CHAPTER 5

MANAGING THE INTERNET: COMPETITION WITH SPECIAL EMPHASIS ON INTERCONNECTION ISSUES

5.1 The Question of Competition: An Introduction

This chapter will begin by painting with broad brush the various matters concerning competition before taking a closer look at the interconnection issues[17]. In the past, there were compelling natural monopoly arguments in favour of monopoly provision, but technological progress, falling real prices for many inputs and increased demand have changed the structure of telecommunications (and the Internet industry) to the extent that the industry is no longer regarded as a natural monopoly (Baumol and Sidak, 1994). Perhaps the biggest problem that arises in the presence of a large incumbent telecommunications operator is the fear that it might seek to abuse its position of dominance. This is a legitimate concern for policymakers when looking at any industry where one firm has a substantial revenue share of the market.

[17] A first task in the analysis of competition issues in the "converged" communications market or the Internet market is to define appropriately the relevant market. The guidelines on dominant position and substantial lessening of competition basically define the context, the market and then make an assessment. It is important to note that a too-narrowly-defined market may lead to unnecessary competition concerns while a too-broadly-defined market may obscure the real problems of competition. Once a definition is obtained, an analysis of demand-side and supply-side substitution can be undertaken to gauge the extent of competition in the Internet industry, which would involve the selection of a list of indicators. This requires detailed statistics that is still lacking in the country. A look into demand-side substitution would reveal what substitutes exist for Internet subscribers/users and whether enough customers would switch, in the event of a price increase, without incurring a cost, monetary or otherwise, to constrain the suppliers' behaviour. An analysis of supply-side behaviour, on the other hand, would investigate whether suppliers are able to respond soon enough to a small, non-transitory change in relative prices by switching production to the relevant products without incurring significant additional costs or risks.

The MCMC, whose role is to protect competition (as distinguished from promoting or encouraging competition), views competition as the process of actual or potential rivalry between firms in a market. The MCMC in the Guideline on Dominant Position in a Communications Market observed that:

> "A dominant position is not primarily a matter of the formal structure of the market, but of the conduct of actual or potential competitive rivals within it. For example, it is possible to envision a situation where a licensee holds the bulk of market share, but is forced to restrain its prices in order to maintain that market share. In such a case the condition of independence is not met, and it is highly unlikely that a licensee is in a dominant position..... Conversely, it is possible to envision a situation where a licensee holds only modest share, but is in a position to exercise dominant position by virtue of structural features such as vertical integration into upstream or downstream markets."

Thus an incumbent with significant market power may not be in a dominant position if its conducts can be restrained by rivals with comparable or lower levels of market power. In light of this, the Commission set out in the Guideline on Substantial Lessening of Competition and the Guideline on Dominant Position in a Communications Market to include a non-exhaustive list of conducts which may have a negative effect on competition, namely predatory pricing, foreclosure, refusal to supply, bundling, parallel pricing and other pricing and supply behaviour[18]. Table 5.1 summarises a non-exhaustive list of conducts that might have negative effects on competition depending on the circumstances. Given that there is a multitude of such conducts, the aim of this paper is thus focused on those related to interconnection. Armed with this very brief overview, I

[18] The anti-competitive practices as laid out in the Reference Paper of the WTO Agreement on Basic Telecommunications include:
(a) Engaging in anti-competitive cross-subsidisation;
(b) Using information obtained from competitors with anti-competitive results; and
(c) Not making available to other services suppliers on a timely basis technical information about essential facilities and commercially relevant information which are necessary for them to provide services.

will first discuss the "last mile" problem, a brief examination of the local loop market, and then relate the importance of interconnection as a means to breaking down this hiatus.

TABLE 5.1 - TYPES OF POSSIBLE CONDUCTS HAVING NEGATIVE EFFECTS ON COMPETITION

Types of Conduct	*Example*
Predatory Pricing	Prices are set below production costs in the short term in order to eliminate competitors (either by driving them out or by deterring entry) and increase long term profits
Foreclosure	Customers are forced to enter into a long term supply arrangement with a particular supplier limiting competition in the market through customer choice restriction. Often these agreements will include customer penalties for early termination of the agreement.
Refusal to Supply or Share	Selective supply of goods and services to rivals, effectively limiting the number of competitors. Such refusal to supply might include network information, new services, and a service essential to any-to-any connectivity. Refusal to share scarce physical resources, which are difficult to reproduce, might include floor space in exchanges or space in ducts.
Reduction in Quality of Supply	If a licensee is able to reduce the quality of supply without a corresponding reduction in prices, this may constitute evidence of an ability to act independently in the market and of a dominant position in the relevant market
Bundling	A refusal to supply a good or service separately from another good or service forcing consumers to purchase the bundle rather than just the service they want
Parallel Pricing	A collusion between rivals to change prices in step
Price Fixing	Rivals enter into cooperative agreements regarding prices and sales conditions
Non-linear Pricing	Two-part tariff with a fixed fee plus a constant per-unit charge. Aggregated rebate scheme with discounts for taking full product range
Resale Price Maintenance	Retail price fixed by the incumbent/producer; usually a price floor or price ceiling
Excessive Discounting	Discounting which suppresses competition by discouraging the use by the customers of competitors' services, or raises entry barriers by targeting those customers able to move to actual or potential alternative suppliers
Price Discrimination	Charge favourable prices to own service providers. However, price discrimination may be an efficient means of recovering common costs

