple outputs and demand-side economies of scope complicates the problem of determining what price one network should charge a competitor for access to its network. A telecommunication network that enlarges its scope makes itself more valuable to users. A “universal” or ubiquitous communication infrastructure is recognized by nearly all societies as being of immense social and economic value. However, a competitor who buys only one unit of access into a universal network is technically able to resell access to all of the users connected by the incumbent, even though the competitor does not have to face the costs and risks of creating the entire

network. The competitor is thus able to appropriate some of the economic value of the other network's scope. A large-scope network thus faces an appropriability problem. The phenomenon is quite similar in form to the problem of intellectual property. A person who obtains access to valuable information is technically able to appropriate some of the value of the information by duplicating it and reselling it to others. In information markets, pricing regimes discriminate between those who are final consumers of the service or information, and those who intend to resell. In telecommunications service markets, the appropriability problem leads to concerns about the ability of an incumbent to maintain universal service when subjected to competition. The fear is that interconnection will allow competitors to enter only the low-cost components of the network and leave the high-cost segments to the incumbent.

What then should the incumbent charge a competitor for interconnection? Based on the analysis above, the question can be reframed in this way: To what extent should competing networks be allowed to realize the same demand-side economies of scope offered by the universal network to its end-users? Economists typically take one of two approaches.

One view, based more on regulatory practice than on theory, holds that competing networks should be charged only the incremental costs incurred by the incumbent in supplying interconnection. In essence, this position holds that there should be no distinction between competitors and users; both should benefit from the same demand-side economies of scope. Some even argue explicitly that interconnection pricing should be low enough to *assist* new entry for a short period of time (Neu and Neumann, 1993). In this approach, pricing principles are subordinate to a pro-competitive regulatory policy, which hopes to make up through dynamic efficiencies what it may sacrifice in static pricing efficiency. Implicitly, this position denies that there is any appropriability problem, although many of its advocates recognize the potential for deterioration of universal service. They address this problem by proposing taxes or subsidies, shared by incumbent and newcomer alike, to support service in high-cost areas (Noam, 1993).

The other view, which has been worked out most explicitly by Baumol and Sidak (1994), says that the competitor should be charged the incremental costs of establishing interconnection plus the opportunity costs of the incumbent incurred by supplying access to a competitor.⁵ This viewpoint recognizes the need for some kind of distinction between the prices offered end users and prices offered resellers or competitors, but does not explicitly raise the issue of appropriability. The Baumol proposal plays an important role in the New Zealand story, and will be discussed at greater length in section 4.

2.2 The Interconnection Problematic Defined

The reason interconnection of competing networks has emerged as the critical issue in telecommunications policy can now be defined more explicitly. In developed countries with high penetration, new, competing telecommunications networks will require access to the incumbent's users if they are to compete successfully in any but the most peripheral markets. Such interconnection will not, however, come about as a product of a voluntary negotiation, because in most cases the incumbent has nothing to gain and a lot to lose from providing access to its competitors. Thus, if interconnection is to take place at all it must be compelled. Because the transaction is a product of compulsion rather than the market,

regulators must be the ultimate price-setters. There is, however, no consensus on the theoretical basis for deriving interconnection prices.⁶ The absence of clear guidelines notwithstanding, the price of interconnection is the single most important factor affecting the economic viability of the new competitors, and in the long term, probably the incumbent as well.

But it is more than simply a problem of pricing. In most cases new carriers are demanding forms of access that simply were not offered commercially before. Thus, in order to deal with the problem of interconnection, regulators have reached deeply into the technical structure of the network in order to redefine service offerings in a way that facilitates competition. Equal access, Open Network Architecture, Automatic Number Identification (ANI), number portability, and other forms of technical regulation have emerged as a result. In effect, regulators are attempting to create an intermediate market for telecommunications services by fiat.

There is much more at stake here than the viability of new competitors, important as that is. How regulators handle the interconnection problem will profoundly affect the universality of the network. Incumbent monopoly networks generally rely on average prices set to sustain the network as a whole. Competitors typically attack only a few of the routes and services, forcing the incumbent to break apart the many components of the network and price them separately. Unless interconnection with competitors can be reconciled with the incumbent network's need to appropriate the value of a universal network, competition will be inimical to universality.

3. NEW ZEALAND'S EXPERIMENT IN DEREGULATED TELECOMMUNICATIONS

As noted before, the complexity of the interconnection problem has prompted most countries to intensify and expand regulation of the telecommunications industry. New Zealand's attempt to dispense with regulation in this area is unique. As such, it provides an opportunity to observe what happens when interconnection and competition are left to evolve without regulatory intervention. Even if the policy adopted by this regulatory maverick proves to be a complete failure, the results are interesting as a social experiment.

Before 1987, New Zealand's telecommunications industry was a traditional PTT; that is, a state-owned monopoly administered by the New Zealand Post Office. The Post Office enjoyed a statutory monopoly with vertical control over terminal equipment, local exchange service, and national and international long distance service. In 1987, the Government restructured the Post Office, dividing telecommunications, postal, and banking services into three separate state enterprises. A new Telecommunications Act passed the same year opened terminal equipment to competition. An amendment passed in 1988 ended the statutory monopoly on all remaining aspects of telecommunications services, effective April 1, 1989. In 1990, the Government sold a majority of the shares in the Telecom Corporation of New Zealand to a partnership of the American telephone companies Bell Atlantic and Ameritech. Thus, within a span of only three and a half years, telecommunications in New Zealand have been corporatized, liberalized, almost completely rate-deregulated, subjected to open entry, and privatized.

The only major constraints remaining on the Telecom Corporation of New Zealand (Telecom) are the so-called Kiwi Share obligations (KSO), which were imposed at the time of privatization. The KSO commit Telecom to continue offering flat-rate residential telephone service⁷, prevent it from withdrawing service from remote areas, and prevent it from increasing residential rates faster than the rate of inflation unless Telecom's profits are adversely affected. All other rates are unregulated. Disclosure regulations require Telecom to publish information about its prices, special discounts, and financial data in the *New Zealand Gazette*. Other than that, the only restraint on Telecom is the Commerce Act 1986, which is New Zealand's antitrust law. The Commerce Act, which applies to all industries, specifically prohibits a dominant firm from acting uncompetitively, bars misuse of a dominant position in the market, and prohibits business acquisitions which create or strengthen dominance.

3.1 New Zealand Law and Policy Regarding Interconnection of Network Operators

There are no special regulations regarding the interconnection of new network operators to the Telecom public network and no industry-specific regulatory body. Instead, interconnection arrangements are supposed to be governed by the law of contract. Terms and conditions are negotiated between Telecom and the other parties on a case-by-case basis.

There are still special constraints on Telecom's behavior, however. In addition to the Kiwi Share obligations mentioned above, there are obligations pertaining to interconnection. The New Zealand government realized that because of Telecom's dominant position in the market for telephone services and the difficulty of duplicating the scope of its network, new competitors would have to rely on Telecom for access to telephone users, particularly at the local level. In order to prevent Telecom from stifling competition by withholding access to its facilities, the Ministry of Commerce obtained in June 1988 a public commitment from Telecom to interconnect its facilities to competitors on "fair and reasonable terms."⁸ Telecom is also subject to the Commerce Act 1986, a law intended to prevent anti-competitive conduct. New Zealand courts have applied the "essential facility" doctrine in the context of the Commerce Act to hold that facilities which cannot be practically duplicated by competitors must be shared on fair terms by those who possess them whenever such sharing is feasible.

Thus, there is a *de facto* legal obligation to interconnect. There is, however, no regulatory agency to specify or mediate the terms of interconnection. In the absence of a regulator, litigation under the Commerce Act provides the only recourse in cases of irreconcilable disagreements or anti-competitive abuses. The policy was summarized by the New Zealand Minister of Communications (Williamson, 1991, p. 16) in this way: "This government's policy is to set the regulatory framework for interconnection but not to involve the Government or its departments in direct negotiations. Leave that to the interconnecting parties And if they can't reach agreement on particular points, they can take their differences to Court where the Commerce Act and general competition law will be their adjudicator."

