

The Interconnection Dispute

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Introduction

Dr. Sylvia Xu, Chairperson of the telecommunications regulatory agency of Delop, had served as on the agency for one year. She and her two fellow commissioners were the first commissioners for the Telecommunications Commission of Delop (TCD) and they had spent most of the past year organizing the commission, hiring and training staff, meeting with legislators and ministry officials, meeting with industry and customer representatives, meeting with the press, and identifying priorities. Today promised to be a day that would test how well they had done building the TCD's expertise, credibility, and independence.

At 8:00 a.m., Chairperson Xu was already reviewing the briefing materials on the case the TCD was to address at 2:00 p.m. today. On its face, the case was a technical issue: How should two competing telephone companies compensate each other for the calls that they exchanged through their interconnection arrangement? The companies -- the incumbent telephone company, Delop Communications Corporation (DCC), and an entrant, Future Teleco (FT) -- had been unable to negotiate an interconnection agreement. FT insisted upon an arrangement known as "bill and keep" or "sender keeps all", in which each company bills retail customers and keeps all resulting revenues. DCC insisted that it should be compensated for calls from FT's customers to DCC's customers. According to Delop's Telecommunications Law, companies are to negotiate interconnection arrangements. If the companies fail to reach an agreement after 40 days,

then they can ask the regulator to resolve the areas of disagreement. Last week, FT had filed a request with the TCD, asking the TCD to resolve the pricing issue. DCC objected to the filing, saying that FT had not negotiated for 40 working days as required by the law and that FT had not negotiated in good faith. Both parties agreed that negotiations had begun three months before. DCC argued that it and FT had met only one day each week since negotiations began, so the 40-day requirement had not been met. DCC asserted that FT had always intended that this issue would be settled by the TCD because FT believed that the TCD could be persuaded that bill and keep arrangements had worked well in the Internet and in the US.

As Chairperson Xu read the details of the disagreement, she listed the decisions she and her fellow commissioners confronted that day. Fortunately, they did not have to make a final decision on the dispute, although they could if they wanted to. The dispute had been brought to the TCD only a few days ago, so there was much that the TCD did not know. Foremost on the chairperson's mind was the role that the TCD should play. The Telecommunications Law gave the TCD authority to resolve interconnection disputes, but because the commission and its staff were inexperienced in such technical matters, and because DCC and FT were both using their political connections to pressure the TCD, the chairperson thought she would prefer that the companies resolved their differences without involving the TCD. She wondered if she could devise a way to encourage or force the companies to resolve this on their own. If the TCD was going to be involved, the commission would have to

decide an approach and what procedures to use. There were no established practices for such disputes and the law did not describe how the TCD was to handle the disputes. Clearly a lengthy dispute resolution process would harm FT because it would be without revenues until it was able to establish interconnection with DCC. A 1998 survey by the Public Utility Research Center (PURC) at the University of Florida shows that there is a wide range of options for roles that regulators play in interconnection. (Exhibit 1)

She also wondered how she would prepare her staff for the issues. The companies possessed considerable technical telecommunications expertise and were hesitant to reveal very much information about their networks and services for fear that their rivals would use the information to gain a competitive advantage.

As to the substance of the dispute, Chairperson Xu was uncertain how her various options would affect the companies involved and the customers. Was there a right way to price interconnection? If so, what were the consequences of pricing it too high or too low? Also if the TCD became involved in the issue, should it make any interim decisions on traffic, prices, or payments to allow FT to enter the market?

Background

Formed just two years ago, the TCD was one of the centerpieces of Delop's new Telecommunications Law. Competition was the other centerpiece and one of the TCD's primary responsibilities was to ensure that competition was robust. The three TCD commissioners were appointed by the president and approved by the Parliament. Although none of the new commissioners were politically powerful, they were politically astute and well educated. The president had told them that he expected them to carry out the responsibilities of the TCD with minimal disruption to the smooth operation of his

administration.

But telecommunications competition is full of controversy. In order to provide ubiquitous service, each competing carrier must have the ability to terminate calls from its customers to its rivals' customers. There is some resource cost for the terminating carrier to terminate calls, therefore, in most countries the terminating carrier is compensated by the originating carrier. But how should the compensation be calculated? Should the same compensation method be used for all traffic? Should Internet-bound traffic be considered "calling"? Should it be considered international or domestic? Industry experts say that all telecommunications will be treated as data in the future. Does that mean that all interconnection arrangements should migrate towards the Internet model? Should interconnection policies be implemented under tariffs or by individual contracts between carriers?