Source: Obtained and adapted from the Guidelines on Dominant Position and Substantial Lessening of Competition prepared by MCMC.

5.2 The "Last Mile" Hurdle

The physical barriers to the companies providing narrowband and broadband Internet services are the subscriber lines, or what commonly known as the last mile. The last mile is basically the existing pair of copper wires running from the homes and businesses to a central switching office or exchange. This twisted copper pair has been traditionally installed, owned and operated by the incumbent telephone company.

Despite the rapid development of technology and competition in the communications market, competition in the local loop market has not developed much and it remains as the main market segment where the incumbent has a dominant position. It seems that the incumbent's dominance in this segment will remain for a while unless there is a significant breakthrough in wireless technology or digital power line transmission. For example, "only Telekom is in a strong enough position to roll out broadband services at competitive prices as it owns about 97 per cent of the fixed line last mile to Malaysian users" (Annuar, 2003). However, this last mile problem has been rather universal but that does not provide the profit-maximising incumbent to abuse its position. Furthermore, according to TMNet, The economics of reaching out to the fringe and rural areas are not attractive because it costs RM2,000 to roll out Internet access to an urban subscriber and three times that to a rural customer. However, the rural customer brings in revenue that is three times less than his urban counterpart.

Why has competition not developed in the local loop market? Indeed, the last mile is the most expensive part of the telecommunications network, and it is not possible in the short to medium term for new entrants to have a ubiquitous network such as those of the incumbent. Thus every new entrant wants some form of access over the local loop.

In addition, relative to long distance backbone networks and trunk networks, which could be easily deployed through arrangements with utility companies (Tenaga) or national highway authorities (PLUS), the construction of subscriber lines are subject to strict local regulation and lengthy discussions with local authorities and private property owners to obtain rights-of-way. Considering the huge up-front investment to deploy local networks and the difficulties to get rights-of-way, the most probable candidates for local loop competition were electricity utilities, satellite and mobile operators, of which I will discuss later. However, only recently that the line-of-business restrictions, which prevented telephone companies, electricity utilities and satellite operators from entering each other's market, were removed under the Communications and Multimedia Act 1998 (CMA).

What can be done to resolve this? There are fundamentally three different ways for new entrants to enter the local market: direct investment in the local loop, unbundling of the local loop, and interconnection. Since it is not economically possible, at least in the short-to-medium term, for new entrants to construct local loops providing access to all consumers unless they already have direct access paths like electricity utilities or with the

emergence of new technology, there remains two viable options for new entrants to compete in the local market, that is, unbundling and interconnection.

As set out earlier, the aim of this paper is to assess the issue of interconnection while unbundling will be discussed briefly later. Interconnection is the physical link of two or more networks so that a customer on one network can contact another located on another network, while access refers to the services facilitated by interconnection, such as Internet access call origination and termination. The local loop is a facility over which these two economic services, Internet access call origination and termination, are rendered. The ISPs basically rely heavily on the local loop for connecting their customers to their central offices for the provision of Internet access services. In order to have a comprehensive understanding on the interconnection issues, this paper will first touch on the role of network effects and then explain the different types of interconnection. This will be followed by an analysis on the monopolising conduct associated with interconnection.

5.3 To Interconnect or Not to Interconnect

5.3.1 The Role of Network Effects

In discussing the network industries or specifically in this context, the Internet, the concept of network effects needs closer examination. We know that network effects exist when the addition of a user in a network increases the value of the network to all

users. This concept is popularised by a statement known as the Metcalfe's Law, which generally claims that the value of a given network is proportional to the square of the number of its users. However, a critical mass needs to be achieved for such a network to take off. Government intervention in the form of enticement is often sought for the take-off stage. Once taken off, the critical mass is then attained when enough users are on the network to justify the costs of joining the network. Beyond this point, widespread adoption of the network would materialise since the value of the network exceeds the costs involved.

We also need to distinguish between two network effects, that is, direct and indirect network effects (Katz and Shapiro, 1985, 1986 and 1994). A direct network effect is one in which the addition of a user to a network directly affect the value of the network. An indirect network is one in which the value of a complementary good or post-purchase service of durable goods increase as a result of having more users on the network.

