

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

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INTRODUCTION

The world's telecommunications infrastructure, once the exclusive preserve of government or private monopolies, is rapidly moving toward privatization and 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 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. The process of liberalization in telecommunications is not really a shrinking of government involvement so much as it is a *redefinition of the relationship between the public and private sector.*

True, the objects and rationales of regulation are changing. 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. The primary role of regulators has been to adjudicate and coordinate this relationship. They have also been forced to mediate many of the competition policy disputes that have arisen as huge established networks contend with fledgling service providers.

The issue of interconnection opens a veritable Pandora's box of regulatory issues. Technical standards ensuring compatibility among the networks must be established. Prices for various kinds of interconnection arrangements must be set, and if they are to be efficient prices which do not distort the market, some effort to determine the true economic cost of establishing such linkages must be made. The complexity of this problem is magnified by the fact that 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. The new operators' status in the general telephone numbering plan must be defined, for example. In some cases ownership of the numbering scheme has been transferred from the telephone company to the regulatory authority. 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 service to all of the society.

As noted before, in most nations these 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 paper 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 paper,

interconnection of competing networks is being handled within a radically different 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.

The paper attempts to contribute both empirical and theoretical insights to current telecommunications policy debates. The empirical part focuses primarily on two issues regarding the results of New Zealand's experiment: 1) what kind of interconnection agreements between the Telecom Corporation of New Zealand (the incumbent monopoly) and its competitors emerged from this deregulated environment? and: 2) how effectively, or ineffectively, has competition in telecom services functioned in the absence of regulatory oversight of interconnection?

In answering these questions, the paper shows that competition in toll markets has functioned in a surprisingly effective manner despite the absence of equal access and regulatory oversight. In the final analysis, however, the interconnection problem has seriously undermined New Zealand's attempt to banish regulation from telecommunications altogether. The monopoly power of Telecom Corp has led to long delays and litigation in the conclusion of local interconnection agreements. In an attempt to cope with these problems, New Zealand is gradually backing into regulation.

The problems which New Zealand has encountered can be predicted and explained in theoretical terms. The paper discusses the theoretical problems in policy and economics raised by interconnection generally and New Zealand's policy specifically. The theoretical problems fall into two basic areas: 1) the special economic characteristics of telecommunication networks which give rise to the interconnection problem, and 2) the value and pricing of access. With respect to network economics, the analysis demonstrates that networks are collections of many complementary outputs held together by demand-side economies of scope. These facts explain why it is unreasonable to expect a monopoly that controls nearly all of the market for local access to voluntarily negotiate an interconnection agreement with start-up rivals. The paper then attempts to apply the insights derived from these concepts to the problem of access pricing. The paper surveys the debate among economists over the proper methodology for pricing telecommunications access, and focuses in particular upon critiquing the Baumol-Willig "efficient component pricing rule." The Baumol-Willig rule, which comes closest to a theoretically sound solution to the problem, plays a prominent role in the New Zealand story. The paper advances several arguments as to why the Baumol-Willig rule is unlikely to settle the interconnection pricing problem, although unfortunately it is too early to assess empirically the actual effects of the rule in action.

The paper argues that the most compelling solution to the problem is not theoretically-derived pricing methodologies, but the break up of the Telecom Corporation of New Zealand into separate regional operating companies. The remnants of Telecom could then be allowed to negotiate interconnection agreements within New Zealand's deregulated regime. The resulting agreements could be made available on similar terms and conditions to other competitors.

This paper advocates the radical transitional program of divestiture as the best solution, but recognizes that legal and political constraints may preclude that option.

The paper is divided into three parts. Part 1 discusses the significance of interconnection in telecommunications policy. Part 2 contains the empirical data and analysis of the New Zealand situation. Part 3 analyzes the implications of New Zealand's experience, using the situation as a basis for a critique of the Baumol-Willig rule and of the role of regulation in a competitive telecommunications industry.

Part 1
THE SIGNIFICANCE OF INTERCONNECTION IN TELECOMMUNICATIONS POLICY

1.A THE ECONOMICS OF INTERCONNECTION.

The interconnection problem has its roots in four 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 outputs increases. This is commonly known as the *network externality*, but could also be described as the existence of significant *complementarities* between the multiple outputs of the network. Third, the network is composed of many different components or parts which must work together to provide any one of the services offered by the network. This is known as the problem of *compatibility*. Fourth, 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.