DCC was a large carrier, which had for a long time held the monopoly franchise for provision of telephone service throughout the country. Since it had never been a government-owned operator, DCC had avoided the difficult privatization processes that other companies around the world were going through. Regulated for the past forty years by the Communications and Utility Ministry, DCC has developed its network to serve the entire country, and was capable of serving almost every customer. From the Ministry's perspective, DCC's job had been to ensure that customers had little to complain about. Because DCC had generally succeeded in this, the Ministry had given DCC freedom to earn as much profit as it could without causing complaint and to extend its markets. Given this profit incentive, DCC had developed local networks and trunking to maximize efficiencies in the use of switching and trunking technologies.

To serve larger metropolitan areas, DCC had deployed a mixture of "end office switches" and "tandem switches". An end office switch is one to

which a telephone subscriber is connected. This switch is capable of switching calls from one subscriber to another also served by that switch. If the call is destined to another area, the switch routes that call to the appropriate connecting trunk, which the call transits to a tandem switch (or another end office, via direct trunking). A tandem switch is an intermediate switch between the originating and terminating points of a call. A tandem switch connects trunks. A "trunk" is a communication line between two switches.

DCC's metropolitan network architecture incorporates end office switches to serve customers, direct trunking (end office to end office) for routes with high calling volumes, and trunking to a tandem switch to handle calls destined outside the area, and to handle calls for low volume routes within the area.

Early in the market reform process, DCC argued that its prices for local telephone lines were being subsidized by other services, primarily international long distance. DCC traditionally was the country's only provider of international long distance and, according to DCC's financial accounting records, most of DCC's profits came from international calling. DCC said that this imbalance between its service prices and the services' underlying costs would make it impossible to compete, so the Ministry allowed DCC to begin rebalancing its prices. DCC claims that this process is still incomplete and that new entrants will attack DCC's profitable markets and ignore the market for local lines.

FT is a new entrant seeking to provide telecommunications services in competition with DCC. However, FT is not a fledgling competitor. Rather, FT is an operating subsidiary of a global telecommunications corporation that has substantial resources. FT has placed telecommunications facilities in the metropolitan area it is serving, which include a single switch, capable of performing both tandem and end office switching functions, and fiber optic trunking and

distribution facilities. FT is also building a international Internet backbone and has aggressively and successfully marketed Internet access in Delop. Furthermore, FT has marketed its backbone services to other ISPs in Delop. FT says that, if it must pay interconnection fees to DCC, then DCC should pay termination charges for traffic that it sends to FT's ISP customers.

At least two other companies have expressed an interest in entering Delop's market. One is the nation's electricity distribution company. The other is the neighboring country's incumbent telecommunications provider. Both say that their decisions to enter Delop's market depends upon how the TCD resolves the DCC-FT dispute.

Interconnection in Traditional Telephone Networks

In most countries, there are two types of providers of voice telecommunications service: wireline carriers and wireless or mobile carriers. In most countries, when wireline carriers interconnect their networks they pay each other for terminating calls. In addition, a wireline carrier may pay another carrier for transit. Transiting occurs when one carrier transports another carrier's calls between end offices. Exhibits 3 and 4 show interconnection prices for several countries.

Countries differ on interconnection charges between wireless and wireline carriers and between wireless carriers. The charging systems depend primarily on how customers pay for their service. There are two systems. In the called-party-pays system, the customer receiving the call pays her wireless provider for completing the call to her. In the calling-party-pays system, the customer placing the call pays for the call. With the called-party-pays system, there is no need for the carriers to charge each other for terminating calls because the customer receiving the call pays the terminating carrier. With calling-party-pays, either the originating carrier or the calling party pays the

terminating carrier. The International Telecommunications Union has conducted a survey of wireless interconnection prices. It is at <http://www.itu.int/osg/sec/spu/ni/fmi/intro.html>.

Internet Interconnection

The Internet is a network of networks with multiple network providers, some of which are backbone providers. The Internet backbone provides high-speed connectivity for the networks that comprise the Internet. Backbone providers have two basic methods of interconnection: peering and transit. With peering, the network providers carry each other's traffic without charge.