3.2 Telecom's Template Interconnection Contract

In line with its undertaking promising interconnection on fair and reasonable terms, Telecom held a series of industry briefings starting in June 1988 to vet its proposed interconnection arrangements. A standardized interconnection guidebook with specific arrangements proposed was published in July 1989.⁹

In essence, Telecom's interconnection proposals used numbering prefixes to distinguish between Telecom and non-Telecom networks, and required interconnectors to pay the standard retail charges for local and toll usage. Alternate local networks (e.g., cellular telephone systems) would be given 02XX access codes, and competing long distance networks were given 05XX access codes.¹⁰ The scheme also identified 17 points of interconnection (POIs) in Telecom's network where new long distance operators could establish trunk-side connections to Telecom's switches.

Telecom's proposed interconnection scheme envisioned an arm's length relationship between the established public network and its new rivals. Relative to the approach established by regulators in other developed countries, its terms and conditions were unfavorable to entrants. Telecom retained full control of the numbering plan. Users of alternate networks had to dial four additional digits. Whereas competitors in the U.S. and Australia pay what is in effect a discounted "wholesale" rate (based on incremental costs only) set by regulators for their usage of the public network, Telecom's competitors would pay the same usage rate as any individual business line user. Furthermore, its technical specifications for local interconnection were based on the assumption that the switches of its competitors would be small private branch exchanges rather than full-fledged commercial telephone switches.

Telecom's justification for this arrangement focused on how an access code-based differentiation of networks promoted true competition in a variety of ways. Specifically, Telecom argued that access codes: i) allow users to access easily a large number of competing networks; ii) promote informed choice by making it easy for customers to identify the service operator used and to relate the type of service received to specific carriers; and iii) facilitate switching and processing of calls by multiple networks. By the same token, a transparent or integrated numbering scheme diminished true competition among networks by i) requiring networks to have the same local calling area; ii) requiring the price of calls within a network to be the same as the price for calls between networks; iii) requiring ancillary services such as directory information to be provided jointly and in a non-differentiated way (Ministry of Commerce, Communications Division, 1992, pp. 21-22). As the government did not intervene at this point, Telecom's template became the starting point for all future negotiations.

3.3 Competition in National Toll and International Markets

As the law opening up network services to competitive entry went into effect in 1989, a total of seven groups of potential competitors began jockeying for position.¹¹ In the summer of 1990 two of the largest competitors, the Bell Canada-Television New Zealand partnership and the MCI-Todd Corporation-New Zealand Rail group, merged to form Clear Communications Ltd. Due to its backing by well-financed and technically

experienced North American and domestic firms, Clear's formation led to the withdrawal of all other large telecommunications interests.

In an important conjunction of events, Clear entered into interconnection negotiations with Telecom in mid-1990, just as Telecom was seeking government approval for its privatization deal. The government was unwilling to sign off on Telecom's privatization unless an interconnection agreement paving the way for workable competition had been made. As Clear was the only remaining competitor seeking interconnection and Telecom needed an agreement, Clear's bargaining power was enhanced.

On August 24, 1990, Clear and Telecom signed a Memorandum of Agreement setting out the broad outlines of an interconnection agreement. Only a few weeks later, the government sold its Telecom shares to a consortium led by the American firms Bell Atlantic and Ameritech. A final toll bypass interconnection agreement between Clear and Telecom was concluded March 4, 1991.¹² By May 1991, the Clear long distance network was up and running.

3.3.1 Analysis of the Clear-Telecom toll interconnection agreement

Clear's negotiations with Telecom produced several significant concessions from Telecom's template interconnection proposal. The final agreement fell somewhere between the "arms-length" relationship originally proposed by Telecom and the equal access arrangements characteristic of the U.S. and Australia, although it was closer to the former than to the latter. It is important to specify the exact nature of the agreement in order to aid in the later analysis of how competition has functioned in New Zealand.

Points of Interconnection (POIs). Clear's toll interconnection agreement used 15 of the POIs designated by Telecom, which allowed it to be accessed by 85 percent of New Zealand telephone users. Wherever Clear does not have a POI, it must terminate telephone calls using the Telecom toll network, and pay the regular Telecom toll charges.

Access Codes. Clear customers must dial a four-digit access code to use its network. Clear was assigned the 050X number group. 0500 and 0501 are the respective codes for Clear's national and international services. The 0508 code is Clear's toll-free service. The agreement promised to eliminate these special codes and automatically route calls from Clear customers to Clear's network when the new network's share of the national toll market exceeded 9 percent. (In fact, Clear exceeded the 9 percent share so rapidly that Telecom was unprepared to offer non-code access when this threshold was passed. As of February 1993, Clear customers were still dialing 050X to get into the network.)

The numbering distinction between Clear and Telecom was also extended to toll-free long distance numbers. Long established in the U.S., toll-free service has only recently been developed in New Zealand using the 0800 numbering block. Telecom considers the 0800 number group to be a branded product. It therefore refused to make 0800 numbers available to competitors without special payments to compensate it for marketing the idea. Unwilling to accept this deal, Clear began marketing its own toll free service using 0508. For technical reasons, Clear's 0508 toll-free service is not a full substitute for 0800 and is not universally available.

Interconnection Fees. Telecom's stated policy was that network operators would be charged the same usage fees as any other business customer for local and toll transport. Clear's negotiators won a small concession of 6 percent off the standard rates. Also, Clear

was not required to pay for the provision of the Automatic Number Identification (ANI) function.

Billing Name and Address Information. Billing Name and Address (BNA) information is used by network operators to identify and bill customers who make calls through their network. As a matter of policy, Telecom refused to supply BNA to Clear or any other competing network operator. Clear has created a customer database from its own application forms and bills its customers directly.

International Facilities. Clear and Telecom were unable to negotiate a satisfactory resale agreement for international facilities. Consequently, Clear was forced to acquire international satellite and cable circuits independently.

The list above makes for a sharp contrast with interconnection arrangements based on the principle of equal access. The new competitor is more difficult to access, and in numbering, international facilities, and billing, the competitive carrier had to develop its own practices and facilities rather than relying on a nondiscriminatory service offering from the established network. In addition to this, Telecom has engaged in practices that would be considered *prima facie* anticompetitive in other legal and regulatory environments. For example, Telecom is allowed to bundle together toll service, local access services, and customer equipment sales and offer substantial discounts on the resulting package to larger users. Large users are not infrequently offered discounts of more than the 6 percent offered to Clear on Telecom's standard toll and international charges.

Nevertheless, Clear achieved a much better deal than proffered in Telecom's original template agreement. It reduced its usage and ANI payments and was given a promise of non-code access in the near future. The movement toward non-code access indicated that Clear's understanding of its future role in the telecommunications service marketplace was more in line with the equal access models of regulated countries than with Telecom's "arm's length" model. The final agreement adhered consistently to neither model, but represented a compromise between the two. This compromise made it possible for both parties to come to an agreement whilst still retaining their own particular view of the proper approach to interconnection. This conflict of visions ultimately came to a head in the impasse over local interconnection, which is discussed below.

3.3.2 Results of toll competition in New Zealand

The assumption behind most pro-competitive, equal access policies is that the kind of inequalities listed above constitute a fatal obstacle to effective competition in telecommunications markets. But do they really? The following data indicate that despite the obvious inequalities in the interconnection agreement, national and international toll competition in New Zealand have functioned at least as successfully as competition in countries with policies that promote or protect competitors.

