A Competitive Market Approach to Interconnection Payments

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INTRODUCTION
Telecom networks are unique because they require a high degree of cooperation from all parties involved and because of the interdependency of network components. Technical standards, service definitions, and pricing arrangements all must be well understood by the various users of the network in order to ensure efficient provision of the network’s services (Melody 1997a). Therefore, in order to allocate properly the joint costs and benefits of the telecom network, a sound interconnection pricing policy is of paramount importance.

Establishing the price for interconnection, however, is a challenging undertaking, and there has been pressure on regulatory commissions to adopt interconnection arrangements that set termination charges at zero. This is due to the perception that regulators cannot measure costs correctly and historically have chosen interconnection prices that are too high (DeGraba 2000: paras 69, 91). In addition, proponents of zero termination charges argue that the market distortions from high interconnection prices have induced new entrants in telecommunication services since 1996 to target firms, such as Internet Service Providers (ISPs), that terminate large volumes of traffic.

In this contribution, the concept of ‘bill-and-keep’ whereby the calling party’s network does not have to pay the receiving party’s network to terminate the call is discussed. Whether this outcome is efficient and consistent with competitive markets is examined. An explanation of why the flow of traffic has been unbalanced between incumbent long-distance operators and competitive local-access operators is offered. This outcome is the natural outcome of the barriers to entry created by incumbents in their refusal to provide collocation to ISPs.

SETTING THE CORRECT PRICE
Interconnection arrangements in the telecom industry have a long history. Beginning in 1894, when the initial patents expired, the Bell System had to enter into interconnection contracts with independent telephone companies, and the Independents similarly signed contracts with each other. Bill-and-keep contracts were negotiated where traffic was balanced. In other cases, the company that
originated more calls made a settlement payment. However, the most prevalent form of interconnection was revenue sharing. For example, a typical interconnection contract for a long-distance call required that 15-25% of the originating revenue be paid to the network (Gabel 1987: 171-2). The contracts were established before the advent of federal or state regulation, but the terms varied little after regulation was established. For local traffic, Bill-and-Keep was adopted where traffic was balanced. Otherwise, reciprocal compensation or access charges to recover the cost of interconnection were used.

The originating party paid for the cost of interconnection under calling-party-pays arrangements, and where traffic was balanced under bill-and-keep. Furthermore, the retail prices generally were designed so that the customers who initiated the calls paid for the calls, rather than having the cost of interconnection distributed evenly among the customers. This has been standard practice in the telecom industry on the basis that the decision made by an originating party to place a call is the decision that imposes costs on the network.

The history of interconnection of telephone companies illustrates that: the costs of interconnection traditionally have been recovered from the calling party on the basis that the calling party is the cost-causer; the practice of calling party pays predates the establishment of state or federal regulation; and; bill-and-keep has been adopted in situations where traffic is balanced – where traffic is not balanced, the carrier on which the majority of traffic originated has made payments to the terminating carrier.

**Practical Constraints on Interconnection Pricing Arrangements**

In a world with no externalities (positive or negative) and perfect information, interconnection pricing would be straightforward for regulators. In such a world, telephone service would represent a service for which two parties benefit and a call would be placed so long as the sum of the benefits exceeds the costs. At the margin, costs would be shared based on the benefits obtained by each party. In the real world, however, it is impossible to allocate the benefits to the calling and called parties. Thus, it is problematic to ascertain how costs should be shared, that is, we cannot allocate costs on the basis of benefits because we do not know how to measure the benefits. Lacking information on valuation, the appropriate policy fallback is a second-best solution, using cost-based prices.

Moreover, with the growth of competition in the telephone industry, it is even more important that prices be established that govern the connection from one
network to another. Regulators should be concerned that incumbent local access companies will try to establish barriers to entry, and to block entry by establishing too high an interconnection price. To avoid too high a price, regulators could impose a zero price on interconnection (that is, bill-and-keep). But would this be reasonable?