Also, as noted in Varian (1999), the value of a given communications network such as a phone system rests on the fact that all phones use a common communications standard such that any member of the network can communicate with another member. The same argument would also apply to the Internet, since the communications protocol (TCP/IP) serves as a *de facto* open standard between completely disparate networks, allowing members from different networks to connect with each other without actually belonging to each other's networks. In allowing such interconnection, the Internet truly

serves as a "network of networks". As a result of widespread interconnection, end users currently have an implicit expectation of universal connectivity whenever they log on to the Internet, regardless of the ISP they choose (Kende, 2000). Thus, positive network effects dominate the Internet and are a motivating factor for networks to interconnect.

Beside positive network externalities, there are other factors encouraging Internet interconnection. Surges in the Internet traffic volume have not only created network logjams but also raised the transit costs for Internet providers. Understanding the traffic flows from one provider to another and engaging in interconnection agreements can identify ways to tackle both the problems. Interconnection comprises the commercial and technical arrangements under which service providers connect their equipment, networks and services to enable customers to have access to the other service providers' customers, services and networks. The physical infrastructure and software engineering aspects of connecting multiple networks were resolved through the establishment of network access points (NAPs) or Internet exchange points (IX). It is the economic aspect or commercial interactions of the providers that I will focus on in this section.

5.3.2 Wholesale Internet Access Call Origination and Termination Service

The MCMC, in the Access List Determination consultation paper (2000d), confirmed that it is generally accepted that the local loop exhibit strong natural monopoly characteristics but identified it as a facility which is considered to be a bottleneck. For

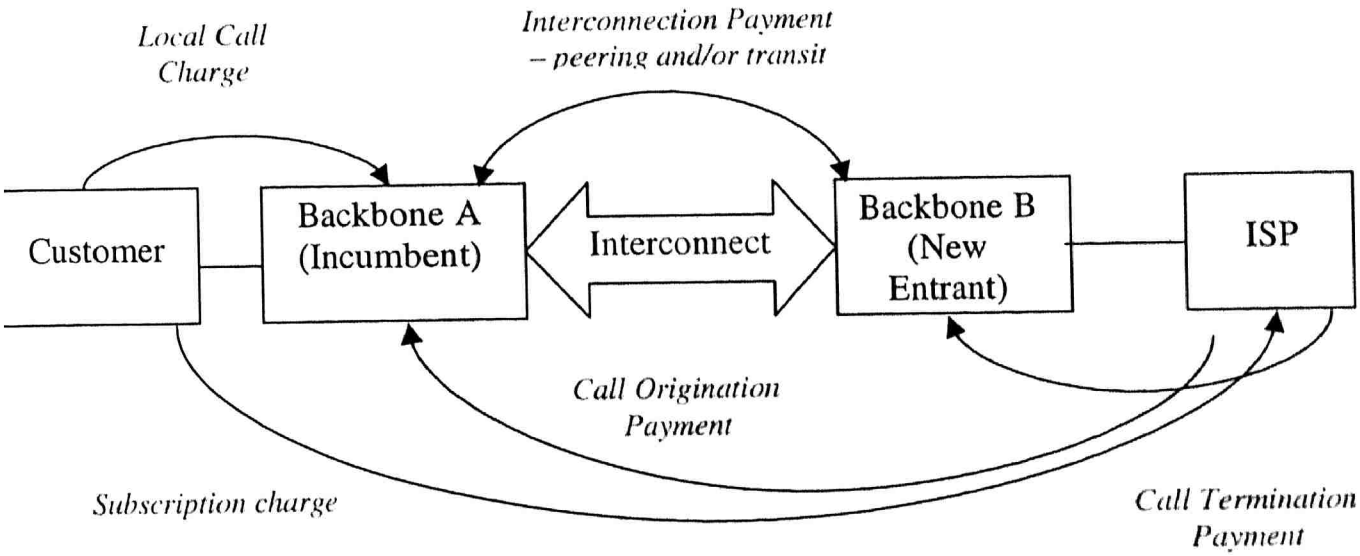
Internet access call origination and call termination services, the local loop has been considered as a bottleneck.

The Internet access call origination service is provided by the network operator or normally the incumbent with access to the end users. Most consumers access the Internet via their fixed telephone company, which to most is TMB. The MCMC (2000d) considers that the Internet access call origination service is unlikely to be provided to Internet access service providers on a competitive basis because the local access network (over which the call origination service would be provided) exhibits strong bottleneck characteristics. The MCMC (2000d) also envisages that the Internet access call origination service would include calls carried to a point of interconnection associated with a switch (at the local switch or tandem switch levels), a point of presence associated with the access seeker's modem bank or router co-located at the access provider's switch, or at the access provider's modem bank or router.