1.a.1. *Heterogeneous output.*

The existence of *heterogeneous output* is fundamental to the analysis of telecom 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. A user who dials a telephone number is telling the system to set up a specific communication path between him/herself and another user. From an economic point of view, each individual connection between users is a separate and distinct output or service.¹ This becomes obvious when the issue of substitution is considered. If a telecom network connects users A, B, and C, and A represents a home, B represents an office, and C a grocery store it is clear that providing a connection between A and B is not a substitute for a connection between A and C. The user at A will demand connections to B at different times and for different reasons than connections to C. Connections from A to B and from A to C could in principle be provided by completely separate facilities. It is only the 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 telecom 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?

1.a.2. *Demand-side economies of scope.*

The problem is complicated further by the presence of *network externalities*. The value of a telecommunication network to its users generally increases as more users join it. A telephone network that connects only two people is of very limited utility. Adding users increases its value. 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 paper, 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 on their part in terminal equipment or another service subscription. The alternative would be two or more unconnected systems, which would require expenditures on duplicate equipment and/or service subscriptions for users who wanted to reach everyone.

The heterogeneity of a network's output, when coupled with network externalities, plays a decisive role in shaping the competitive process. Contrary to the utility textbooks, which mistakenly attribute the monopolistic character of past telephone systems to supply-side economies of scale, telephone monopoly in the US came about because of user desires for demand-side economies of scope. In the U.S. (one of the few countries in the world to even permit telephone competition in the early stages of development for an extended period of time), after 25 years of competition between separate networks users demanded convergence on a single system. Interestingly, a demand side economy of scope can exist, and lead to integration, even when there are supply-side diseconomies of scope.² In fact, during the era of manual switching it was well known that telephone exchanges became more expensive to maintain and operate as their scope grew. The pressures toward monopoly came from the desire of users to achieve demand side scope economies through consolidation of local exchanges.³ Readers familiar with the standards/network externality literature will recognize this as a typical outcome of "standards" competition. On the other hand, there is no evidence that consolidation of telephone systems resulted in decisive supply-side economies of scale or scope.

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. Part of the problem is that the capital requirements of duplicating the scope of the incumbent are prohibitive. Even if that were not a problem, 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."⁴ In short, established networks have market power simply by virtue of the fact that they are established, and not because they offer better service or lower prices. For this reason, a network with a large established scope has no incentive to interconnect voluntarily with smaller competing networks. The American economist Gerald Brock 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."⁵

It is possible to exaggerate the inertial power of the network externality, however. The fact that the telecom 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 economically 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. A historical study of Bell's competition with independent telephone companies in the early 1900s, for example, showed that Bell's refusal to connect with

its competitors was a completely ineffective barrier to entry, even though Bell was initially much larger than its rivals.⁶ 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.⁷ 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.

1.a.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. Indeed, 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.⁸ In this approach, pricing principles are subordinate to a pro-competitive regulatory policy, which hopes to make up through dynamic and allocative 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.⁹

The other view, which has been worked out most explicitly by Baumol, 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.¹⁰ 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 Part 3.

1.B THE INTERCONNECTION PROBLEMATIC DEFINED.

The reason why 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. As Martin Cave has written:

...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.¹¹

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, new numbering plans, 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 is vital to the future of all telecommunication users, large and small, and to the future of the existing public carriers. The introduction of competition via interconnection unleashes powerful centrifugal forces in the telecom marketplace. 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. Thus, interconnecting competitors to the public network not only raises concerns about the maintenance of universal service, it also leads to pressures to "unbundle" the technical components of the network, and to price them separately as well. Since the telecommunication infrastructure is characterized by joint and common costs, and since the network consists of so many different outputs to "unbundle," the process of deaveraging rates and unbundling services raises extremely complicated issues in cost accounting and rate regulation.

1.C THE UNIQUENESS OF NEW ZEALAND'S POLICY.

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.

PART 2
NEW ZEALAND'S EXPERIMENT IN DEREGULATED TELECOMMUNICATIONS

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 service¹², 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 version of an 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.

2.A. NZ LAW AND POLICY REGARDING INTERCONNECTION OF NETWORK OPERATORS.

As noted, New Zealand prepared for the introduction of competition primarily by removing all legal and regulatory barriers to entry. Telecom has no statutory protection from competition, and anyone in New Zealand can register as a network operator. 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 NZ 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."¹³ 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, while the general law of contract provides the basis for interconnection negotiations, 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 NZ Minister of Communications 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.¹⁴

2.B. 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 1989.¹⁵

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.¹⁶ 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 US 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.¹⁷ As the government did not intervene at this point, Telecom's template became the starting point for all future negotiations.

2.C. INTERCONNECTION AND 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.¹⁸ 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 telecom 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, 1991.¹⁹ By May 1991, the Clear network was up and running.

2.c.1 Analysis of the Clear-Telecom 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% 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%. (In fact, Clear exceeded the 9% 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 USA, 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% 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% 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, most importantly, 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 in Section 2.d below.