Peering is voluntary and generally a backbone provider agrees to peer with another backbone provider only when the other network is comparable in size and geographic reach to the first backbone provider's own network. This ensures that the interconnection is equally valuable to both providers. If two interconnecting networks are unequal in size and scope, then the larger network generally refuses to peer with the smaller network. As a result, if the networks interconnect, the smaller network pays the larger network for transit, which provides the smaller network with connection to all end users in the Internet. A Federal Communications Commission paper on Internet interconnection is available at <http://www.fcc.gov/opp/>.

Internet Traffic on Voice Networks

Incumbent telecommunications service providers generally contend that Internet-bound traffic does not fall within the calling scope and retail price structures associated with traditional voice telephony, and so is not the type of traffic for which interconnection compensation is intended.

They argue that interconnection compensation is intended to ensure that when a competitive carrier gains a customer, that customer can call other subscribers on the incumbent's network, without

subjecting the competitive carrier to discriminatory charges or practices. Furthermore, Internet-bound calls are inherently one-way, making long distance or international charging schemes more appropriate.

Others believe that there should be no distinction between voice and data calls. The distinction is an artifact of history and soon all calls will be data calls. Furthermore, there is no cost basis for distinguishing between terminating a call for a voice conversation versus one for a data exchange: Costs are the same for carrying a voice call or a data transmission. In addition, treating data traffic differently from a terminating compensation perspective would provide perverse economic incentives and distort network investment. Entrants that serve ISPs believe that they have done so by virtue of their higher quality of service, better prices, and superior customer care.

A PURC study (Exhibit 4) found that serving ISPs was important to entrants in the US. Calls to ISPs were subject to termination charges during the time of the study. The study found that higher interconnection prices was associated with more interconnection traffic for entrants, implying that the new entrants were profiting from the higher interconnection prices by targeting ISPs and other customers who received large volumes of calls.

Pricing Interconnection

If a country decides against bill and keep, a number of other methods are available for determining interconnection prices. A PURC survey of interconnection policies (Exhibit 1) found that all of the countries surveyed expect service providers to negotiate interconnection and access agreements. The scope of the negotiations varied across countries. In Canada, for example, the Canadian Radio-television and Telecommunications Commission treated interconnection and access as normal tariffed services, and required negotiations for only a few

technical details. At the other extreme, New Zealand and Sweden gave regulators almost no authority over interconnection and access arrangements. New Zealand had no industry regulator, relying instead upon competition law and the threat of creating an industry regulator to police interconnection. Sweden limited the regulator's role to expressing opinions on fairness of proposals if negotiations failed.

When regulators become involved in interconnection pricing, they generally consider three basic approaches to price setting: (1) the Efficient Component Pricing Rule (ECPR); (2) cost-based pricing; and (3) demand-based pricing or Global Price Caps (GPCs). (Exhibit 2 shows the results of a PURC survey that relates interconnection prices to the regulatory methods used to determine these prices.) The ECPR recommends that entrants pay incumbents their opportunity costs, except for monopoly profits. In other words, the prices the incumbent would charge to competitors would ensure that the incumbent would make the same amount of non-monopoly profit regardless of whether it succeed in the competitive portion of the market. Supporters of this theory explain that the ECPR ensures that an entrant succeeds only if it lowers industry costs. Furthermore, if the incumbent's profits on interconnection are less than its profits on the final product, then the incumbent could be expected to protect its retail market by hindering entry. The PURC study in Exhibit 4 finds evidence that incumbents hinder entry when incumbents make higher profits on retail services than on inputs sold to competitors.

Regulators' options for cost-based prices for interconnection include fully distributed cost (FDC) and incremental cost. FDC is an accounting approach to cost measurement, which allocates all of the firm's costs among its services. The general benefits of FDC are that: (1) FDC-based prices add up to the total revenue requirement under rate of return regulation; (2) FDC can be simple to implement, appear fair, and be easy to understand,

although the minutia can create bureaucratic inertia; and (3) if costs can be traced, FDC may encourage companies to be responsible for service-specific investments. The disadvantages of FDC are that: (1) it may be unfair because high-volume services receive most of the costs even if they do not cause very many costs; (2) there is a lot of discretion in how to allocate accounting costs, so widely varying results can be justified; (3) costs are historical rather than forward looking; and (4) FDC may assign overhead costs to new services that have not yet established a market.