Internet access call termination, on the other hand, is the link between the originating network and the ISP. When a competitor to the incumbent, whether existing player or a new entrant, has direct access to its customers, the incumbent needs to interconnect with the competitor to terminate its customers' call towards the network of the competitor. This normally includes a combination of PSTN and IP networks. ISPs generally buy this part of the call from the terminating network operator, who buys the originating part of the call from the originating network operator. Both the incumbent and

its competitors usually need to pay interconnection charges for to connect their customers in each other's network.

Figure 5.1: Payment in the Local Loop Market



Most service providers in Malaysia, be it mobile operators using basic long-distance services or others, have some form of a revenue sharing arrangement where one pays the other for the usage of its infrastructure and vice versa. This is, however, not the case for Internet services. While the ISPs pay the incumbents for the infrastructure they lease, the end users pay local call charges to the incumbents for using the telephone lines as dial-up services for accessing the Internet, of which the entire amount accrues to the incumbents. Due to a lack of revenue sharing arrangement, the ISPs whose margins are squeezed would find it difficult to offer competitive rates (as opposed to the incumbents) to end users.

5.3.3 Types of Internet Interconnection

5.3.3.1 Peering and Transit

There are basically two kinds of Internet interconnection among the Internet providers, that is, peering and transit. Peering is very much a game of relationship. It involves an agreement between Internet providers to exchange their customers' routing information with one another, thereby supporting the inter-networking activities of each provider's customers. This is different from transit in the sense that peering does not provide access to the entire Internet but only to the other peering partner's customers. In other words, peering is a non-transitive relationship. If A peers with B and B peers with C, it does not mean that customers of A can reach those of C. If both providers find that peering is in their interest, there is still the question of how to connect, and how much it will cost. Peering arrangements are often "settlement free" but these days, larger IBPs charges for peering because the value proposition is unbalanced in some way.

The transit arrangement is often hierarchical, that is, it embodies a provider-customer relationship. As mentioned earlier, a transit provider will route traffic from the transit customer to its peering partners, allowing access to the entire Internet. With transit arrangements, usually small IBPs pay a fee, which could be a flat or a usage-based fee, for using the facilities of large IBPs to send and receive communications.

Many backbones have adopted a hybrid approach to interconnection, peering with a number of backbones and paying for transit from one or more backbones in order to have access to the backbone of the transit supplier as well as the peering partners of the transit supplier (Kende, 2000). TMB, for instance, has multiple domestic and international peering arrangements through its EastGate:

- Bilateral peering arrangements - (IX to IX)

  EastGate interconnects with other Internet Exchange providers to ensure secure, fast and uninterrupted data transfer

- Multilateral peering arrangements (IX to ISPs)

  As EastGate's peering community grows, users will be able to utilise various added routes to reach targeted destinations with highly reliable and quality Internet access at the user's optional speed.

Within each country, the typical scenario is that the ISP connects first to the US and then interconnects with other ISPs. Interconnection among ISPs is important because intra country Internet traffic (between subscribers of, say, TMNet and JARING) will remain within the country rather than transmit via the US. To the local user, it means faster access to local resources such as local web sites.

5.3.3.2 Forms of Peering Arrangements

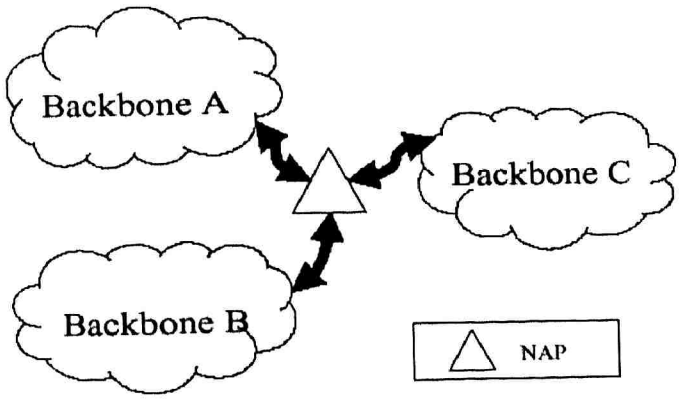
Peering is sometimes referred to Internet interconnection with no financial settlement generically, which is also known as "Sender Keeps All" or "Bill and Keep" arrangement. Several kinds of peering exist, namely, bilateral peering arrangement with or without settlements, multilateral peering arrangement, third-party administrator, and cooperative agreement[19]. Depending on the numbers of peering partners, bilateral peering arrangement or multilateral peering arrangement is undertaken when IBPs and/or ISPs agree to interconnect for economic reasons, while third party administrator provides interconnection between a number of hosts. Cooperative agreement is another form of arrangement where certain governmental agencies may look to interconnect with each other but do not try to make money off of each other.

