

SECTION B

New Technologies, Networks and Markets

New technologies, and the changing economics of the industry and its markets have been major contributing factors to the structural changes in telecom. This Section examines current trends and possible future implications. William Melody reviews the changing role and significance of interconnection in telecom networks, including its transformation from a technical into an economic issue. He explains how market developments have required increasing regulatory intervention on interconnection, culminating in the US *Telecommunications Act of 1996*, which requires pervasive regulation in order to make effective competition possible.

Jens Arnbak looks beyond the currently popular technologies, focusing his attention on developments in VLSI circuits, photonics, wireless technologies and intelligent networking. He evaluates their probable implications and the issues they may raise for policy and regulation. Robin Mansell assesses the redesign of the telecom network in its conversion from voice telephony to the advanced computer standards of intelligent networks. She observes that the network is a common resource for many different types of users and uses, and that it is important to identify the techno-economic factors that are driving the new design of networks and their implications for policy and regulation.

Knud Erik Skouby analyses the changing telecom industry structure and market characteristics. He looks at the development of three global “supercarriers” and their implications for service development, markets and regulation. Morten Falch examines evidence on industry cost and demand characteristics, noting the limited substantive and detailed current information available in the dynamic telecom marketplace.

Chapter 5

Interconnection: Cornerstone of Competition

William H. Melody

1.0 Introduction

Efficient interconnection is crucial to the effective implementation of virtually all public policies opening competitive opportunities in telecom. Interconnection has been an issue of considerable controversy since the earliest days of telephony. After the expiration of the original Bell patents in 1893, interconnection restrictions – imposed by the Bell Companies on potential competitors in the US, and established from the outset in most other countries – played a key role in building the national monopoly industry structures that are now the objects of reform.

Interconnection is fundamentally important because the telecom system must function as a single system. Users desire end-to-end services within an apparently ‘seamless’ communication network. They want connectedness and connectability. They do not usually care who owns what facilities in the overall system, or how the communication links are established. As traditional telecom networks have grown from national to global dimensions and have been expanded to include competitive suppliers and new services, interconnection has become the key to defining the limits of telecom service networks and the structure of competition that can prevail in supplying them.

2.0 Some Unique Characteristics of Networks

2.1 *Cooperative Interconnection*

For telecom networks to function effectively, a high degree of co-operation is required from all parties involved. The component parts of the network are highly interdependent. Investment in one part of the network creates potential benefits across the whole network. Blockages and deficiencies in one part of the network can create bottlenecks, increased cost and reduced revenue in other parts of the network. This co-operation must extend across technical standards and protocols, service definitions and quality, investment obligations, tariff structures and revenue settlements. In many respects a network is only as strong as its weakest link, as many users discover periodically when attempting to make telephone calls to fax machines, computers and countries with insufficient network capacity.

When there are several different operators co-operating in the provision of network facilities and services, the network interdependence can provide powerful incentives for strategic and even opportunistic behaviour. In simple market economic

terms the objective of each co-operating partner is to maximise its net revenue (the difference between its revenue and costs) by imposing as much of the network costs as possible on other partners while positioning itself to realise as much of the revenue as possible. As this must be done within a framework of ongoing co-operation, the results are heavily influenced by ongoing negotiations among the operator partners about the sharing of network costs and service revenues.

Until the telecom reform process began, telecom operators and policymakers solved the problem of network interdependence by establishing national, regional or local monopolies for supplying facilities and services over specified geographical regions. As monopolies operating under either government control or government regulation, any incentive to maximise net revenue was severely reduced as the operator would not be able to realise extra profit on a continuing basis, and there were only very weak incentives to minimise costs. The negotiations among the PTOs for sharing costs and revenues took place far removed from the pressures of a competitive marketplace and thus often came to adopt criteria very different from the efficient supply of telecom services, including making financial contributions to the treasury, absorbing excess levels of employment, or over-investing in network capacity. International negotiations in particular were careful to preserve the sovereignty of independent nations to do what they wished with the revenues generated from international telecom services.