Telecom had four years, from the beginning of the deregulation process in April, 1987, to the beginning of Clear operations in May 1991, to prepare for the coming of competition. Telecom had inherited from the New Zealand Post Office massive subsidies from toll calls to local service estimated at NZ\$ 400 million per year. From 1988 to 1990 the new management moved to rationalize Telecom's price structure by rebalancing its tariffs. Long distance usage rates were cut by 35-50 percent. Monthly rentals for residential local telephone service were increased by NZ\$ 10 per month or 33 percent. Usage-sensitive pricing for local calls were instituted for business users of local telephone

service (Crook, 1990). Despite Telecom's impressive prior efforts to rationalize its rates, the advent of competition quickly produced additional price reductions and service improvements. Moreover, Clear gained market share at a pace faster than anyone had expected.

Pricing Changes in National and International Toll Services. Competition produced significant changes in the level and structure of national toll rates. Initially, Clear maintained its national toll tariffs at 10 percent below Telecom's. Clear also billed for calls at six-second increments, whereas Telecom's billing increment for long distance calls had been 1 minute. (Even without a change in the rate, reduction of the billing increment to one second can produce a price reduction of 5 to 8 percent.) Both initiatives were countered by Telecom. After eighteen months of competition, both carriers were billing at one-second increments after the first minute, and both were positioning themselves as the low cost provider. Both carriers also introduced volume discount plans for residences and businesses. For Clear, volume discounts started at 6 percent and went up to 20 percent. Telecom's volume discount plan went from 8 percent for small users to 14 percent for larger users. Clear also instituted discounts for prompt payment of 1-2 percent. Altogether, small users experienced a reduction of at least 14 percent, and large users a reduction of 20-25 percent, because of the Telecom-Clear rivalry.

In international services, Clear undercut Telecom's prices by 30 percent on every route except for Australia. Clear's entry forced Telecom to reduce its rates by 3 to 8 percent. Both carriers introduced volume discount plans for international services, ranging from 3 percent to 6 percent for Telecom and from 2 percent to 10 percent for Clear. Clear is investing NZ\$ 20 million to develop its own international facilities, half of which will go to a cable to Australia. This will intensify price competition in New Zealand's most important international route.

Unlike British Telecom, AT&T, and Japan's NTT, Telecom New Zealand did not maintain a price umbrella for its competitors and position itself as the high quality service. It announced its intention to compete aggressively on price and matched Clear's price cuts all the way. By 1993, there was little difference between Clear and Telecom prices.

Clear's Market Share. A consultancy report on liberalization of telecommunications prepared for the New Zealand government in 1988 projected that a new competitor would gain slightly less than 2000 customers and a market share of a few percentage points after one year (Touche-Ross, 1987). In fact, by December 1991, only seven months after beginning operations, Clear had about 30,000 customers and had already reached the 9 percent market share threshold that was supposed to lead to non code access. Clear's market share of national toll calls climbed to 16 percent by the end of 1992,¹³ and had stabilized at around 18 percent by the middle of 1993. Clear's share of international traffic varies by route, but was confirmed to be greater than its share of national tolls (i.e., greater than 18 percent) on the U.S., U.K., Singapore, Hong Kong, and Japan routes.¹⁴ For those who believe that equal access is a necessary condition for effective competition, these numbers are devastating refutations. Furthermore, the later implementation of noncode access did not result in any significant increase in Clear's market share.

Impact on Telecom Usage and Revenues. Competition put a significant dent in Telecom's revenues. In the final quarter of 1992, as the price war between Clear and Telecom raged, Telecom's national long distance calling volumes increased by 10 percent over the previous year and was up 4.4 percent over the nine month period ending

December 1992. Telecom's national toll revenues in the nine months ending December 1992, however, dropped NZ\$ 57.5 million (14 percent) when compared to the same period in 1991. According to Telecom, international outgoing minutes also increased by an unspecified amount, but revenue decreased by NZ\$ 25.5 million (7 percent). Although Telecom attained record profit levels, the growth in profitability came from a combination of revenue growth in businesses still untouched by competition, such as cellular telephony and local service, and from steady reductions in its labor force. Telecom's rapid erosion of market share and revenue in national toll encouraged it to take a tougher stance in its negotiations over local interconnection.

The apparent success of the New Zealand regime in the national toll market can be deceptive. Relative to the problems posed at the local level, long distance interconnection and competition is fairly simple to implement, and there are long-standing precedents in the U.S., U.K., and Japan. The combination of a technological revolution in long distance transmission and a century-old tradition of averaged pricing has left the price and incremental cost of long distance service so far apart that it would be difficult for any reasonably efficient new business *not* to undercut the prices of the monopoly on a few main routes after obtaining universal access to all users via the established network. The U.S., Japan, and Australia have all taken very different approaches to the pricing of long distance interconnection (many elements of which are completely unjustifiable in economic terms). Yet in each case the effects of long distance competition have been similar: a fairly rapid bidding down of prices and the achievement of a significant market share by the new entrants.

3.4 Clashes over Local Interconnection

Competitors have also begun to enter the local service market. BellSouth has established a digital cellular telephone network to contest Telecom's formerly exclusive control of the cellular market, and Clear Communications has attempted to establish a Centrex-type service to compete with Telecom in the supply of business local exchange service. In both cases negotiations have been protracted. Whereas BellSouth concluded an interconnection agreement, Clear and Telecom were unable to reach acceptable terms for local interconnection, resulting in litigation which took two and a half years to resolve.

3.4.1 The BellSouth-Telecom interconnection agreement

Telecom's cellular telephone subsidiary was until recently the only company offering mobile telephone service in New Zealand. Telecom Cellular's monopoly has been one of the brightest spots in its financial picture. During the 1992 year, revenues grew at a rate of 24 percent and the number of cellular users grew by 38 percent. At the beginning of 1993 there were approximately 92,500 cellular customers in New Zealand, or about 2.7 percent of the population. By late 1995, there were approximately 300,000 cellular users on Telecom's network.

BellSouth successfully bid on the frequency band set aside for cellular service in 1990, and announced its intention to offer digital service using the European GSM standard. In February 1992 it entered into negotiations with Telecom for interconnection. An agreement was concluded by mid-1993. The agreement was far less favorable than Clear's. As was the case in negotiations with Clear, Telecom refused to release its customer database (BNA

information) to BellSouth. When calls pass from the Telecom network into the BellSouth network, Telecom buys airtime from BellSouth for the call and bills its own customers. Unlike Clear, BellSouth also was required to pay for ANI information for each call that goes into the Telecom network. BellSouth felt that this requirement was unfair because ANI information is a standard part of the switching and signaling system, and no extra costs are required to supply it to BellSouth. BellSouth did not get any discounts off of the regular Telecom charges for terminating local calls. In fact, it agreed to pay a premium of about NZ\$.04 per minute over the standard usage charges for business calls. The 1993 agreement contained a number of other highly restrictive features which have since been discarded due to their anticompetitive implications. Under the original contract, for example, BellSouth could not contract with a third party (e.g., Clear Communications) for long distance interconnection or local exchange interconnection without the approval of Telecom New Zealand. There is also evidence that Telecom delayed certain forms of interoperability BellSouth needed in order to implement its planned automatic international roaming service until Telecom had introduced its own international roaming service (BellSouth, 1995). Thus, BellSouth's ability to obtain a "first mover" advantage through service innovation was destroyed.

BellSouth signed the agreement because it had no choice if it wanted to get into the business. Nevertheless, it claims that it is "not satisfied" with the outcome of the negotiations, and that the results are a "major handicap in our ability to compete."¹⁵ Price competition is not possible in the market because Telecom controls its costs. In the two years since the agreement was made, Telecom's subscribership has continued to soar, while BellSouth has a very limited market penetration. This is in contrast to worldwide trends, where cellular is almost everywhere a highly competitive marketplace in which incumbents with a head start have not enjoyed this sort of market dominance. In sum, the BellSouth-Telecom interconnection agreement was precisely the sort of unbalanced, if not crippling, contract that could be expected from deregulated interconnection coupled with total control of access by the incumbent.