Public and Private Peering

Public peering occurs when IBPs interconnect at neutral NAPs. For example, IBP A would have access to IBP B's network and vice versa, in an environment that treated them equally. As illustrated in Figure 3.1, IBP A connects to a NAP and then arranges to have peering other IBPs (IBP B and IBP C) at that neutral site. There is still no public peering arrangement in Malaysia as of 2002. Private peering, on the other hand, takes place at a mutually agreed interconnection point that is generally dispersed. In Figure 3.2, IBP A and B bypass the NAP when establishing a private peering connection but utilises the NAP when exchanging traffic with IBP C. If two carriers wishing to peer privately already have transport going to a NAP, they may simply bypass the NAP's switches and interconnect directly at the same physical location as the NAP (Kende, 2000).

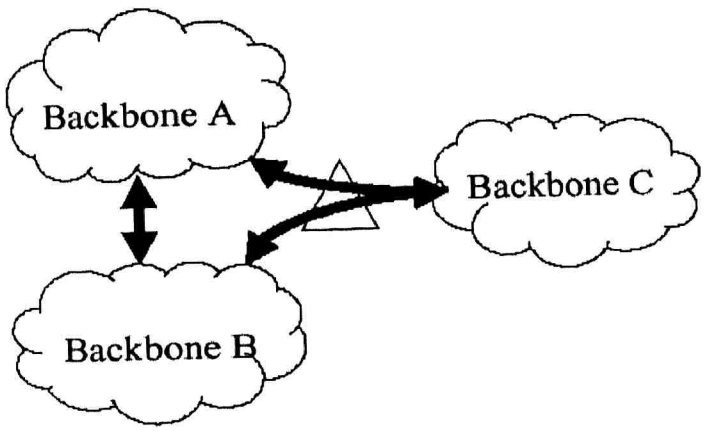
[19] See Bailey (1995).

Figure 5.2: Public Peering



Source: Kende (2000)

Figure 5.3: Private Peering



Source: Kende (2000)

The problem with private peering arrangements is that smaller IBPs or ISPs may find it difficult to enter private peering agreement with their larger counterparts. This is due to the fact that the larger IBPs do not receive proportional pecuniary benefits from such private peering. Suppose IBP A is a Tier-1 carrier that is 100 times larger than IBP

B, will IBP A be interested in exchanging traffic for free with IBP B or does it prefer the traffic of a larger player that is similar in size and clout? Kende (2000) asserts that there is no accepted convention that governs when two backbones will or should decide to peer with one another, nor is it an easy matter to devise one. Given such complexity, IBPs will peer if they perceive mutual benefits from peering, may it be equal geographic spread, capacity, traffic volume, or the number of customers, based on their own subjective terms rather than any objective terms. These decisions to peer could be modelled using a game theoretic framework, which will not be attempted here.

5.3.4 The Internet Backbone Monopolising Conduct[20] Issues

In this section, the issues of potential market power abuses or monopolising conducts by the incumbents or dominant IBPs will be discussed. It is not uncommon for a particular enterprise to gain a dominant or even monopoly position within a particular market. This could result from any of a number of factors: the privatisation of a previously state-owned business; the economies of scale; and the high cost of initial entry into the market.

The guidelines on dominant position seek to restrict the ability of dominant firms to unfairly exploit their market positions, which I refer to as actual or potential

[20] Market power in itself is not an offence under competition policy laws, since this could be the result of superior products and/or services, the development of which should be encouraged by policymakers. What is of much concern is more of the monopolising conduct of the incumbents that seek to exclude other competitors. Since market concentration does not necessarily leads to monopolising conduct, the use of market concentration ratios should be scrutinised. In reality, however, there might exists some positive correlation between market power and monopolising conduct.

monopolising behaviour or conduct. To engage in such behaviour, one must abuse a dominant position in a relevant market. Consequently, market definition can be critical in determining if there has been an unfair exploitation of a dominant position. The abuse of a dominant market position related to interconnection can be manifested in a number of ways as discussed below.

The incumbent's dominance could result in the following practices related to interconnection: refusal to interconnect smaller IBPs and ISPs, thus squeezing out competition and further concentrating the market; discriminatory pricing in favour of its own ISPs (TMNet is both a backbone provider and the largest ISP); price increases; or provision of poor service to interconnecting providers, encouraging those providers' customers to drop the competitors' service and come over to the incumbent's backbone, further concentrating the market.