Nevertheless, even in a regulated monopoly environment, privately owned PTOs, particularly in the US and Canada, had an incentive to ensure the costs and revenues of the national networks were shared in a reasonable manner. In the US, AT&T and the Bell System established technical standards and investment and operating requirements for the connecting non-Bell regional operators, audited their books of accounts and decided the appropriate sharing of the network revenues based upon their appropriate costs, including a reasonable return on investment. AT&T was the ongoing regulator of interconnect arrangements. These AT&T practices could be appealed to regulatory authorities, but seldom were because it would require the regulators to undertake a detailed examination of the accounts and operations of the complaining connecting telco.

The Trans Canada Telephone System (TCTS) – now Stentor Communications Inc. – is an association of the regional PTOs which plans and facilitates the provision of services that cross the different regions of Canada. Investment and operating responsibilities are negotiated, and service revenues are shared. The “revenue settlement plan” that has been applied by the TCTS throughout most of the monopoly period specified that the appropriate expenses each operator incurred in providing TCTS services could be claimed against network revenues, and the remainder of the revenues would be allocated among the participating carriers so as to provide each PTO with the same rate of return on its investment used in supplying these services. A detailed uniform system of accounts and cost allocation methodology was developed. In implementing the revenue settlement plan the PTOs audited one another’s accounts more rigorously than any government regulators ever have to ensure there were no unjustified claims, and the revenue settlement plan was being applied uniformly and fairly on an ongoing basis.

This experience illustrates the point that even under conditions where geographical monopolies are providing components of a larger national or international network, interconnection is not a one-time problem to be solved, but an ongoing issue to be monitored and managed. In interconnection negotiations, the gains of one PTO are

most often achieved as a direct transfer from the other partners in the network. For example, an increase in the interconnect charge or revenue share of one PTO results directly in a decrease in the interconnect price or revenue share of the other. Thus there are major potential rewards for competing effectively at the interconnect negotiating table, even when PTOs are not competing in the marketplace. Moreover, interconnection arrangements must be modified periodically to reflect changing conditions, including technical arrangements relating to new technologies and upgrading the network, the costs of equipment and other resources, the growth of demand, new service development and the structure of the evolving market. Interconnection always has been a dynamic issue. The process of managing ongoing interconnection negotiations always has been important to the efficiency of the services provided and the financial success of the individual operators participating in providing the network services.

2.2 Competitive Interconnection

When the circumstances for interconnection negotiations change from cooperation between geographical monopolies to cooperation between direct competitors for similar services in the same area, then the criteria for negotiation are much more sharply focused on the market standards of efficiency and profitability of individual operators, and the incentives for strategic and opportunistic behaviour are increased dramatically. The established PTOs are not about to give a new competitor a free ride on their network, nor allow their own efficiency to provide the foundation for a competitor to take away their business and earn high profits. New competitors, on the other hand, can only supply a portion of the overall facilities network needed to provide services to customers. In order to have any chance of demonstrating their efficiency and service capability, they must be able to obtain access to PTO network capability at reasonable prices.

But how does one differentiate efficiency gains from strategic gains from interconnection negotiations? Any gain won at the interconnection negotiating table is in effect a direct financial transfer from the one interconnecting operator to a competitor. Thus, both parties must remain just as alert to potential gains and losses from interconnection negotiations as from the marketplace. Yet the purpose of telecom reform is to stimulate the efficient provision of telecom services to customers, not to create an ongoing poker game of strategic and costly negotiations among the competing operators about the appropriate interconnect arrangements.

3.0 The Market Structure for Interconnection Negotiations

The inherent interdependence of network components, and the inherited overwhelming monopoly power of established PTOs who already have comprehensive facility networks in place make the market conditions for national interconnection negotiation about as lopsided as possible. The PTO owns the only established network, serves virtually 100 percent of the market and provides the only direct connections to nearly all customers. It has no market incentive to interconnect with a new competitor at all. The new competitor has no market power in that national market and nothing to offer the PTO at the interconnection negotiating table except the new national telecom policy that directs the PTO to interconnect. But it is important to recognise that this is political power influencing the framework for negotiations, not the market power of the new competitor. The established PTO has been ordered to interconnect – against its perceived self-interest.