Most other industries do not rely on bill-and-keep, for example, financial services, credit and ATM cards, package delivery services and airports (Shy 2001). In the telephone industry we are beginning to observe the operations of competitive markets and policy makers should not be enticed by simplistic and non-competitive zero-price solutions like bill-and-keep.

The Distribution of Benefits from Phone Calls

The strongest argument for bill-and-keep would be if the receiving party equally benefits from a call. This has been argued by DeGraba (2000: para 4), but the benefits of a telephone call are not shared evenly by the caller and the receiver.

Telephone calls are characterised by joint demand since there are at least two parties involved in any call. Similarly, the call is jointly provided by both the caller’s and the call receiver’s network. Consequently, the issue arises as to how to allocate joint costs.

Since there are at least two parties to any telephone call, presumably both benefit from the call. DeGraba (2000) argues that this is a justification for reversing the historical use of calling-party-pays, by shifting termination charges to the receiving party. However, even though call receivers benefit from some calls, it is impossible to say how the benefits of the call are shared. Therefore, it is inappropriate to assume that both parties benefit equally, and to base policy changes thereon. For example, calls from telemarketers surely benefit the caller more than the receiver. Many would argue that these calls have negative value for the receiver since he/she is unlikely to be interested or is interrupted in the middle of another activity.

Proponents of mandatory bill-and-keep interconnection arrangements argue that callers make fewer calls since they must bear the entire costs of the call rather than sharing them with the receiver as would be the case under bill-and-keep arrangements (Allegiance Telecom 2001: 21). However, the fact that call receivers have the option of having toll-free numbers (for example, many businesses choose to do this to encourage more calls) suggests that call receivers have the option of purchasing a specific service which encourages them to receive more phone calls, and that the network is not under-utilised as suggested by proponents of mandatory bill-and-keep interconnection arrangements.
There is no empirical evidence that callers would place more calls under Bill-and-Keep arrangements. Under ‘toll-free’ services, the call receiver pays because he/she has decided that the benefits justify the additional costs incurred, whereas customers who choose not to have toll free numbers are saying implicitly that they benefit more by making phone calls than receiving them. Moreover, the proliferation of products to screen unwanted calls (for example, Caller ID or Call Waiting) clearly contradicts the assumption under bill-and-keep that calling and called parties benefit equally from phone calls (Allegiance Telecom 2001: 21). Without these devices, only the calling party has complete information regarding the purpose of a telephone call, and thus he or she should bear the costs of termination. Since not all consumers can afford or desire call-screening devices, policy changes that unnecessarily encourage their purchase would be a costly technology distortion.

**Interconnection and Network Externalities**

Using a calling-party-pays system as opposed to bill-and-keep is more likely to internalise positive network externalities between calling and called parties and is one of the main justifications for interconnection charges. Suppose that as a result of the called party being able and willing to accept a call, the calling party receives a direct benefit. This is an externality flowing from the called party to the calling party. Assuming that this externality is larger compared to the externality going in the other direction (which would seem logical since the call was initiated by the caller who presumably has a higher willingness to pay), then there may be efficiency grounds for having the calling party subsidise the called party.

The incentive required to capture positive network externalities can be introduced using a termination charge since it encourages the receiving party to accept phone calls, whereas termination charges assessed on the receiving party will discourage the use of telephone services. A termination charge received by the terminating network will, through competition, be passed back to the called party by way of cheaper retail prices for services provided. If the calling party funds this termination charge, then this could be an efficient transfer between the two types of callers. An example where such network externalities are likely to be very important is the case of interconnection between fixed-line and mobile networks. However, by imposing mandatory bill-and-keep such transfers will be eliminated. This will lead to serious inefficiencies where there are significant network externalities.

**Economic Efficiency Principles**

Under bill-and-keep, switching cost recovery would be folded into all the other costs that must be recovered. The final price would be either traffic-sensitive or a
fixed per customer charge. However, if regulators cannot set traffic-sensitive prices correctly, as argued by the proponents of bill-and-keep, how can these costs be recovered efficiently?