The pricing method most favored by regulators is to set the interconnection price equal to the incumbent's incremental cost with only a small mark-up for covering common costs. The underlying theory is that entrants should only have to pay for the costs that they cause. Furthermore, entrants would have difficulty competing if interconnection prices were set according to the ECPR or FDC because entrants would be denied the opportunity to take retail profits from the incumbent. Estimating incremental costs has proven difficult. Courts in the US have found that the FCC's incremental cost method denies incumbents an opportunity for full cost recovery. Several economists have expressed concern that US incremental cost estimates are lower than incumbents' actual incremental costs and ignore many opportunity costs, including Real Options.

Regulators have yet to try GPCs. GPCs is a demand-based approach to regulating prices that uses Ramsey pricing principles to promote efficiency. With Ramsey pricing, customers are charged different prices based on their responsiveness to price changes, or elasticity of demand. 'Responsive' or elastic customers pay a higher mark-up above incremental cost than do inelastic customers. The objective of Ramsey pricing is to have quantities sold deviate as little as possible from the consumption mix that would occur if prices were equal to marginal cost. GPCs treats interconnection as a product and places it in a global price cap basket.

Another contentious pricing issue is identifying which costs should be covered in interconnection charges. In some countries, entrants must cover all of the incumbents' costs of network modification and interconnection arrangements. In other countries, the costs are shared. In Hong Kong, for example, the two interconnecting carriers are each responsible for their own costs of establishing, preparing, and maintaining their networks for interconnection. These costs are regarded as part of the incremental costs of interconnection and are to be recovered through interconnection usage charges. Some incumbents claim that entrants cause excessive costs by requesting unnecessary capacity. When the traffic doesn't materialize, the usage charges fail to recover all of the costs of the interconnection arrangement. Some entrants counter this claim by explaining that incumbents act anti-competitively and frequently fail to

provide the required capacity.

Tariffs for Interconnection

Some countries tariff interconnection. Tariffs may have the benefit of promoting even and fair application of rates and terms to all carriers, and thus help the regulator achieve non-discrimination goals. There are administrative costs to this approach. Contracts may have the advantage of being more direct and efficient, and more consistent with an ultimately completely deregulated market. But abuses can happen if the negotiating power of the parties is uneven. Other countries establish a standard offering that any entrant may adopt as its interconnection agreement.

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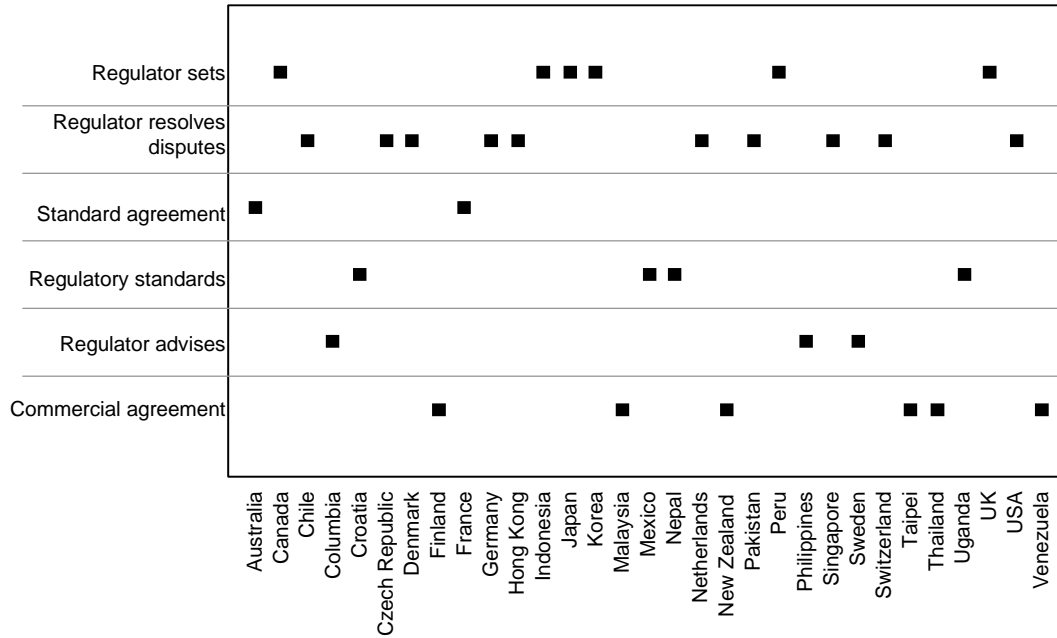
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Exhibit 1. Results of 1998 PURC Survey on Regulator's Roles in Interconnection



“Regulator sets” means the regulator sets the interconnection price. Other aspects of interconnection are negotiated. “Regulator resolves disputes” means that the regulator sets the interconnection price only if the carriers do not reach an agreement. “Standard agreement” means the regulator approves a standard interconnection offering that any entrant may adopt. Entrant may also choose to negotiate an interconnection agreement. “Regulatory standards” means the regulator establishes interconnection policies and negotiated agreements must comply with these policies. “Regulator advises” means the regulator can only offer advice on how to resolve an interconnection dispute. “Commercial agreement” means interconnection is negotiated and the regulator plays no role.