5.3.4.1 Anti-Competitive Pricing Behaviour

As mentioned earlier, the Internet has created positive network effects for the consumers, which provides the incumbents incentives to tilt the market towards them. One concern involves the increase of prices to ISPs. Having more than one player in the backbone market would present ISPs with an option to react by switching to other products offered by other firms. If the alternatives were attractive in their existing terms of sale, an attempt by the dominant IBP to raise prices would probably result in a reduction in sales large enough for the price increase to be not profitable.

A market dominant firm may be in a position to earn monopoly profits; that is, profits which are in excess of what a firm in a competitive market would earn. In order to maintain a dominant position, a firm may attempt to keep possible competitors out of its market. One method is through predatory pricing, that is, pricing below cost in order to drive a rival out of a market or discourage a new competitor from entering the market. Once the competitor is out of the market, prices can then be raised.

Being the incumbent, TMNet handle the traffic for many of the Internet's popular website destinations. Customers of other IBPs and ISPs will want to reach these popular destinations and customers served by TMNet, which has the largest customer base. That could give the incumbent the leverage to charge unfairly high prices for linkups. This will not only affect the cost competitiveness of other existing IBPs and ISPs but also make it harder for new entrants to survive, unless they use multiple backbone providers which give them alternative routes.

An incumbent that holds a monopoly power may price its product at a high level to certain customers who it knows may resell to buyers the monopolist wants to sell to directly, but charge a lower price to customers who do not resell to buyers of interest to the monopolist. In effect, the monopoly seller applies a price "squeeze" that makes it impossible for the others to serve customers targeted by the dominant firm. For these competitors, the major barrier is a lack of fairly priced, quickly provisioned lines leased from incumbents.

Moreover, slow dial-up customers are high yielding while fast broadband customers are low yielding for resellers. As more and more customers switch to broadband, the profit margins for these resellers continue to plunge. These resellers face further setbacks from the intense competition from the incumbents that are bundling broadband as part of a larger package of services that leaves little room for resellers to expand.

5.3.4.2 Anti-Competitive Supply Behaviour

Most products and services, telecommunications or not, are bundles of attributes or features. It is recognised that consumers benefit from the convenience of purchasing from a range of products and services from a single supplier offering lower transaction costs, and creating cost efficiencies. Besides serving dial-up services such as TMNet 1515 and TMNet 1525 for the mass market and TMNet Direct for corporate customers, TMNet offers a range of other Internet and multimedia services such as TMNet Myloca, EastGate, TMNet Global Roaming, etc.

Given the presence of TMNet in these various segments of the Internet industry, there is a potential for TMNet to bundle these products as a package to rival other players in the Internet value-added services market and enjoy leveraging. Leveraging involves the ability of a firm with a dominant position in one market to use that dominant position to gain an advantage in another market in which it may not otherwise hold a commanding position. If the incumbent is allowed to wholesale out the service and has its own offerings, this will in effect lead to the incumbent cross-subsidising its own Internet

provision, since the incumbent also own the Internet backbone. However, since products in this segment of the industry are quite differentiated, monopolising conducts are unlikely to occur. This is because quality and reliability are the important elements rather than price itself.

An incumbent may be able to maintain its dominant position because it controls an essential facility (the local loop) that cannot be easily duplicated. For example, Tengku Azzman Shariffadeen, MIMOS' president and chief executive officer, in an article by Jacobs (2002), argued that "no matter which service provider it works with, JARING will still have to rely on Telekom Malaysia to a certain extent as it is still holds the monopoly of fixed line infrastructure in the country. We are basically supplier agnostic. We have worked with Fibercomm, Maxis, UUNet, Teleglobe – basically whoever will give us the best deal. But we cannot rule out working with Telekom Malaysia completely."

Competition law may mandate that the essential facility be made available to others through unbundling, for example. One focus of both the public and the politicians is the unbundling of the local loop, which allows competitive communications companies' access to incumbents' local loops - the last mile of the lines to the customer and business premises. Naturally the incumbent would like to retain some form of control over the local loop. Then, to what extent should the local loop be unbundled? This question on unbundling is particularly important when it comes to the provision of broadband services. Experiences from the US, the UK and Germany revealed that the

regulators in these countries favour the introduction of full unbundling involving the incumbents sharing their local loop with new entrants as leased circuits.

Unbundling may, however, indirectly discourage investment in broadband network services because they adversely affect the potential returns on investment and encourage free-riding by rivals who would rather use existing local network elements under a lease-control scheme than risk building their own capital. If new entrants can access all the customers on an incumbent's network by investing in only modest amounts of infrastructure, say by connecting to a single point in the incumbent's network, then the risks associated with network investments may be borne disproportionately by the incumbent, and thus discouraging further network investments.