3.4.2 The Clear-Telecom dispute over local interconnection

It was apparent from August 1990, when the first Memorandum of Understanding between Clear and Telecom was signed, that Clear intended to enter local as well as long distance service. The issue of local interconnection, however, was temporarily set aside so that the parties could reach an agreement on the less complicated issue of toll bypass. When the issue was taken up again in March 1991, Clear and Telecom found, after six months of negotiations, that they could not agree on fundamental issues pertaining to numbering and access pricing. The breakdown of negotiations led to a severe test of the viability of the whole New Zealand approach to telecommunications liberalization. Under New Zealand's system of nonregulation, Clear and Telecom's dispute had to be taken to court and tried on competition policy grounds. Specifically, Clear set out to prove that Telecom was in breach of Section 36 of the Commerce Act. Both litigants acquired some of the best economists money can buy; hence the court record provides a comprehensive exegesis of the economic issues posed by interconnection and competition in telecommunications.¹⁶

The Basis of the Clear-Telecom Dispute. The MOA signed by Clear and Telecom on August 24, 1990 contained certain broad conditions pertaining to local interconnection. Since local interconnection was not included in the toll bypass agreement, a revised

Memorandum of Understanding (RMOA) was signed March 4, 1991 in order to preserve and restate the two parties' intention to enter into a local agreement. The terms for interconnection proposed in the RMOA were essentially the same as those contained in Telecom's template interconnection proposal.¹⁷ As such, they were acceptable to Telecom but not to Clear.

Clear's alternative proposal, made March 13, 1991, was driven by the objective of total transparency between the two networks, and thus differed markedly from the RMOA. Clear wanted to be allocated complete blocks of unused NXX-XXXX numbers from the national numbering plan. These ordinary numbers, rather than a special access code, would be used to call Clear customers from the Telecom network, and vice-versa: Clear customers would perceive no difference between calling other Clear customers or Telecom customers. Each network would bill its own customers at its own rates and retain all revenue. No payment for terminating calls from the other network would be imposed by either party. This latter condition Clear perceived to be essential to the economic viability of its service.

Telecom disagreed with this proposal on two essential points.¹⁸ First, transparent numbering arrangements were unacceptable to it because of its strong belief that real competition required product differentiation. Consumers should know which network they were using and the price and service associated with it; the access code conveyed this information. Telecom also believed that it was entitled to be paid for terminating calls from the Clear network. Handling such calls, it argued, incurred much the same costs as handling any other telephone call.¹⁹ In addition to these direct responses to Clear's proposal, Telecom began to introduce a new issue into the negotiations. It expressed concern about the additional costs imposed upon it by its Kiwi share commitments and the competitive handicap this represented. Thus, it began to broach the idea of an "access levy" which would increase interconnection charges to gain a contribution from competitors to its subsidy to rural and residential subscribers. With these two positions staked out negotiations stalled.

The Resale Incident. Relations between the parties broke down entirely in July-August, 1991. Clear attempted to purchase Telecom's DDI service in order to meet a contractual obligation to provide local service to a government department in Wellington. Telecom refused to supply the service, fearing that DDI resale would allow Clear to achieve effective interconnection without using an access code or paying an access levy. This episode has not attracted much attention in analysis of the New Zealand case, but to this observer it is quite important. It shows that Clear could have overcome the barrier of the network externality quite easily, by purchasing a pre-existing Telecom service. Telecom apparently felt that this kind of competition was so serious that it refused to supply service altogether. Indeed, in the final Court resolution of the case this is the *only* action of Telecom which was unambiguously found to be a violation of the Commerce Act. At any rate, Clear's inability to meet its service commitment to the government Department, made many months before when it had hoped that negotiations would be concluded early, was a severe embarrassment. It filed a lawsuit charging Telecom with violating Section 36 of the Commerce Act at that time.

Economic Theory to the Rescue? Convinced of the need for expert advice on the appropriate principles for access pricing and the defense of its access levy, Telecom engaged the American economists Baumol, Willig, Kahn, and Rohlfs in November of

1991. Over the course of the next eight months, Telecom made Baumol and Willig's "efficient component pricing rule" the basis for its interconnection rates. In essence, the Baumol-Willig pricing rule compensates the incumbent for the incremental costs of supplying access to competitors *plus* the opportunity costs incurred by not restricting access to itself. (A more complete statement and discussion of the method can be found in section 4, below.)

The positions advanced by Kahn and Rohlfs, on the one hand, and Baumol and Willig on the other, differed in certain respects but both supported Telecom's claim that its interconnect prices could legitimately include a contribution to network overhead in addition to incremental cost. Indeed, the Baumol-Willig testimony supported Telecom's desire for an "access levy" in much more sweeping terms than Telecom itself had originally framed it. According to their rule, Telecom's price for interconnection could legitimately recover not only incremental costs and a contribution to the KSO, but also a markup that would compensate it for *all* opportunity costs incurred by Clear's use of its facilities. Baumol's testimony asserted that such a pricing rule, far from being anti-competitive, was the only one consistent with competitive marketplace norms.

By June 1992 Telecom had formulated its final bargaining position. It dropped the demand that Clear customers be accessed via a special numbering code, and proposed to give Clear all 90X numbers in each local calling area. Calls to the Clear network would be differentiated by the use of a distinct dial tone. Telecom still demanded to be paid for terminating calls from the Clear network. Telecom proposed that it be paid its standard business usage rates less that part of its cost saved by Clear carrying the call part of the way. Clear's payments for access to the Telecom network would be the equivalent of a monthly line rental at business rates less any saving in its average incremental cost created by Clear's local loop facilities. Using the economic principles embodied in Baumol and Willig's economic principles and the calculations performed by an accountant, Telecom prepared an "access levy" table specifying the rates Clear would pay for access to and usage of the Telecom network.

The High Court released its decision in December 1992. Although it ruled that Telecom had violated Section 36 of the Commerce Act in a number of minor ways, the primary thrust of its decision was that the economic principles advanced by Telecom's economic experts provided an appropriate basis for resolution of the interconnection dispute. In other words, the Court gave its stamp of approval to the Baumol-Willig charging scheme. The court was convinced that the Baumol-Willig framework provided the proper principles for interconnect pricing and all that remained was to develop specific charges based on those principles.

Clear Communications took this decision to the Court of Appeal. The Communications Division of the Ministry of Commerce was also unhappy with the decision, because it was convinced that local competition could not develop under the Baumol-Willig framework. The Appeals Court overruled the High Court and held that Telecom's reliance on the Baumol-Willig pricing rule was in breach of Section 36 of the Commerce Act. The opinion particularly criticized the way the pricing rule might allow Telecom to recover monopoly rents. The rule was also unacceptable to the Court because its proper implementation appeared to require the existence of a regulatory body capable of identifying costs and conducting regular reviews of access charges. Such extensive regulation did not appear to be possible given government policy of nonregulation.

Telecom immediately refused to accept the Appeals Court's rejection of the Baumol-Willig pricing rule. Clear, on the other hand, objected to the Court of Appeal's refusal to award it damages. Both parties took the case to the court of last resort, the British Privy Council. On October, 19 1994, the Privy Council issued a decision upholding the Baumol-Willig pricing rule. Telecom's use of the rule as a bargaining position did not constitute the use of its dominant position in violation of Section 36 of the Commerce Act but was in fact an appropriate model for approximating the behavior of a firm in a competitive market. The Council pointedly emphasized in its decision that the New Zealand government had the option, should it desire to use it, of directly regulating interconnection prices by activating Part IV of the Commerce Act.

By mid-1995, New Zealand's government, as well as most industry participants aside from Telecom, were deeply dissatisfied with the outcome. Clear and Telecom still had not arrived at a mutually acceptable pricing agreement. Sometime in the late summer of 1995, New Zealand's Prime Minister called both parties into a private meeting and delivered an ultimatum: settle the matter or the government would intervene under Part IV. In September 1995, almost exactly the same time as the Ministry of Commerce issued a Discussion Paper analyzing the situation and outlining various options for intervention, Clear and Telecom announced that they had settled on the basic elements of an interim interconnection agreement. The precise terms of the agreement were not disclosed. But the pattern remained the same: the local interconnection agreement, like the toll agreement, was more a response to political pressure than the outcome of commercial negotiation.