Having the user pay a per minute price would discourage the use of telecom services since there would be an incentive for parties not to answer calls to reduce termination charges assessed on them, that is, bill-and-keep would not capture the positive network externalities associated with the Calling Party Network Pays (CPNP) principle.

Per minute charges also are not desirable for covering termination costs under bill-and-keep arrangements because they would tip the market towards monopoly since consumers would have an incentive to subscribe to larger networks in order to avoid these charges.

Any proposal to replace usage sensitive terminating access fees with a fixed customer charge contradicts the view that economic efficiency dictates that traffic sensitive costs be recovered through traffic sensitive prices. Aside from the argument that the cost-causer is not the cost-payer, there are a number of reasons that bill-and-keep arrangements violate the principles of economic efficiency.

- Reforming the existing CPNP regimes with bill-and-keep will require a reduction in per-minute charges to the caller and an increase in flat end-user charges to recover the lost revenue since the called parties’ providers would have no other way to recover termination costs except through flat-fees to its customers.
- A fixed monthly per-line subscriber charge ignores the capacity costs associated with termination of phone calls – all customers would pay the same fee for termination of calls regardless of the number of calls received.
- In unregulated markets bill-and-keep interconnection arrangements exist only under the restrictive condition of balanced traffic – however, in dynamic and partially regulated markets like telecom there is no guarantee that the traffic between any two operators will remain balanced over time and thus a bill-and-keep arrangement does not afford adequate flexibility.
- Under bill-and-keep and a fixed monthly subscriber line charge, the terminating company has less incentive to provide good service since it is not getting paid for the termination service on each call on a per call basis – there will be under-investment in termination services and over-investment in other services since recovering costs from a fixed monthly line subscriber charge does not send the proper signals about the cost of individual calls.
Bill-and-keep amounts to setting termination charges at zero, which is clearly below cost since termination costs are non-zero.

**Setting the Price of Interconnection**

Interconnection pricing has been based traditionally on reciprocal compensation agreements reached between various local access companies. But, what is the impact of traditional interconnection pricing arrangements on Internet service? Specifically, ISPs receive calls, but do not make calls. Consequently, some argue that this one-way traffic has led to a significant amount of money flowing away from incumbent local access companies as the ISPs do not pay termination charges and collocate facilities with competitive local access companies.

Regulators have begun to rethink how to price interconnection and to consider bill-and-keep interconnection pricing arrangements in order to force ISPs to cover termination costs (Federal Communications Commission 2001a). However, imposing mandatory bill-and-keep to correct for the ISP collocation problem is arguably misguided and unsound.

The incumbent local access companies claim that the competitive local access companies have targeted ISPs in order to take advantage of high reciprocal compensation rates. However, it is not a problem that the new entrants have targeted ISPs as customers. There is a reason why ISPs should collocate with the new entrants which has nothing to do with reciprocal compensation. Incumbents have said that ISPs cannot collocate in their central switching offices. ISPs can save a tremendous amount of money by collocating with the competitors.

It should also come as no surprise that new entrants have targeted ISPs as customers. Since before the passage of the US Telecommunications Act of 1996 it has been understood that fledgling local access companies would, at least in the early stages of competition, primarily target businesses and other high margin telecom customers. Empirical evidence suggests that the Internet expanded rapidly around the same time the Telecommunications Act opened the door for competitors to provide local telecom services.

The marketplace for ISPs expanded significantly at the same time as newly formed competitive local access companies began searching for customers. There is a fundamental difference between ISPs and other businesses which makes it easier for the new entrants to attract ISP business. There were no longstanding relationships with incumbents to overcome and local number portability was not a concern. The competitors attracted business by offering state-of-the-art local fibre...
networks and by offering to collocate ISP equipment (Focal Communications Corporation et al. 2001: 19-22).