If there is complete unbundling, how should the incumbent be compensated for the cost of the copper wires, which in many cases has already been recovered? How should the costs of maintenance and technology upgrading be divided between the players? The pricing of the loop will probably be based on the long run incremental cost (LRIC - taking into account of nominal capital cost and the depreciation period for the copper wires), in addition to an allowance for the costs common to the copper wires and other services offered by the incumbent. The maintenance and technology upgrading costs should be borne by all players in the market in proportion to some selected criteria such as traffic generated by each operator.

Another possible monopolising conduct is when the incumbent undertake targeted degradation at interconnection points, that is, customers from a rival may systematically face deteriorating performances while the incumbent's customers will continue to receive uncompromised services. This may lead customers to switch from the rival to the incumbent, which is more likely if the rival is a small competitor. The country should require incumbents to introduce cost-oriented pricing for leased lines and to provide service level agreements (SLA) in contracts, which would establish penalties for failure to meet the SLAs and increase pressure on incumbents to provide leased lines in reasonable times.

Furthermore, large backbone companies usually have their own separate criteria for which companies they will accept as peers, that is, the carriers with which they will exchange traffic without any payment. They often do not make these criteria publicly available. Big backbone companies are getting more selective about their peer selection because they feel that they cannot afford to share the huge investments they have made in their networks with others. Physically, the larger IBPs cannot possibly peer with all the ISPs and smaller IBPs to ensure that peering arrangements are mutually beneficial and of sufficient value to justify the cost of peering. The companies that do not meet their criteria have to become paying customers, much like ISPs, or look around for other backbone providers who will peer with them. This is because peering requires expenditure of resources, including human resources, use of equipment, and network bandwidth. Such resources are constrained in most cases. For this reason ISPs make conscious decisions as to with which providers they will peer, and under what business

terms. What is more damaging is if a larger IBP threatens to de-peer with another large IBP unless the latter becomes its customer, this could break up the Internet.

Furthermore, carriers building high-capacity networks may not been able to strike peering agreements with major backbone providers. They fear that the established backbone companies have an incentive to keep them out of the game, since the new players could overtake the old-timers with their well-capitalised, next-generation networks. The very people these smaller players have to interconnect with are the very people who have the most to lose.

There are currently no industry or government standards for peering criteria. Smaller IBPs often do not know why they are rejected as peers. They are afraid that the bigger companies use secret and arbitrary criteria to deny them peering relationships, thus raising their costs and harming their service. The larger companies, however, say that they are turning them down because these newcomers often do not have many customers. Strategically, these companies will accept the new entrants as peers once they build up significant traffic to exchange.

IBPs generally connect to other IBPs through private agreements. Since this is not made public, it seems feasible for the incumbent monopoly to segment the market, discriminate between buyers, and charge a higher price to the group of consumers with the smaller elasticity of demand. It is reasonable to assume that the smaller IBPs have lower elasticity due to the fact that they have few alternatives if there is a price change.

As private peering or transit agreements reflect an actual exchange of traffic, the incumbent monopoly may just discriminate with respect to network size and/or customer base. One would expect the monopolist to charge a higher price to the smaller IBPs to take into account the potential imbalance in traffic exchanged. Given that smaller IBPs are intrinsically disadvantaged, unregulated markets would eventually lead to the survival of the large IBPs. It is also worth noting that some IBPs own ISP, which may imply the practice of price discrimination and other differential treatment.

The reason peering bisects regulatory and economic concerns at the heart of this debate is because tier one IBPs do not just sell transit to other networks -- they also control the accessibility of their customer's routes that other IBPs need to interconnect or else they're effectively off of the Internet. Another IBP might have enough infrastructure to handle their own traffic, but if one or a group of IBPs have enough dominance that cutting off another IBP would kill the latter and not harm the former, then the trend is towards extracting payments for interconnections. The question is why there is no public peering in Malaysia. A concern related to this is that while small IBPs do not pay in the case of peering through the NAP, they must pay a transit fee if they connect directly to one of the large IBPs.

It is important to stress that it is interconnection, not transport capacity, that is the key issue to consider regarding ease of or barriers to entry in the Internet access market. Should one firm grow too large, it will be able to set the terms of interconnection, through either unilateral or concerted action. Ultimately, the end user

will be captive to the pricing set through the interconnection agreements of the dominant backbone provider.

5.3.4.3 Mergers, Acquisitions and Joint Ventures

The concern of horizontal restraints arises when Telekom proposed to acquire Jaring in January 2001, which would have given the merged entity a near monopoly of at least 80 per cent of the local Internet market. Competition law may be used to prevent monopolies from forming. It often requires prior government approval before firms above a certain size may be merged or acquired and may require a process of notification by firms exceeding a certain size threshold.