Exhibit 2. Results of 1998 PURC Survey on Costing Methods on Interconnection

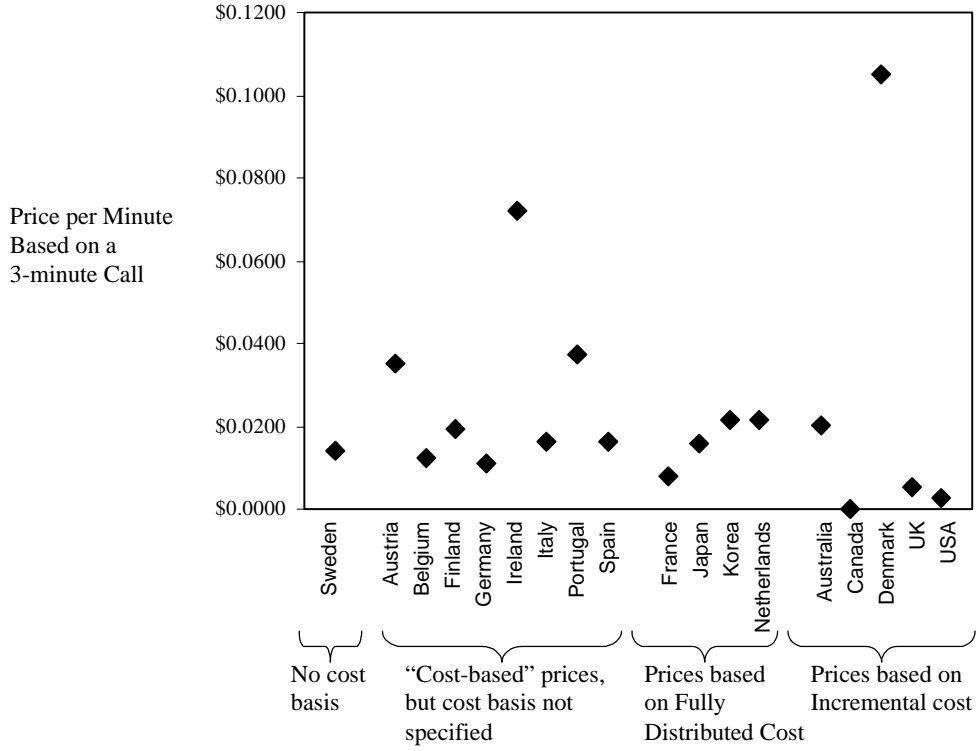


Exhibit 3. Results of 1998 PURC Survey on Interconnection Prices

| Country | US Dollars |
|-------------|------------|
| Sweden | \$0.0143 |
| Austria | \$0.0350 |
| Belgium | \$0.0121 |
| Finland | \$0.0193 |
| Germany | \$0.0109 |
| Ireland | \$0.0719 |
| Italy | \$0.0164 |
| Portugal | \$0.0373 |
| Spain | \$0.0161 |
| France | \$0.0077 |
| Japan | \$0.0160 |
| Korea | \$0.0215 |
| Netherlands | \$0.0217 |
| Australia | \$0.0201 |
| Canada | B&K |
| Denmark | \$0.1050 |
| UK | \$0.0053 |
| Hong Kong | \$0.0130 |