If a new competitor involves one or more PTOs from other countries, they will bring to the negotiating table equal knowledge and experience about the strategy and details of PTO interconnection negotiations, and perhaps some leverage from other interests of the PTOs outside the country. But within the national market under consideration, it has nothing to offer the established PTO except the threat of taking away a portion of its business. The established PTO has no market incentive to negotiate competitive interconnect agreements at all. Its preferred position would be no interconnection.

This provides a stark contrast with the efficiency standard of competitive market theory which assumes that each party comes to the negotiating table with a powerful incentive to discuss which components of a total network each party can provide most efficiently so that total network costs will be minimised, and network capability maximised, the full range of customer demand will be satisfied, and both parties will be more profitable. According to the competitive market standard, the established PTO should unbundle its network into all the distinct, modular components possible, establish a structure of interconnect prices which reflects the costs (including a reasonable return on investment) of each component, and invite interconnection by potential service suppliers at any level. This would lead to potential competition across every component of the network where competitors thought they could operate more efficiently than the PTO. According to the theoretical ideal, there would be no need to legislate interconnect negotiations, and the PTO would have no incentive to bias its cost measurements, claim too high a profit in its interconnect prices, or otherwise exercise its monopoly power. Although the theory of optimally competitive markets is a long way from reality, it does provide a useful reference point for assessing the real market relations and the appropriate role for regulation in helping the market work more competitively.

If a PTO is ordered to interconnect with competitive infrastructure operators and network service suppliers in a market environment where it can perceive only negative effects on its own operations, it has a powerful incentive to establish conditions that will make it as difficult as possible for the new entrant to succeed. Protracted negotiations with extensive delays is a traditional method for imposing costs, inefficiency and uncertainty on new competitors. In several countries a number of potential new competitors have been negotiated into bankruptcy or withdrawal from the market before they offered any services at all. Interconnection is a significant barrier to entry under the control of the established PTO that can be stretched a long way before government authorities are likely to conclude it is being abused.

The interconnect conditions themselves can severely restrict the opportunities of new entrants on a range of issues. Restricted locations and levels of access to the PTO network, and an interconnect pricing structure that makes it economic to enter some services (e.g. long distance), but not others (e.g., local), are traditional ways of containing and controlling the competition that can take place. Establishing price levels for interconnect services that require the new entrant to pay the established PTO amounts to cover both its costs and the profit the PTO would lose from any business that shifted to the new entrant (as provided in the so-called efficient component pricing rule [ECPR]) is a way of protecting PTO profits from being affected by the loss of business to competitors and making it extremely difficult for new entrants to make headway. Insulating the PTOs monopoly profits from the effects of competition is neither efficient nor how competitive markets function.

The PTO also can significantly influence the structure of competition which develops through the interconnect arrangements it establishes, i.e., favouring large firms, small firms, telephone services or VAS. It is hardly surprising that PTOs would prefer to deal with sister PTOs from other countries with whom they already have co-operative interconnect arrangements for international services, and maybe even competitive market relations in other countries. Duopoly is a much more manageable form of competition for the established PTO than a more diversified competitive structure with unfamiliar players introducing new uncertainties that could seriously threaten the established ways of doing things. It also makes it much easier to control VAS market developments and ensure a major PTO presence in these markets because nearly all VAS suppliers will be dependent on the PTO for ongoing infrastructure support and access to customers.

The developments summarised here reflect both the experience to date and the straightforward logic of self-interested market behaviour. The PTOs have behaved in the same manner as all participants in the reformed telecom marketplace, which is to say that they have been pursuing their own economic interest. The difference is that the PTOs have overwhelming monopoly power in their national markets, and interconnection is the cornerstone of competition. If interconnection is left to the marketplace, it will be used by the PTOs to regulate their market in their interest, within the policy framework established by the government. In most cases this will ensure relatively weak competition directed more to artificial service differentiation within the umbrella of substantial PTO monopoly power than to efficiency and lower prices. If governments are serious about a competition policy in telecom, they cannot leave its implementation to the established PTO and its (monopoly) market determined interconnection practices. Effective implementation of a competition policy requires ongoing government regulation that plays a proactive role in ensuring interconnect arrangements permit real competitive opportunities and are in the public interest.