4. ANALYSIS AND CRITIQUE OF NEW ZEALAND'S INTERCONNECTION POLICY

The attention devoted to New Zealand's experiment is far out of proportion to the economic significance of the country's telecommunications marketplace. And rightly so. Interconnection is the critical issue in the transition to a new industry structure, and New Zealand's experience provides an unusually pure experiment with a certain approach to interconnection policy. In this section I shall evaluate that experiment and attempt to derive lessons for policymakers in both New Zealand and elsewhere. I make three arguments. First, interconnection cannot be deregulated until the demand-side inertia created by user convergence on a single network is eliminated or undermined. Second, the Baumol-Willig pricing rule does not offer a satisfactory solution to the problem of interconnection pricing in a monopolized market. Third, structural interventions (specifically, divestiture and resale) may be the most effective tools in paving the way for a market in interconnection. These ideas are elaborated in turn below.

4.1 Interconnection Incentives

Although it publicly voiced its demand that interconnection must be supplied, the New Zealand government provided neither Telecom nor its competitors with a specific definition of what constituted "fair and reasonable" terms. Nor is it immediately and unambiguously apparent what are the interconnection policy implications of a general competition law. New Zealand's regime can thus be described as one of requiring interconnection but

deregulating the process by which an interconnection agreement is made. This is not a viable solution to the interconnection problem; it is a recipe for conflict and confusion.

Telecom's market power is derived from the user "lock-in" created by demand-side economies of scope. It is unrealistic to expect a monopoly that benefits from this inertia to voluntarily negotiate an interconnection agreement that would eliminate or erode it. Thus, New Zealand's attempt to deregulate interconnection arrangements has failed because there is no commercial incentive to bargain between the incumbent and its competitors. The New Zealand experience thus supports Brock's (1981) characterization of the incentives of networks regarding interconnection. An incumbent with virtually universal coverage in a saturated market has nothing to gain from interconnection with a start-up rival. A situation of dependence rather than of mutual gains from trade prevailed. The interconnection agreements which were made were clearly products of direct or indirect political pressure rather than commercial incentives.

This should not necessarily be taken as an indictment of Telecom. For Telecom, deregulated but obligated interconnection created a contradictory mandate. It was expected to act like a commercially-motivated, competitive firm, yet it was forbidden from doing what any commercially-motivated, competitive firm would do if it were in its shoes, namely, refuse to interconnect altogether. Reliance on the Commerce Act 1986 did not provide much help. Interconnection prices are obviously the decisive factor affecting the viability of competition in the market. But without a competitive market in place to determine efficient interconnection prices, the law cannot easily decide whether new competition is unprofitable because the incumbent is engaging in illegal, anti-competitive behavior, or simply because the competitor is inefficient relative to the incumbent.

Telecom itself recognizes that its only commercial motivation for interconnecting with competitors is to fulfill its commitment to the government and, even more important, to avoid regulation. When asked by the author what commercial benefits it received from providing interconnection to its rivals, a Telecom spokesman replied that "the preservation of the deregulated environment in New Zealand" was the *only* "compelling reason to provide interconnection on 'fair and reasonable' terms." In regulated environments, the spokesman added, "rules are established to confer benefits on one or more competitors at the expense of one or more other competitors. The previous monopoly telephone company usually ends up on the 'expense' side of things Accordingly, [avoiding regulation] is the main 'commercial' benefit for Telecom to provide interconnection to competing networks."²⁰ (If avoiding regulation was Telecom's objective then its court victory was a pyrrhic one indeed, for as we shall see the interconnection methodology it adopted proved to be one which requires active regulation.)

4.2 The Baumol-Willig Pricing Rule

In the absence of commercially negotiated interconnection, the Baumol-Willig pricing rule was adopted by Telecom and later validated by the courts as the proper basis for interconnection rates. Whatever its merits as pure theory, the Baumol-Willig rule does not provide a way out of New Zealand's impasse. As the following arguments demonstrate, it simply steers New Zealand back onto the path of technical and economic regulation.

4.2.1 Description of the Baumol-Willig rule

Baumol and Willig's "efficient component pricing rule" has been widely debated and discussed so a short restatement will suffice here. Telecommunications service involves the production of two (or more) service components. The incumbent firm is an integrated provider of both components. The competing firm can produce one component by itself (connections to its own customers) but must buy the second component (connections to all other customers) from the incumbent in order to be able to offer the final product (ubiquitous telephone service) to consumers. The problem, then, is to define an efficient price for the second component. In Baumol's proposed pricing methodology, an efficient price permits competitive entry only by firms that are more efficient than the incumbent at the production of the first component, while fully compensating the incumbent for the incremental and opportunity costs incurred by the supply of the second component. The inclusion of opportunity costs is the source of controversy. Baumol contends that it is economically irrational and inefficient for an incumbent firm to offer the contested component for only the incremental cost. Such a pricing scheme fails to recover the contribution to overhead (the opportunity cost) that the firm could gain if it sold the final product to end users itself.

4.2.2 Critique of the Baumol-Willig rule

The Baumol-Willig rule is sound theory but inadequate policy. It is in essence a description of how a perfectly competitive or contestable market *would* operate, not a strategy for moving from a monopolistic market to a competitive one. The critique of the method is based on three arguments. First, the rule can be applied only if the provider of interconnection is offering the final product at a rate established in a competitive market. Second, application of the rule in non-competitive conditions requires substantial government regulation. Third, the transition from competition to monopoly requires unbundling the components of telecommunications service in new ways, and the rule does not address the pricing problems posed by this.

The Final Product Price. The methodology operates under a crucial constraint: it can be applied only if the provider of interconnection is offering the final product at a rate established in a competitive market. If the final product price is set by a monopoly, then extensive regulatory oversight of the incumbent monopoly will be required to ensure efficiency. Baumol's testimony makes this constraint quite clear.²¹ By working backwards from the assumption of a competitive price, the method assumes away the very crux of the problem, which is that we don't know what price should be charged for the final product owing to the existence of a monopoly. Under monopoly conditions, the actual effect of the Baumol-Willig pricing rule is to give the monopolist a property right to its monopoly rents.

Need for Regulation. In his New Zealand testimony and in the academic debates surrounding the rule, Baumol recognized these problems but contended that they could be addressed through regulatory control of the incumbent firm's prices.²² The method's reliance on regulation can be considered a negative for two reasons. First, there is no regulatory agency in New Zealand, so it is inappropriate to adopt a pricing methodology that requires one. Second, and more fundamentally, regulation, particularly regulation which attempts to define and monitor costs and prices in a multiproduct environment, has been a source of continuing controversy and delay where it has been relied on. Competition was authorized and new regulatory techniques developed (e.g., price caps and

incentive regulation) in order to move away from what came to be seen as increasingly futile attempts to link specific costs to specific services.²³

A similar criticism can be made of the “uniform spread” principle of access pricing advanced by Alfred Kahn (1992). Kahn’s approach is based on the requirement that the incumbent charge competitors for interconnection the same thing it charges itself. In theory, such a methodology avoids the monopoly profits problems raised by the Baumol-Willig rule but still requires extensive regulatory oversight of the incumbent’s costs. The success of Kahn’s approach depends entirely upon accurate identification of three economic data: i) Telecom’s actual marginal costs of supplying access to itself; ii) the actual contribution or cross subsidy made by local business access to residential service; iii) the amount saved by Clear doing part of the work. It is difficult to understand how this information can be gathered and validated in a changing technological environment without the existence of a regulatory authority with ongoing supervisory powers. Even with a regulatory agency, it is not easy for regulators or competitors to unambiguously identify the dominant firm’s incremental costs. Regulatory agencies rely on the firm itself to supply the accounting information, and the preponderance of joint and common costs in telecommunications networks makes it difficult to arrive at noncontroversial conclusions. To repeat, past experience with cost studies has not been promising.