Note: B&K means Bill and Keep

Exhibit 4. Results of 2000-2001 PURC Study of Competition in the US

Interconnection and Competition in the US

| Company | State | Per minute price for a 3-minute call US Dollars | Market Share of New Entrants | Company | State | Per minute price for a 3-minute call US Dollars | Market Share of New Entrants |
|---------------|------------------|---|------------------------------------|---------|----------------|---|------------------------------------|
| Ameritech | Illinois | \$0.0083 | 1.50% | GTE | California | B&K | 1.35% |
| Ameritech | Indiana | \$0.0012 | 0.97% | GTE | Florida | \$0.0093 | 0.97% |
| Ameritech | Michigan | \$0.0034 | 1.19% | GTE | Hawaii | B&K | 1.93% |
| Ameritech | Ohio | B&K | 1.42% | GTE | Illinois | B&K | 0.00% |
| Ameritech | Wisconsin | \$0.0089 | 0.80% | GTE | Indiana | \$0.0050 | 0.16% |
| Bell Atlantic | Washington, D.C. | B&K | 1.04% | GTE | Kentucky | B&K | 0.21% |
| Bell Atlantic | Delaware | \$0.0019 | 0.55% | GTE | Michigan | \$0.0034 | 0.00% |
| Bell Atlantic | Massachusetts | \$0.0204 | 2.00% | GTE | North Carolina | \$0.0110 | 2.07% |
| Bell Atlantic | Maryland | \$0.0032 | 0.65% | GTE | Ohio | B&K | 0.00% |
| Bell Atlantic | Maine | \$0.0197 | 0.64% | GTE | Oregon | B&K | 2.25% |
| Bell Atlantic | New Hampshire | \$0.0197 | 0.72% | GTE | Texas | B&K | 0.95% |
| Bell Atlantic | New Jersey | \$0.0036 | 0.46% | GTE | Virginia | \$0.0069 | 0.75% |
| Bell Atlantic | New York | \$0.0073 | 1.94% | GTE | Washington | B&K | 1.25% |
| Bell Atlantic | Pennsylvania | \$0.0028 | 1.25% | GTE | Wisconsin | \$0.0198 | 0.04% |
| Bell Atlantic | Rhode Island | \$0.0197 | 0.87% | SBC | Arkansas | B&K | 0.79% |
| Bell Atlantic | Virginia | \$0.0049 | 0.55% | SBC | Oklahoma | \$0.0120 | 0.87% |
| Bell Atlantic | Vermont | \$0.0283 | 0.57% | SBC | Texas | B&K | 1.43% |
| Bell Atlantic | West Virginia | \$0.0082 | 0.00% | SBC | California | \$0.0075 | 1.80% |
| BellSouth | Alabama | \$0.0100 | 0.64% | US West | Arizona | B&K | 1.40% |
| BellSouth | Florida | \$0.0013 | 0.91% | US West | Colorado | B&K | 1.59% |
| BellSouth | Georgia | \$0.0100 | 1.87% | US West | Iowa | B&K | 0.03% |
| BellSouth | Kentucky | \$0.0036 | 0.82% | US West | Idaho | \$0.0045 | 0.49% |
| BellSouth | Louisiana | \$0.0016 | 0.24% | US West | Minnesota | \$0.0032 | 1.30% |
| BellSouth | Mississippi | \$0.0031 | 0.21% | US West | Montana | \$0.0066 | 0.28% |
| BellSouth | North Carolina | \$0.0130 | 2.43% | US West | North Dakota | \$0.0043 | 0.04% |
| BellSouth | South Carolina | \$0.0028 | 0.49% | US West | Nebraska | \$0.0056 | 0.95% |
| BellSouth | Tennessee | \$0.0190 | 1.65% | US West | New Mexico | \$0.0008 | 1.20% |
| | | | | US West | Oregon | B&K | 1.49% |
| | | | | US West | South Dakota | \$0.0051 | 0.07% |
| | | | | US West | Utah | \$0.0043 | 1.81% |
| | | | | US West | Washington | B&K | 1.64% |
| | | | | US West | Wyoming | B&K | 0.00% |

Note: B&K means Bill and Keep

Abstract of Study Findings, by Mark A. Jamison:

The study examines how incumbents and entrants respond to prices for network interconnection in telecommunications. I find that low prices for entrants to lease incumbents' facilities, exchange traffic, and buy incumbents' services for resale increase entry. However, if prices for leasing incumbents' facilities are low relative to incumbents' retail prices, then less entry occurs, presumably because incumbents hinder entry to protect profits. Higher prices for exchanging traffic increase entrants' market share, presumably because they target customers (such as Internet Service Providers) who receive more calls than they make. Low prices for reselling services do not cause entrants to choose reselling over other supply methods.

Source: Jamison, M.A. "Incumbent and Entrant Incentives with Network Interconnection: The Case of US Telecommunications," Mimeo, Public Utility Research Center, University of Florida, 2001. Available at <<http://bear.cba.ufl.edu/centers/purc/primary/Mjamison.htm>>.