4.0 The Basic Principle for Interconnection

There are essentially two types of interconnection, that which connects at the end of the network, and that which involves the interconnection of networks. Historically the two have been quite distinct and treated very differently. The former was initially customer terminal interconnection, and was viewed as direct competition by the telecom operators because they supplied, and sometimes manufactured, the terminals as part of their network services. The latter was the interconnection of monopoly telephone companies serving contiguous geographical areas, and was viewed as primarily cooperative. But as the technologies have improved and markets have been liberalised, these distinctions have become somewhat blurred over time.

The interconnection of telecom networks serving contiguous geographical areas creates a larger network of calling possibilities for the subscribers of both interconnecting operators, and generates revenues substantially in excess of the additional costs of establishing and maintaining the interconnection. The revenues collected from the PTOs across the two networks are shared in a variety of ways between the cooperating carriers. They range from detailed cost-based divisions of revenue among PTOs, as described above, to payments by the smaller PTO for the privilege of interconnection with the larger one. Often divisions of revenue, including those for international services, are

based upon long established general guidelines that may have no necessary relation to actual costs or revenues.

Competitive interconnection was first established at the ends of the network for terminal devices and simple extensions to the tails of the monopoly operator network. Challenges to the monopoly PTO restrictions against 'foreign attachments', i.e. those not owned by the monopoly PTO, first arose in the US. Manufacturers of recording devices and telephone attachments failed to obtain interconnection approvals in the 1940s and 1950s. Private microwave systems of railroads, electricity and natural resource companies, established to meet specialised needs, were interconnected only for emergency reasons and their use severely restricted. Microwave transmission systems established to deliver television signals from the end point on the monopoly PTO network to the hinterland were interconnected only for the purpose of receiving signals and passing them on.

In the historic Carterfone case – the Carterfone was a simple acoustical coupling device allowing private microwave system communication signals to enter the public network without an electrical connection – the US Federal Communications Commission (FCC) revised the principle of legal interconnection on 27 June, 1968 as follows:

...our conclusion here is that a customer desiring to use an interconnecting device to improve the utility to him of both the telephone system and a private radio system should be able to do so, so long as the interconnection does not adversely affect the telephone company's operation.

This principle has since been applied to all kinds of interconnection in the US and many other countries. Terminal devices have grown from simple terminals to computer systems, LANs, buildings and sub-divisions, as well as microwave, cable and satellite links. The principle was then extended to MCI, Sprint and other competitive network operators. But as competitive interconnections, the negotiation of terms and conditions tended to be protracted, usually requiring the intervention of a regulatory authority and/or a court.

5.0 The Types of Issues

The most significant issue at the beginning of interconnection discussions is to establish an effective process for decision-making on issues that will arise on a regular and continuous basis. This process will need to incorporate the interests of all affected parties, to develop the information needed for narrowing the differences among the parties, and to provide a basis for informed decisions in the public interest. Then the ongoing problems that must inevitably arise in a dynamic marketplace can be resolved expeditiously in reference to public policy objectives.

Interconnection debates have tended to revolve around four distinct types of substantive issues. The initial concern of the established operator is that the interconnection of equipment outside its control may introduce technical harm into the network and damage its capabilities. This makes it essential that compatible technical standards be established and maintained. Experience has shown that technical interconnection is not a significant problem in modern telecom systems as technical issues can be readily resolved. Neither negotiating party benefits if technical incompatibilities exist. Historically, most of the technical debates have been driven by

underlying economic issues, presented in the more respectable guise of technical concerns for negotiating competitive interconnections. A number of developing countries are confronted with the problem of technically deficient terminal equipment being dumped on their markets. Although a serious problem, this is primarily a problem of quality control and equipment certification, not interconnection.

A second category of substantive issues relates to service definitions, i.e., agreement on the levels and grades of service, and the terms and conditions for offering the services to be interconnected. Achieving this compatibility is a direct function of the desire of the carriers to do so, in order that a wider service might be offered. The development of global public facsimile (fax) is a good example of this, having been technically possible for many years before PTOs decided to adopt compatible service definitions and make it a global public service.

Direct interconnection often requires that costs be incurred by the interconnecting carriers to bring about the desired service compatibility. For example, telecom authorities in a number of European countries have found that the costs of modifying their systems to create a uniform European telecom network for all public telecom services are substantial and are taking several years to implement. Problems associated with negotiating agreements on service issues have tended to be overcome without difficulty under cooperative conditions, but have often raised serious difficulties under competitive conditions.