2.c.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 1 April, 1987, to the beginning of Clear operations in May, 1991, to prepare for the coming of competition. Telecom had inherited from the NZ 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%. Monthly rentals for residential local telephone service were increased by NZ\$ 10 per month or 33%. Usage-sensitive pricing for local calls were instituted for business users of local telephone service.²⁰

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% 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%.) 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% and went up to 20%. Telecom's volume discount plan went from 8% for small users to 14% for larger users. Clear also instituted discounts for prompt payment of 1-2%. Table 1 shows that, taken together, small users experienced a reduction of at least 14%, and large users a reduction of 20-25%, because of the Telecom-Clear rivalry.

In international services, Clear undercut Telecom's prices by 30% on every route except for Australia. Clear's entry forced Telecom to reduce its rates by 3 to 8%. Both carriers introduced volume discount plans for international services, ranging from 3% to 6% for Telecom and from 2% to 10% 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 early 1993, there was little difference between Clear and Telecom prices.

Clear's market share. A consultancy report on liberalization of telecommunications prepared for the NZ 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.²¹ In fact, by December 1991, only seven months after beginning operations, Clear had about 30,000 customers and had already reached the 9% market share threshold that was supposed to lead to non code access. Clear's market share of national toll calls climbed to 16% by the end of 1992,²² and had stabilized at around 18% 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%) on the USA, UK, Singapore, Hong Kong, and Japan routes.²³

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% over the previous year and was up 4.4% 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%) 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%). 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 longstanding precedents in the US, UK, 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 US, 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.

2.D. 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 recently concluded its interconnection agreement, Clear and Telecom were unable to reach acceptable terms for local interconnection, resulting in litigation which is unresolved at the time of this writing.

2.d.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% and the number of cellular users grew by 38%. At the beginning of 1993 there were approximately 92,500 cellular customers in New Zealand, or about 2.7% of the population.

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. By 1 July, 1993, the BellSouth system was up and running.

Although at the time of this writing BellSouth's interconnect agreement with Telecom was not yet officially signed, some basic features of the agreement are known. 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 signalling 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, they pay a premium.

BellSouth claims that it is "not satisfied" with the outcome of the negotiations, and that the results will be a "major handicap in our ability to compete."²⁴ BellSouth claims that price competition is not possible in the market because Telecom controls its costs. With the new competitor operational only two months, however, it is too early to determine empirically the effectiveness of competition in the cellular market. At present, BellSouth claims to have "several hundred" users on its network. What is perhaps more significant is that an agreement was reached without resort to the courts.

2.d.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 telecom 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.²⁵

The Basis of the Clear-Telecom Dispute. The MOA signed by Clear and Telecom 24 August 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 4 March 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.²⁶ As such, they were acceptable to Telecom but not to Clear.

Clear's alternative proposal, made 13 March 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.²⁷ 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.²⁸ 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. Relations between the parties broke down entirely in July-August, 1991, when 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, thus pre-empting negotiations. Clear's inability to meet its service commitment, 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 part 3, 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, however, did not agree. It took the decision to the Court of Appeal. The Communications Division of the Ministry of Commerce was also unhappy with the model, because it was convinced that local competition could not develop under the Baumol-Willig framework. Moreover, the toll interconnect agreement between Clear and Telecom expires in 1995 and must be renegotiated. An application of the Baumol-Willig framework would result in toll interconnect charges less favorable than those already in place. Some economists in the Ministry of Commerce doubt whether even toll competition would survive under such circumstances. A decision by the Appeals Court was expected in by the end of 1993. As of this writing there is still no competition in wireline business local service in New Zealand.

PART 3

ANALYSIS AND CRITIQUE OF NEW ZEALAND'S TELECOMMUNICATIONS POLICY FRAMEWORK

In this section I shall make four arguments. First, New Zealand's attempt to deregulate interconnection arrangements has failed, because there is no basis for a market transaction between the incumbent and its competitors. The enormous economic inertia created by the incumbent's prior control of the entire market for customer access gives it no commercial incentive to bargain. Second, the Baumol-Willig pricing methodology does not solve the problem unless New Zealand is willing to engage in comprehensive regulation of rates and service—an unattractive option. Third, the failure of deregulated interconnection is not a failure of deregulation per se, but a failure to create the proper *conditions* for the operation of a free market. The incumbent's excessive power is best addressed through a structural solution; specifically, divestiture of Telecom. By creating smaller incumbent firms, firms that do not possess a near-total monopoly of existing access connections, New Zealand can create the basis for deregulated, commercial interconnection negotiations. Fourth, I attempt to show that maintaining a deregulated, liberal telecommunications environment is a superior option to returning to regulation.