Unbundling. Another problem with both methods is that many of the services to be priced are not traded in a market yet. With respect to Kahn’s argument, incumbents don’t really “charge themselves” for the interconnection services they “supply to themselves.” In a monopoly network, full-service interconnection is *not supplied on the market*. That is precisely why there is an interconnection problem. Frequently there is not even an established definition of the services required by an entrant; equal access arrangements in the U.S., for example, were created by legal and regulatory mandate. The difference between an internal hierarchy within a firm and an external transaction conducted across a market is fundamental to industrial organization theory, and one wonders how economists of this caliber can base their pricing methodologies on premises which seem to ignore that distinction.

The Baumol-Willig method in particular assumes that the components to be priced are already well defined and traded in a market. In the case of the Baumol’s routinely used example of interconnecting railroads, the model assumes that service between cities is already a combination of easily separable, clearly-defined routes, each with its own identifiable incremental costs. This is not yet the case with many of the telecommunication interconnection services. To carry forward the railroad analogy, the following would be a more appropriate case: assume that there are two railroads, A and B, whose lines don’t intersect. Railroad B wants to interconnect its track with A’s switching center in one city and run its *own* trains on A’s track to other cities. While the principle of defining opportunity costs still holds, it is no simple matter to determine what the opportunity costs are when new forms of access are created. In addition to the costs of constructing access facilities that connect A’s lines with B’s and the opportunity costs associated with B’s use of A’s track, additional administrative costs, such as signaling and coordination problems, will be created. The incumbent A is not simply selling a pre-existing service to B. It is engaging in forms of administrative coordination which are not, as yet, sold on the market to others.

The obvious limitations of the Baumol-Willig rule provides the springboard for a more general argument. *Any* pricing methodology based on economic theory alone will be of limited usefulness in the transition to a competitive telecommunications market. Neoclassical theory in particular focuses almost exclusively on the relationship between marginal costs and prices within a framework that assumes perfect competition or perfect contestability. The problem with this approach is that it assumes away the biggest problems facing regulators and the industry. Due to the absence of effective market competition, we do not *know* what costs really are, what cross-subsidies are present, and whether or not monopoly rents exist. Any attempt to translate theoretically derived pricing regimes into practice must compensate for these shortcomings by employing discovery procedures such as cost studies, continuous regulatory supervision and of course, the inevitable byproduct of such activities, litigation. Elegant theory thus results in highly inelegant institutional arrangements. If New Zealand's attempt to set interconnection prices by "deregulating" them failed, so did its attempt to use economic theory as a substitute for commercial negotiation.

4.3 Structural Solutions

In this section I want to show that structural interventions, coupled with a longer-term time horizon, offer better ways to approach the interconnection problem. The incumbent's market power can be undercut through actions such as divestiture and/or forms of resale rather than by regulation of interconnection. Structural remedies are preferable because they leverage the power of market forces to erode monopoly power. They avoid the information-gathering and monitoring costs of traditional rate regulation, and are more precisely targeted at the causes of monopoly power.

4.3.1 The theoretical rationale for structural intervention

It is first necessary to elaborate on the theoretical basis for this approach, drawing on the analysis developed in section 2 of this chapter. Both the court record and the Discussion Paper issued by the Ministry of Commerce, The Treasury (1995) reveal serious misconceptions concerning the source of Telecom's monopoly power. Both tend to be based on traditional natural monopoly theory, which focuses on supply-side efficiencies. The Ministry of Commerce Discussion Paper, for example, begins by expressing an assumption that local telecommunications service is a natural monopoly. Its only support for this conclusion is the bald assertion that "portions of Telecom's network are a natural monopoly [and] these portions cannot be economically duplicated by Clear or other entrants" (Ministry of Commerce, The Treasury, 1995, p. 17). But precisely what "portion" of the Telecom network is a natural monopoly? The report never explicitly identifies this, a rather surprising omission given the centrality of this question. Presumably the report is referring to local access lines. The plain fact, however, is that Clear, and potentially hundreds of other entrants, are quite capable of duplicating any *individual* access line. It might be argued that it is the accumulation of access lines that provides the "natural" basis for monopoly; it is indeed more difficult to find the capital resources to duplicate all of them within a reasonable period of time. But even this is not the main problem. A cellular telecommunications provider can cover all of New Zealand's central business districts with wireless access facilities fairly rapidly. Presumably,

BellSouth has already done this. The “bottleneck” remains, however: even a universal alternative network that sprang into being overnight would need to bargain with Telecom for access unless the majority of New Zealand’s telephone users switched to the new network immediately. Duplication of access facilities is not, therefore, the primary issue.

The source of Telecom’s market power is not a supply-side “natural monopoly” in some physical “portion” of the public network. It is the network externality, or more precisely the demand-side inertia created by the fact that most users are already on its network, and would have to sacrifice considerable demand-side economies of scope to switch to a new network.

4.3.2 Policy implications

A monopoly based on demand-side economies of scope is a very different animal from the natural monopoly of traditional neoclassical theory, which is based on declining costs on the supply side. Consequently, the appropriate policy responses are also different. We can identify the following as the broad implications of a policy approach grounded in a demand-side analysis of the incumbent’s market power:

- i) Real competition in local telecommunications means duplication of local access facilities. Policy should therefore encourage duplication of access facilities, not preclude it as counter to a presumed “natural monopoly.” (If policy makers believe that duplication is not feasible or desirable then they should abandon their objective of a competitive local telecommunications market.)
- ii) The supply of access must proliferate (and/or fragment) until it reaches the point at which no one provider controls the pathway to a critical mass of users. At that point, and that point only, negotiations between interconnecting suppliers of access take on the characteristic of a real market transaction, and deregulation of interconnection is appropriate.
- iii) The most direct way to divide the control of access beyond the critical mass point is to break up the incumbent telephone company. Divestiture can take a variety of forms, which will be discussed below.
- iv) Competitors should also be able to interconnect with the incumbent through the purchase of pre-existing forms of service without being subjected to price discrimination and without assuming any special legal or regulatory status as “network operators.” Resale allows new entrants to overcome the network externality while bypassing the need for lengthy negotiations. It also imposes economic discipline on the incumbent, by enabling arbitrage (to destroy cross-subsidies) and preventing predatory forms of price discrimination between competitors and large users.
- v) A telephone network is a huge bundle of different access units. Competition in the supply of access is therefore necessarily a long-term process that will take root in certain user clusters and gradually spread to other communities of interest. The idea that a theoretically defined pricing rule or the choice of one particular regulatory

regime over another will instantly create a homogeneous, competitive marketplace for telephony is unrealistic.

vi) Insisting on access and interconnection arrangements that enforce competitive parity according to the most exacting standards of textbook economics can be an obstacle to real competition rather than an aid to it. Inequalities in access conditions between competing networks provide one of the strongest incentives to supply alternative access facilities. Furthermore, the definitions of competitive parity offered up by neoclassical theory generally ignore the appropriability problem.

4.3.3 Divestiture

The root of the interconnection problem is the asymmetric incentives to deal on the part of the incumbent and new entrants. The cleanest way to rectify this problem is to ensure that existing access connections are not under the exclusive control of a single firm. Specifically, Telecom could be broken up by, for example, dividing Telecom into three or four integrated operating companies based in different geographic regions, or by separating Telecom's cellular subsidiary from Telecom's wireline network.

If the first option were chosen, each unit would be based in different territories and control the former Telecom's facilities in those territories, but would be authorized to enter all service and equipment markets in the other territories. This proposal shares some of the features of an American-style divestiture, but important differences must be clearly understood. The AT&T divestiture of 1984 was based on an artificial distinction between "local" and "long distance" markets which could only be maintained by establishing arbitrary territorial divisions and legal barriers between various telecom service markets. The theory behind it was to isolate the supposed "natural monopoly" segment of the market (local exchange access) from the supposedly "competitive" long distance segment. (In this respect American policy makers made the same conceptual error as the New Zealand Discussion Paper.) What is proposed here is the division of Telecom into fully integrated telecommunication companies based in separate territories, not a separation along "local" and "long distance" markets. The idea is to *fragment the control of access* rather than to quarantine a so-called natural monopoly market. This does not require any artificial boundaries between markets, only the prevention of collusion between the remaining players.