A broader set of issues involves the fundamental economic questions raised in competitive interconnection negotiations in which the established PTO thinks it has nothing to gain and attempts to minimise its losses, and the new carrier knows its opportunity to compete could be lost at the interconnection negotiating table before even entering the market. A fundamental issue is access to markets and services, i.e., types of access, specification of connection locations, levels and grades of service, terms, conditions, prices, etc. The interconnection requirements of the new operator will impose costs on the established operator. The better the access, the higher the costs, and the more effectively the second operator can compete. The prices charged to the new operator for access can provide a major barrier to entry, or a subsidised competitive advantage. These economic issues tend to dominate interconnection negotiations between operators.

Finally, there are the issues of broader economic and social policy that bear on the interconnection decision. Universal service obligations, information society or industrial development policies, and in some countries employment policies may require consideration in the new decision-making process. If they are to be incorporated effectively into interconnection negotiations, the direct involvement of the telecom regulator is required. The key interconnection issues are summarised in Table 1.

Technical
Standard setting; technical compatibility; signal quality; Open Network Provisioning (ONP)/Open Network Architecture (ONA).
Service
Co-operative network expansion; compatible practices; uniform service definitions and conditions; shared responsibilities, costs, and revenues
Competitive
Terms of access to and use of essential facilities; negotiated locations; service levels, capacities, quality; negotiated prices and risks; supplemental services for the second carrier.
Regulated
Criteria for determining equal and equivalent access; assessment of reasonable costs and prices; incorporation of USO and industrial policy objectives; establishing a process for ongoing problem resolution.

Table 1 – **Interconnection Issues**

6.0 Supplemental Services

In addition to the many dimensions of establishing effective interconnection of one or more additional operators, there is a range of supplemental services which could be supplied by the established operator. These include automatic number identification (ANI), billing, operator services, directory, back-up, route diversity, and others. They are service functions that the established operator often can perform more efficiently than the new carrier because of its size and dominant position. For some of these, customers would be better served if they were provided in a co-operative manner.

This raises the important principle of how far a new operator can go in demanding such services from an established operator and how much freedom the established operator will have in setting prices and conditions for such services. A new operator would prefer to request the supply of all service functions that would lower its costs. It would supply only those functions where its costs would be lower. In the extreme, this could lead to a ‘piecing out’ and cherry picking of facility segments, functions and other activities by the new operator to maximise its competitive position. But in a perfectly competitive market, this is precisely what would happen.

Such a development inevitably raises the issue of reciprocity. Should the established operator have the same opportunity to make similar requests of the new carrier? Where the line gets drawn in the supply of supplemental services, and where the balance of responsibilities lies between the two carriers is extremely important to competitive advantage, overall network efficiency and the breadth and quality of services

provided. The public interest standard would require a balance of competitive and cooperative relations that would encourage optimal efficiency and maximum service development on the total system. However, given the incentives of the carriers it would be virtually impossible to achieve this without regulatory intervention.

7.0 VAS, Resale and New Technologies

Historically, interconnection agreements between PTOs have differed substantially from agreements with users and suppliers of end-links to the basic network. Those at the end of the network have never received the same privileges and opportunities afforded to other telecom operators. The essential reason for this was because operator interconnection was cooperative and extended the network geographically, whereas the end-link connections were competitive and sometimes lacking in quality control at the standards of the PTOs.

However the second operator connection is now also competitive and quality control for the end-links is no longer a technical issue. VAS and specialised network service developments are a significant and rapidly growing segment of the market. Policies establishing resale and complete liberalisation of access to the core network are being considered in many countries. Under these circumstances, there may be no justification for offering discriminatory interconnection privileges to a new operator that are not made available to any potential service supplier. If there is none, what effects would this have on the costs and sheer practicality of the established operator providing a wide range of interconnection services to a large number of competitive suppliers? These questions will require resolution as they will establish both the structure and the boundaries of competition.