3.A. INTERCONNECTION INCENTIVES

Although it publicly voiced its demand that interconnection must be supplied, the NZ 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.

The New Zealand experience tends to confirm Brock's (1981) characterization of the incentives of networks regarding interconnection. Given the dynamics of convergence on a single network created by demand-side economies of scope, an incumbent with virtually universal coverage has nothing to gain from interconnection with a start-up rival. Telecom thus had no commercial incentive to arrive at an agreement and possessed all of the ultimate negotiating power. A refusal to come to any agreement was an outcome acceptable to it but disastrous to its potential competitors. A situation of dependence rather than of mutual gains from trade prevailed.

Concrete evidence of the lack of a true basis for market transactions regarding interconnection is not hard to come by. It is clear that government pressure in the form of a need for approval of its privatization deal played a key role in the rapid conclusion of the Clear-Telecom toll interconnect agreement. Afterwards, Telecom was able to propose highly unfavorable pricing terms, and in the one case when these terms were accepted (BellSouth, which lacked any alternative after it spent millions of dollars to acquire radio spectrum), the prospect for price competition has been severely curtailed in the relevant markets. More serious, perhaps, are the delays and discrimination experienced by competitors attempting to enter the local market. Each negotiation is treated as a separate case, allowing Telecom to bring to bear the full weight of its monopoly power. Apparently, no competitors are allowed to benefit from precedents. This makes it longer and more costly for competitors to bring service to the market, and makes it virtually impossible for them to do so on a timely and predictable basis. Even more harsh, by world standards, is the inability of competitors to order and resell Telecom service offerings that are available to regular customers. Clear Communications, for example, was not allowed to resell DDI service, and has experienced difficulties in obtaining leased circuits from Telecom.

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 an accepted methodology for determining efficient interconnection prices, application of a competition law cannot determine 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 avoid regulation. When asked by the author what commercial benefits it received from providing interconnection to its rivals, the following reply was received:

The compelling reason to provide interconnection on "fair and reasonable" terms was and continues to be the preservation of the deregulated environment in NZ. [In regulated environments,] 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, this is the main "commercial" benefit for Telecom to provide interconnection to competing networks.²⁹

In other words, the only apparent motive for interconnection is that interconnection is required to preserve deregulation, and the expected loss from competition under deregulation is less than that expected from competition and regulation.

It is interesting to note, however, that the technical inequalities imposed on Clear by its interconnect agreement have not served as major barriers to competition. Code-based access did not prevent Clear from competing effectively, nor did the absence of BNA and other forms of technical cooperation from the incumbent. Indeed, this writer believes that there is a great deal of merit in Telecom's argument that full transparency of competing networks can diminish true competition by undermining product differentiation and consumer knowledge of what product they are consuming. This is an instructive lesson for American and European regulators obsessed with the concept of equal access.

3.B. 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.

3.b.1. Description of the Baumol-Willig rule.

Baumol and Willig's "efficient component pricing rule" is based on the following reasoning. 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 supply of the second component.

It is well-established in economic theory that marginal cost pricing is the most efficient and is the outcome of a perfectly competitive market. Prices that are driven to marginal cost, however, will not sustain firms with substantial fixed costs, such as telecommunication companies. In such cases it is therefore acceptable to price services above incremental costs by whatever margin is required to recover a portion of the costs of the fixed overhead: $P = IC + O$. When such a firm is faced with a competitor who wants to buy one component of its product, it is economically irrational and inefficient for it to offer this service for only the incremental cost. Such a pricing scheme fails to recover the contribution to overhead (O) that the firm could gain if it sold the final product to end users itself. In this case, O represents the opportunity cost of selling capacity to another firm.

The neat logic behind this pricing method can be illustrated by reference to Figure 1. Two railroad lines (A and B) serve Detroit and Trenton but only one (A) goes from Detroit to Chicago as well. If railroad B wants to offer through railroad service from Trenton to Chicago, it must buy the Detroit-Chicago part of the service from its competitor, railroad A. Baumol observes that in a competitive market, railroad A will sell the Detroit-Chicago service to competitor C only if the price paid by C compensates it for *both* the incremental cost of supplying service from Detroit to Chicago, *and* the opportunity cost incurred by not providing the through service itself. In the example shown in Figure 1, A charges \$10 for Trenton-Chicago service, and this price yields a contribution of \$4 to its overhead and profits. Thus, A will charge B its incremental costs of supplying Detroit-Chicago service (\$3), plus \$4 for its opportunity cost. The interconnection price is set at precisely that level which makes A indifferent whether service on the Trenton-Detroit segment is provided by it or by another firm. Baumol goes on to demonstrate that this method