Another possibility, which would be easier to implement and in many ways even more well-targeted, would require Telecom to spin off its cellular subsidiary. This might be considered appropriate because wireless markets offer one of the greatest hopes for the growth of local competition. Relative to the rest of the world, New Zealand's wireless voice telephony market is not very competitive, primarily because of Telecom's head start and the unfavorable interconnection requirements imposed on BellSouth. A divested Cellular subsidiary would clear the way for a more even-handed treatment of wireless competitors by the fixed network. It is worth noting in this regard that in 1990 the New Zealand Commerce Commission attempted to preemptively divest Telecom of certain cellular interests, by declining to approve Telecom's successful tendering for the AMPS A cellular band. The Commission ruled that control of both AMPS bands by Telecom would restrict new competition in cellular. The Commerce Commission was eventually overruled by the courts in 1992, but its reasoning has been upheld by events.

Divestiture would eliminate the incentive problem in interconnection negotiations that has plagued New Zealand's otherwise successful liberalization program. Each divested unit would control some, but not all, of the access required to serve the entire market. Each would be dependent upon the others to provide universal access. Each would therefore have a real incentive to engage in interconnection negotiations and conclude "fair and reasonable" terms and conditions. Structural separations, however, must be combined with nondiscrimination principles, so that the interconnection agreements between the pieces of a divested Telecom could be extended to other competitors.

4.3.4 Nondiscrimination and resale

Nondiscriminatory resale of the incumbent's existing services would be sufficient to overcome many of the competitive barriers created by the network externality. In essence, nondiscriminatory resale overcomes the network externality barrier to entry while finessing endless debates over costs.

New Zealand's current regime puts competing network operators in a special legal and economic category and requires each of them to individually negotiate specific terms and conditions with Telecom. This, by itself, is a formidable barrier to entry. If an incumbent makes a service available to one buyer at a certain price, why shouldn't it be required to make the same service available to any other willing buyer? Throughout the Clear-Telecom battle, some of Telecom's most damaging actions involved simple refusals to offer Clear services that it routinely offered normal business users (e.g., refusal to offer leased lines to allow Clear to expand its long distance network access, and refusal to offer Clear DDI.) If the market in question is business voice telephone service, for example, simple resale of DDI would be an alternative to interconnection negotiations. DDI resale does not provide complete interworking between the two systems and no one will get rich on it. But it does quickly overcome the network externality (the new entrant's main concern), and it does compensate Telecom adequately (otherwise Telecom would not offer that price on the market to other users). If resale of Telecom facilities does not provide a viable business in the long term or the optimal platform for service innovation, then competing networks will be pressured to do more than resell Telecom facilities. This is as it should be. Competing networks will have to find a way to innovate their way around the limited form of interconnection made available in this way.

The computer networking industry offers an interesting model in this regard. Internetworking has flourished in data not by integrating the intelligence and operations at the *network administration* and *control* level, as regulators have attempted to do in telephony, but by placing more intelligence in the *terminal equipment*. Once access through resale is guaranteed, an incentive exists to develop innovations in signaling, service and equipment at the CPE end of the circuit to ensure interworking and minimize the inequality between networks. In telephony markets, it is clear now that inequalities in access arrangements are not an insurmountable barrier to entry as long as the competing network has something sufficiently valuable to offer users to compensate for the additional effort. Access codes, for example, had little impact on the viability of Clear. In other parts of the world, callback services have thrived, indicating that many users are willing to trade rather cumbersome dialing procedures and technically inferior line quality for price discounts. Over the longer term, the use of automatic dialers and other kinds of software-controlled interfaces can diminish or eliminate these barriers.

5. CONCLUSION

New Zealand's experience is full of valuable insights and lessons for other countries. New Zealand began by attempting to treat interconnection like any other commercial negotiation between firms. "Deregulated" interconnection, however, ignored the demand-side inertia that gave the incumbent market power. Although this phase of the policy did produce notable successes in toll markets, the interconnection agreement on which this was founded was more a product of political pressure than commercial negotiation. (The announcement of a deal between Clear and Telecom in the Fall of 1995 also was a reaction to the government's implied threat to intervene.)

When an impasse developed over local interconnection, New Zealand moved the controversy into the courts. There the judges struggled to make economic theory rather than commercial negotiation the arbiter of interconnection pricing. This, too, failed. True, after about two years of litigation the courts arrived at an apparent resolution, namely that the "efficient component pricing" method proposed by Telecom's economic consultants was the valid way to handle the problem. But this method, to be implemented, required extensive accounting and cost studies, which merely succeeded in generating additional points of controversy. And to top it off, the proposed pricing method, according to its own advocates, required regulatory supervision now and in the future. Since the entire point of New Zealand's telecommunications policy was to rely on negotiations and the courts in order to avoid the creation of a regulatory agency, this outcome must be adjudged a failure, and a rather ironic one at that.

In the final phase, New Zealand's policy makers appear to have decided that some kind of regulation or further intervention is inevitable. Whether Telecom will preempt these moves with its deal with Clear remains to be seen. For the rest of the world, however, New Zealand's experience can be interpreted as supporting structural and evolutionary approaches to the introduction of competition in telecommunications. New Zealand's deregulated approach would have worked better, it is clear, had it paid more attention to competition policy and industry structure during its privatization of the Post Office and the radio spectrum. Had Telecom been broken into smaller pieces during its privatization, or if its wireless holdings had been limited, competition would have developed far more rapidly. New Zealand also erred by giving Telecom too much power to prevent resale of its facilities, and by putting competing networks in a special legal category. Both policies made it easy for Telecom to wield its market power by means of discriminatory pricing and policies. Divestiture and nondiscrimination should be placed on the international agenda as an alternative to regulation as a response to the problem of interconnection.

REFERENCES

- Baumol, William J. and J. Gregory Sidak (1994). *Toward Competition in Local Telephony*. Cambridge, MA: MIT Press.
- Baumol, William J. and Robert D. Willig (1991). "Brief of Evidence: Economic Principles for Evaluation of the Issues Raised by Clear Communications Ltd. on Interconnection with Telecom Corporation of New Zealand Ltd."
- BellSouth (1995). "BellSouth's Submission to the Government."
- Brock, Gerald W. (1985). "Telephone Pricing to Promote Universal Service and Economic Freedom." U.S. Federal Communications Commission Office of Plans and Policy, Working Paper No. 18.
- Brock, Gerald W. (1981). *The Telecommunications Industry: The Dynamics of Market Structure*. Cambridge, MA: Harvard University Press.
- Cave, Martin (1993). "Interconnection, Separate Accounting, and the Development of Competition in U.K. Telecommunications." Institute of Economic Affairs, Lectures on Regulation.
- Clear Communications v. Telecom Corporation* (1993). 5 TCLR 166 (High Court).
- Clear Communications v. Telecom Corporation* (1993). 5 TCLR 413 (Court of Appeal).
- Cornell, Nina (1992). "Brief of Evidence of Nina W. Cornell."
- Crook, John (1990). "Telecommunication Operations in the World's Most Open Market." Presentation at the Inter Comm Conference, Vancouver, Canada, October 22-26.
- David, Paul A. (1985). "Clio and the Economics of QWERTY." *American Economic Review* 75, 332-37.
- Economides, Nicholas and Lawrence J. White (1993). "One-way Networks, Two-way Networks, Compatibility, and Antitrust." New York University Stern School of Business, Working Paper EC-93-14.
- Farrell, Joseph and Garth Saloner (1987). "Competition, Compatibility, and Standards: the Economics of Horses, Penguins, and Lemmings." In H. Gabel, ed., *Product Standardization and Competitive Strategy*. New York: North-Holland, 1-22.
- Faulhaber, Gerald (1987). *Telecommunications in Turmoil: Technology and Public Policy*. Cambridge, MA: Ballinger.