In the late 1990s, competition between PTOs on the one hand, and retailers of communication services (VAS and resellers) on the other will intensify. Neither the established nor the new PTOs have an incentive to assist retailing competitors by facilitating all of their demands for beneficial access and supplemental services. The range of opportunities for access by retailing competitors will determine the extent to which they can compete for existing services, including basic telephone service.

With full network liberalisation, and the desire of all service suppliers and many large users to control their own voice and data networks, competition is extended into the areas of network intelligence, control and management. One form of this competition is exhibited in the submarket where the PTOs' Centrex switching services and the PABXs of users compete across equipment, services and network management functions. These developments will have a significant influence on the structure of future networks. At one extreme, network intelligence, control and management would remain in the central office switching of the major carriers. At the other extreme, the network would develop in geodesic fashion with most network intelligence, control and management shifting to the retailing service suppliers and larger users, with the operator's primary role being reduced to the wholesaling of raw capacity.

The introduction of new hardware and software technologies will heavily influence the future course of network development. Their introduction will raise additional interconnection issues because they affect technical and service compatibility, economic opportunities and costs. They will impose costs on other participants in the overall network and shift the balance of competitive advantage. Technological upgrading of national and global telecom networks is occurring and will continue for the foreseeable

future. This will require ongoing adaptation of interconnection agreements and resolution of changing interconnection issues.

Perhaps the most significant technological issue for the future relates to the development and introduction of open network provisioning (ONP), or open network architecture (ONA). This will facilitate interconnection across most services and a wide variety of different standards, providing a quantum leap toward liberalising access and providing flexibility in the use of telecom capacity. ONP/ONA will make it much easier to perform network intelligence, control and management functions outside the core PTO networks. To date most of the discussion about interconnection has been about the facility interconnections of second public operators. The more significant interconnection issues for the long-term relate to VAS, resale and network management. It is opportunities in these markets that are essential to unleashing the new services, such as those on the Internet, that will provide a foundation for the development of information societies.

8.0 Network Costs and Interconnection Charges

Within the basic parameters of interconnection outlined above, there are a number of detailed issues to be addressed. Some of the tasks that regulators almost certainly will have to address are listed in Table 2.

For most issues there is a fundamental trade-off between the precision with which interconnection objectives are interpreted and the costs necessary to satisfy them. This is nowhere more evident than in the basic issue of providing “equal access” to new operators. If “equal access” is interpreted as it was in the US for the long distance competitors after the AT&T divestiture, i.e. residential customers’ selection of any operator by dialling the same number of digits, then the PTO network adaptation costs could be large and require some time to implement. If a more limited goal of ‘equivalent’ access is sought, i.e., access by dialling an increased number of digits, the adjustment costs would be less and could be implemented more rapidly. The benefits to the second operator would be less, but should be obtained at lower interconnection charges. The positions adopted by the two operators on this issue will be determined primarily by their respective assessments of the cost/benefit trade-offs.

The basic criteria for judging the reasonableness of interconnection requests and proposed prices will be the respective costs of provision. Telecom costing is a complex matter under the best of circumstances. It is rendered especially difficult for operators that have recently been transferred from government and administrative departments where detailed business accounting and information systems were not employed. Without an effective cost information system, it becomes extremely difficult to find a basis for judging the reasonableness of any price, including the price of interconnection.

Even with good information, cost analysis of telecom networks and services is a complex business. Most costs are common and interdependent, making it difficult to trace direct cost causation in the network and develop acceptable rules for sharing common costs. The development of an effective costing system is essential to good management, effective interconnection and justifiable regulatory judgements. To illustrate, throughout the 1990s OFTEL (the UK regulator) has developed a management accounting system that permits improved cost identification in BT’s accounts. Applying cost-based pricing for interconnection using this improved cost accounting system, it was able to reduce BT

interconnection charges for 1995-96 by 30 percent, and has announced an additional interim 12 percent reduction for 1996-97.