The beneficial relationship between the competitive local access companies and ISPs is not a one-way street. They have become natural business associates because the new entrants provide certain synergies that are not present in an incumbent-ISP relationship. In order to avoid unnecessary switching and transport costs (Gillett 1995), ISPs require the ability to aggregate Internet-bound traffic in a facility that is collocated in order to avoid the cost of buying local loops that carry dial-in traffic and additional loops to carry the aggregated traffic back to the central switching office. The traffic is returned to the central switching office in order to be shipped onto the Internet.

Collocation is normally not offered to ISPs by incumbents because the FCC (Federal Communications Commission 1996) declined to require that incumbent local access companies make collocation space available to Enhanced Service Providers. The incumbents would only be willing to create such barriers if they believe that the regulators will rescue them if a clever entrant finds a way around the barrier. Regulators can improve the process of interconnection by holding parties to the terms of trade that they initially proposed. In the US, the FCC has been too willing to accept the ISP traffic imbalance as a problem, rather than as an appropriate penalty imposed on an incumbent that has created a barrier to entry and is unwilling to allow the efficient collocation of ISPs.

**Pricing Based on Capacity Charges**

One problem with the current pricing of interconnection is that termination in the switch is based on a per minute charge with an equal charge on- and off-peak. It would be more efficient to set charges based on the manner in which costs are incurred. On digital switching machines, incremental interconnection costs are incurred when the interoffice trunk is terminated. This capacity cost should be the basis for setting prices.

In the case of termination costs that are traffic sensitive, capacity charges are the best mechanism for recovering termination costs since the cost of terminating a call is determined by peak usage. Provided that the capacity charges are based on forward-looking economic costs, they are an efficient means of recovering termination costs.

Capacity charges are an effective and efficient way for one carrier to pay another for using its network. Yet, it would be virtually impossible to levy such charges
directly on end users. Hence, it is reasonable – and pro-competitive – for each carrier to determine on its own how to recover the capacity charges from its customers.

It is also important to point out that technological advances argue in favour of more carrier-paid capacity-based charges rather than direct end-user charges. Packet switching is replacing circuit switching, and carriers are interconnecting with high-capacity links. Consequently, increased reliance on per minute prices instead of capacity charges is nonsensical because the former will impose unnecessary operational constraints and costs on carriers and equipment manufacturers.

Packet switching is offered on a capacity basis (Qwest 2001: s. 11), and cost analysts are able to determine the cost of providing capacity on a packet switched system. There is no evidence that firms that interconnect packet switching networks rely on bill-and-keep. The imposition of bill-and-keep would be contrary to the manner in which telecom pricing has evolved to reflect the cost structure of new technologies.

CONCLUSION
It is impossible to measure the value or benefits of a telephone call – especially for the party receiving the call. Value-laden policy decisions that have no empirical or theoretical basis are bad policy. The cost-causer-pays approach is relatively more efficient as it avoids value-laden judgements about the benefits of telephone calls and the issue of to whom the benefits accrue.

Interconnection payment schemes should be based on market forces and they should reflect the fact that the benefits of phone calls are not evenly distributed between callers and receivers. These schemes should capture the positive network externalities associated with the CPNP principle so as not to encourage the under-utilisation of telecom services; and capacity charges that reflect traffic sensitive costs should be employed instead of fixed end-user charges to recover termination costs.

A one-size-fits-all interconnection pricing regime should not be used to cover the costs of interconnection of network traffic. This is not efficient in a market comprised of a variety of types of services that is very dynamic and innovative. Adopting such schemes to cover the costs of interconnection of network traffic is not sound policy. Telecom networks are unique. They require a high degree of cooperation from all parties involved because of the interdependency of network
components. Cooperation is only economically efficient and conducive to competition when it is voluntary and contractual. This would not be the case under bill-and-keep interconnection pricing arrangements. Receiving no payment for handling traffic of rival firms would undermine competition in the telecom industry.