A government agency would be required to review the impact such an acquisition or merger may have on the level of concentration in the relevant market before the acquisition or merger can take place. This helps prevent a market from reaching a point where monopoly power may be attained by an individual entity. Joint ventures can present particular market problems. If two large companies in a concentrated market form a joint venture for only one particular endeavour, then it may be pro-competitive. Consequently, joint ventures, if limited in scope, may be viewed more favourably by competition law enforcement officials than a merger or acquisition involving the same enterprises.

5.3.4.4 Resolving the Last Mile?

The MCMC, in the consultation paper on Access List Determination (2000d), argued that it is not economical for the local access network to be duplicated, which is explained earlier. With the advancement of technology, other forms of access to end users, particularly wireless communications, have emerged and deemed possible substitutes to the existing copper wires. Wireless communications can take several forms, such as microwave, synchronous satellites, low-earth-orbit satellites, cellular, personal communications service (PCS), Very Small Aperture Terminals (VSAT), etc.

The wireless local loop revolution seems to be underway. This is due to the fact that wireless local loop is much cheaper to deploy at lower subscriber densities and has a much lower incremental investment cost than copper wires. In Malaysia, many new entrants and existing players have begun flocking to Wi-Fi as a key to unlock the last mile problem. To name a few, Maxis offers Wi-Fi through its WLAN product and TMB charges RM 19 for unlimited access to its prepaid Wi-Fi services for a 30-day period. Even though TMB has jumped onto the wireless bandwagon, this and perhaps other emerging wireless options open up significant new business potentials for TMB's competitors as they are less dependent on TMB. Furthermore, these competitors will be in a better position to negotiate fairer revenue sharing agreement and other interconnection arrangements with TMB.

The Wi-Fi world will merge with that of the wireless phone carriers, if the wireless industry rises to the opportunity. The fundamental problem with Wi-Fi today relates to roaming. It is like cellular was in the early days. The cell phone carriers'

services are not popular because they are expensive and slow. Wi-Fi can provide data transmission at 11 megabits per second, that is, approximately 200 times faster than the cellular networks (through mobile phones or personal digital assistances (PDAs), at a fraction of the cost.

One of the biggest problems with Wi-Fi, however, is that radio waves carry confidential data and by their very nature is insecure. Furthermore, its coverage is limited in range, that is, radio signals transmitted from a wired base station peter out beyond certain range, approximately within 50 metres or so from a small base station. Another challenge is for users to get connected in a Wi-Fi world that is increasingly fragmented, that is, to enable users to access all Wi-Fi networks as they travel across the country with a consistent experience, through a single authentication and billing relationship. Despite such hindrances, the work of installing Wi-Fi base stations in airports, hotels, cafes, and other venues known as "hotspots", is easier and cheaper.

While the Wi-Fi tackles the residential market, the emergence of Local Multipoint Distribution System (LMDS), another wireless technology that is able to transmit a large amount of data and information at a very high speed of up to 155 Mbps using microwave radios and supports voice connections, the Internet, video-conferencing and streaming, interactive gaming, and other high-speed data applications, looks set to be a viable option for the commercial sector. The provision of LMDS allows new entrants or even existing smaller players who do not have an existing network, such as copper wires or fibre optic lines of the incumbents, to build an advanced wireless network rapidly themselves and

start competing. This is possible because the LMDS technology can be deployed rapidly and relatively inexpensive.

However, copper, microwave and other forms of terrestrial infrastructure are not cost-effective means of linking a remote community of 100 people or a field office consisting of a few people. In this aspect, operators can install satellite-based VSAT networks and utilise it to provide Internet access since IP is already integrated into the VSAT remote unit.

Electricity power lines have the potential to be an alternative local loop for broadband: the technology exists, almost everyone is connected to the power grid and the utility companies need new revenue. The usage of electricity power lines as another last mile resolution for Internet connectivity to end users is a viable option in Malaysia, unlike in the US where there are far too many transformers installed at these electrical circuits. Even so, licensing remains a hurdle to the electricity utilities.

5.3.4.5 International Interconnection: An Asymmetric Problem?

Some non-US carriers, mainly from the Asia Pacific region, have voiced their discontent over the current international Internet arrangements for the transmission of Internet traffic between countries. This is because of the fact that the Internet started in the US, non-US carriers would need to pay the full cost of the leased lines connecting their countries to a US international gateway, together with port charges to connect to a US Internet backbone, and thus, subsidising US Internet users. International links form a

significant proportion of the cost of transmission. The trend towards global networks and partnerships has the potential to create a considerable disparity in the cost structures of Malaysian ISPs. In view of this, Malaysia has joined the following forums, the APEC-Tel/International Charging Arrangements for Internet Services (ICAIS) Task Force and the ITU Study Group 3, to discuss these international issues, which remain unsolved.