Some Interconnection Considerations for the Regulator to Establish:

- A process to involve a range of affected interests, including users
- Conditions for equal and/or equivalent access
- The range of options for new operators – line side, trunk side; locations, levels, grade and quality of access; performance standards and measurement; information exchange
- The rate of network adaptation for new operators
- Assigning the costs of network adaptation
- Availability of associated services – billing, automatic number identification (ANI), operator services, back-up, directory, route diversity, emergency, and others
- A long-term plan for number allocations among operators
- Extent of facility sharing – ducts, radio sites, switching centres, and others
- Extent of “piecing out” network facilities of the PTO
- A methodology for calculation of ongoing costs
- An effective cost information system
- Reporting requirements for operators
- Criteria for evaluating access charges
- Standards for cost and revenue sharing of joint services
- Extent for unbundling of functions in the local exchange
- Risks and responsibilities for network management
- Conditions for sharing forecast and planning information
- Steps towards implementation of ONP/ONA
- Responsibility for network expansion and upgrading
- A methodology for calculating and assigning USO costs
- Establishing comparable access to users and resellers

Table 2 – **Interconnection Considerations**

9.0 Opening the Local Exchange

In the US, the *Telecommunications Act of 1996* opens all domestic telecom markets to competition, including local exchange facilities and services. The Act provides for competitive entry into the local exchange market in three ways:

1. as resellers of services;

2. by obtaining access to any combination of unbundled network elements;
3. direct interconnection of networks.

The Act recognises the imbalance in negotiating power between potential new competitors and the established LECs, and creates an arbitration process in which the new entrant may assert certain rights, including that the LEC prices for unbundled network elements must be reasonable. In its First Report and Order implementing the Act, the FCC noted the Act “requires incumbent LECs to provide interconnection to any requesting telecom carrier at any technically feasible point. The interconnection must be at least equal in quality to that provided by the incumbent LEC to itself or its affiliates, and must be provided on rates, terms, and conditions that are just, reasonable, and nondiscriminatory”.

The FCC interpreted the term “interconnection” to refer only to the physical linking of two networks for the mutual exchange of traffic, and specified a minimum set of five technically feasible points at which the incumbent LECs must provide interconnection:

1. the line side of a local switch (for example, at the main distribution frame);
2. the trunk side of a local switch;
3. the trunk interconnection points for a tandem switch;
4. central office cross-connect points; and
5. out-of-band signalling facilities, such as signalling transfer points, necessary to exchange traffic and access call-related databases.

In addition, the FCC specified a minimum set of unbundled network elements that the incumbent LECs must provide, as including “local loops, local and tandem switches (including all vertical switching features provided by such switches), interoffice transmission facilities, network interface devices, signalling and call-related database facilities, operations support systems functions, and operator and directory assistance facilities”. State regulators may require the incumbent LECs to provide additional network elements on an unbundled basis.

The 1996 Act requires the state regulators to determine prices for interconnection and unbundled elements that are cost-based, and nondiscriminatory. They may include a reasonable profit. In implementing the “cost-based” provisions of the Act, the FCC has concluded that prices for interconnection and unbundled network elements should be based on the LEC’s “Total Element Long-Run Incremental Cost” (TELRIC), plus “a reasonable share of forward looking joint and common costs”. The TELRIC methodology is discussed in Chapter 17 which examines network cost analysis.

Important issues that already have been flagged for arbitration on interconnection include, access to rights of way; co-location of equipment; local number portability; the interpretation of costs using TELRIC and the meaning of “cost-based” prices; and reciprocal compensation arrangements. For unbundled network elements, fundamental issues likely to require arbitration include, the extent of unbundling; the opportunities for new entrants to combine network elements to create platforms for their services; achieving parity of operations support systems and services; costing and pricing. It is

clear the new US policy on open competition will require significantly increased activity by regulators on interconnection.

10.0 Conclusion

Efficient interconnection is crucial to the effective implementation of virtually all public policies permitting competitive opportunities in telecom. Without regulatory intervention, interconnection arrangements are likely to reflect the respective market power of the players at the time of the negotiation, and be used by the PTO to create artificial barriers to entry and shape competitive opportunities to its own interest.

Even under a market structure where there is significant competition in all markets, the PTO will retain significant monopoly power over the terms and conditions of interconnection. By being an active informed participant in establishing interconnection principles and practices on an ongoing basis, the regulator can ensure they reflect considerations of efficiency, equity and broader public policies, while maximising competitive opportunities. Pro-active regulation on interconnection is necessary for competitive markets to get established and to continue functioning effectively.