- Kahn, Alfred E. (1992). "An Economic Evaluation of the Issues Relating to the Terms of Interconnection Provided to Clear Communications by Telecom New Zealand."
- Mueller, Milton (1996). *Universal Service: Interconnection, Competition, and Monopoly in the Making of the American Telephone System*. Cambridge, MA: MIT Press.
- Neu, Werner and Karl-Heinz Neumann (1993). "Interconnection Agreements in Telecommunications." Wissenschaftliches Institut für Kommunikationsdienste (WIK), Diskussionsbeitrag Nr. 106.
- Noam, Eli M. (1993). "NetTrans Accounts: Reforming the Financial Support System for Universal Service in Telecommunications." Paper presented at conference on Universal Service in the New Electronic Environment, Washington D.C., October 15.
- Ministry of Commerce, Communications Division (1992). "Telecom's Justification of Existing Arrangements." *Telecommunications Numbering in New Zealand: An Issues Paper, Second Report*. Wellington, New Zealand: Ministry of Commerce.
- Ministry of Commerce, The Treasury (1995). "Regulation of Access to Vertically Integrated Natural Monopolies: A Discussion Paper." Wellington, New Zealand: Ministry of Commerce, The Treasury.
- Rohlf's, Jeffrey H. (1992). "Economic Issues in Clear vs. Telecom (Before the High Court)."
- Telecom Corporation of New Zealand Ltd., Corporate Policy Department (1989). *Interconnection*, Issue 1: Part 1.
- Touche-Ross (1987). *Competition in Telecommunications Networks*. Wellington, New Zealand: New Zealand Department of Trade and Industry.
- Williamson, Maurice (1991). "Address to the Annual Conference of the Telecommunications Association of New Zealand." *TUANZ 91 Conference Proceedings*. Auckland: Telecommunications Users Association of New Zealand.

NOTES

1. The radical heterogeneity of a telephone company's output is recognized by Brock (1986) and in the New Zealand testimony of Cornell (1991), and developed most explicitly in Mueller (1996). While other economists have recognized this property they almost always proceed to ignore it because, as one economist friend of mine remarked, "it makes the problem [of interconnection pricing] intractable." This recalls the joke about the person who was seen looking for the keys he had lost beneath a lamppost on a dark street. When asked whether he thought he had dropped the keys there he said, "no, but the light is better here." A recent exception is Economides and White (1993), who base their analysis upon the observation that all the components of a network are separate but complementary "goods."
2. For a historical evidence regarding the role of demand-side economies of scope in creating telephone monopoly in the U.S., see Milton Mueller (1996).
3. Gerald Brock (1981, p. 19) characterizes the incentives to interconnect as follows: "Competitors of equal size have a strong incentive to interconnect. Interconnection increases the value of the service offered by each company because it can provide communication with more people than without interconnection If existing companies are of unequal size, interconnection provides maximum efficiency but benefits the smaller members more than the larger. Thus it is likely to be withheld if the larger company is attempting to monopolize the market. If instead of geographical separation the smaller company's customers are also served by the larger company, the larger company has no incentive to provide interconnection. It gains no enhanced value from interconnection, because it could serve all the customers by itself that it could serve with interconnection. Thus it is unlikely to provide connecting privileges except under legal constraint."
4. IBM-Apple competition is an example, as are alternate standards for LANs and third-generation cellular telephone equipment (TDMA vs. CDMA). In digital technologies, standards competition is the rule rather than the exception, and few would argue that uniform standards should be imposed. These represent, however, newly developing markets which allow room for newcomers to establish a critical mass of users.
5. Baumol and Sidak (1994); see also Baumol and Willig (1991).
6. According to Cave (1993), ". . . interconnection prices are the main regulatory battleground [in the development of competition in telecommunications], and all aspects of the process are subject to high inputs of advocacy from interested parties. The scope for this increases because there is no general agreement about the basic principles which should underlie interconnection prices if economic efficiency is to be achieved, let alone about the finer points such as the structure of interconnect pricing and the degree of averaging upon which it should be based."

7. "Flat rate" service means local service that is not usage-sensitive. In 1990 Telecom changed its local business rates to usage-sensitive charging, in which businesses pay NZ\$.03 per minute for a local call. The KSO exempts residential users from such a pricing scheme.

8. Telecom's *Interconnection* Guidebook (Telecom Corporation of New Zealand Ltd., 1989, p. 3) mentions a "written undertaking" between Telecom and the Government promising to provide interconnection to competitors on "fair terms and conditions." Although often cited by New Zealand industry participants and government officials, the actual undertaking was not seen by the author in any of the reports or documents.

9. *Ibid.*

10. That is, to obtain access to a competing long distance company, its customer would have to dial, e.g., "0520" before dialing the desired party's number.

11. One was a partnership of Bell Canada and Television New Zealand (TVNZ). TVNZ has an existing microwave network that could be used for toll bypass. Another was a partnership of the American long distance carrier MCI, the New Zealand investment firm Todd Corporation, and New Zealand Rail. New Zealand rail had its own fiber network and rights of ways. A third was the British firm Cable and Wireless. The fourth was a small Australian firm called Telpac which hoped to use satellite circuits to bypass Telecom's toll network. Telecom New Zealand hoped to sign an interconnection agreement with one of the weaker organizations in order to establish a precedent that could be imposed upon the others. Telpac was chosen for this role. Although Telecom succeeded in signing an agreement with Telpac, the company was unable to actually start its business.

12. Animosity developed between Clear and Telecom in the six months between the Memorandum of Agreement and the final conclusion of an interconnection agreement. Clear spokespersons charge that once the privatization had been approved Telecom began delaying a final agreement by throwing in tough new conditions. Personal interview with Neil Tuckwell, January 1993.

13. Interview with Neil Tuckwell, Clear Communications, Auckland, January 1993.

14. *Ibid.*

15. Keith Davis, Managing Director, BellSouth NZ Ltd., fax to author, 20 September, 1993.

16. See Cornell (1991); Baumol and Willig (1991); Kahn (1992); and Rohlfs (1992).

17. Telecom would offer Clear line-side interconnection comparable to DDI service with 2Mbit DTI links, as if Clear were a PBX. Calls into the Telecom network from the Clear network would be billed at the standard Telecom business usage rates. Telecom would also bill its customers who called into the Clear network at standard rates. No extra

charges would be imposed on calls between the two networks. Telecom customers who called into the Clear network would have to first dial an access code.

18. Max Saunders, Corporate Policy Manager, Telecom Corporation of New Zealand Ltd., letter to Clear Communications Ltd. of 19 March, 1991, cited in High Court decision, pp. 30-36.

19. Furthermore, if Clear charged it for terminating calls from Telecom customers, it would bill its own customers an extra amount to make up the difference. (This of course was anathema to Clear as it would give Telecom customers a strong disincentive to call Clear users and thus would penalize users who switched to Clear).

20. R. Steven Rudd, General Manager, Carrier Relations Strategy, Telecom Corporation of New Zealand, to M. Mueller, 18 February 1993.

21. The price of the final product (in his example, through railroad service) is “deemed competitive,” and the rule “cannot be used to deal with any overpricing of the final product that is alleged to be present” (Baumol and Willig, 1991, p. 37).

22. The monopoly profits critique drawn above was made by Clear Communications and its consultants during the litigation. Baumol’s response was that while the efficient component pricing rule was the proper basis for interconnection pricing, it “does not cure AIDS or baldness [and] it does not eliminate business cycles,” and thus should not be expected to deal with monopoly profits and monopoly inefficiencies. Such problems, he said, should be taken care of through “other means,” which in this context could only mean regulatory oversight.

23. Faulhaber (1988) and Brock (1981) document how the American FCC unsuccessfully struggled with the costing methodologies during the private line/WATs rate controversies of the 1960s and 1970s.