

End-User Networking In Asia

Ken Zita

1. INTRODUCTION

Telecommunications has become the strategic supply line for the modern corporation, but many firms have just begun to formalize communications strategies for the Pacific region. While the largest financial services, travel, and energy companies have had corporate networks in Asia for years, others have been less sure about their commitments. In the past, many companies regarded Asia exclusively for low-cost manufacturing and sourcing of materials, not as a group of individual mature markets. But as the boardroom view of the region shifts toward increased localization, alliances, and acquisitions, the corporate communications network must support and anticipate changes in the regional business strategy.

U.S. companies operating in Asia face many new challenges as the regional telecommunications industry undergoes profound change. Not long ago foreign firms were dumbfounded by impenetrable local telephone company bureaucracies, archaic infrastructures and extortionate circuit charges. Now competition is taking hold. Regional telecommunications carriers are leaping directly into the digital era and bringing local facilities in step with global networking standards. Regional GNP growth is forecast at about 5% for 1993, almost twice the world average. Nearly a third of worldwide information technology expenditures will be made in Asia this year. And market liberalization and telecommunications sector reform is redefining competitive trends in almost every major trading nation. Yet unlike the European Community, where economic planning and information networking developments are monitored by the European Commission, Asia has no common market, few similarities in industrial or political organization, and widely divergent values and expectations. Each country has vastly different rules and procedures regulating telecommunications policy, shaping both the scope and flexibility of end-user networking opportunities.

Complexity and composition of the Asian user networks naturally depends on the firm. Very large corporations typically have no choice but to build regional "private networks" consisting of high capacity lines leased from telephone companies. Smaller companies and those new to Asia still rely on dialing directly, which is expensive. Private networks provide considerable economies of scale in reducing the cost of telephone calls -- by as much as a factor of 10 -- as well as enabling data security and technological control. Private nets require field technical staff to manage the equipment, and not all companies can afford the privilege. Until recently, carriers did not have the expertise to manage complicated user networks, and were essentially oblivious to firms' real communications needs. Much of this

is changing. Carriers, traditionally stodgy, self-centered monopolies, are becoming increasingly market-driven. The turnabout is not exactly altruistic: with increased supply-side competition, profit margins on basic international telecommunications services are plummeting. Service providers hope to make up the difference by charging a premium on specialized services such as customized care of high-volume accounts, a high-profile niche known as managed network services (MNS). Communications managers designing and managing networks in Asia must address two critical questions. Will the system be managed primarily as a private network, and if so, what are the optimal sites for regional network hubs? And alternately, should users entrust their networks to carrier managed network service programs?

2. NETWORKING OPTIONS

Managed network services involve a global telecommunications carrier taking over some aspects of managing the corporate network, a role characteristically entrusted to in-house telecommunications departments. Carriers argue that MNS allow users to focus on their core businesses, freeing them from the distraction -- and expense -- of running their own systems. By sharing the intelligence and common resources in the carriers' networks, staff and capital expenses can be cut.

Companies need to determine how much responsibility they are willing entrust to carriers. MNS helps reduce technical salaries, which in some countries inflate by 15% or more per year. At the same time, firing experts may seriously diminish the corporation's ability to plot and execute information management strategies into the future. Similarly, by turning over basic communications operations to carriers, users lose commercial bargaining power. The cost of high speed private circuits across the Pacific fell on average of 38% in 1992, and this drop will continue. Companies can always provide cheaper solutions than MNS if they are willing to maintain investment in a private system.

Going it alone means users must decipher a barrage of idiosyncratic regulatory changes in each country in which they operate. Since market deregulation first took hold in Japan in 1985, changes have been coming fast. New competitors are proliferating (Australia, Indonesia, Malaysia), restructuring and privatization are pending (Korea, Singapore, Taiwan), and formerly hard-and-fast regulatory rules now shift with the political winds (China, Hong Kong, Thailand). Keeping up isn't easy. Users who maintain their own networks need specialists to stay current with market and political changes, or hire consultants who do.

New technologies for corporate networks are also eclipsing many systems in place today. Firms that have installed systems even five or six years ago must decide if they are prepared to make capital investments in the latest generation equipment to upgrade their network architecture. Most have to do something. In the 1980s, the Asian corporate network was engineered to send batches of financial and sales data from regional manufacturing sites back to the mainframe and data center in the U.S. Applications have changed dramatically since then. Corporate electronic mail and fax traffic is skyrocketing while the proliferation of PCs and "internetworking" of local area networks (LANs) means that companies are distributing computing processing power throughout the organization. Bridging the gap between the old and new platforms is complicated. The impending arrival of ATM could mean re-engineering everything in place today.

At issue is how much network self-sufficiency companies require in Asia. If trends in the U.S. market are any indication, the answer is less. U.S. carriers have pioneered "virtual private networks," a form of managed network service. AT&T, MCI, and Sprint all offer volume discounts of up to 22% on international switched calls, location-level billing, credit card calling and unified numbering plans, all consolidated on a single bill -- features too complicated for firms to do on their own. There are two drawbacks. Most companies don't trust virtual networks for anything but plain old telephone calls; data communications still get transferred on private networks. Second, placing voice calls to Asia on virtual networks siphons off traffic that would be used to cost-justify expensive dedicated circuits for data.

MNS offerings are growing increasingly powerful. New features over and above existing virtual services include private circuit monitoring, fault restoration to ISDN, one-stop shopping, outsourcing, on-site technical supervision, and soon, management "visibility" to LAN servers and desktop applications. Nevertheless, carriers expertise for operating regional user networks remains questionable. Carriers can manage circuits and data communications equipment well enough, but their ability to support higher protocol layers is suspect. Even as carrier value-added services grow more complex, emphasis is on connectivity and transport, not on applications interoperability and systems integration. Thus, users seeking comprehensive facilities and network management solutions in Asia -- that is, control and surveillance equal to what they would provide themselves -- rightly question if carriers are up to the task. Enterprise network management strategies seem to run in cycles, and the prevailing wisdom is that users are willing to entertain outsourcing and managed network services as a serious consideration -- to the carriers' delight, and possibly to the users' ultimate frustration. Many users would prefer to find a networking services company that can, as several Asia/Pacific network managers have said, "take the whole thing off our hands."

3. MANAGED NETWORK SERVICES

The big global carriers, especially AT&T and British Telecom, hope to convince users that virtual networks and other managed network solutions are ideal for the Asia/Pacific region. AT&T recently launched WorldSource, a \$1 billion joint venture with Singapore Telecom and Japan's KDD, targeting corporate networks in Asia, and BT is extending the reach of Syncordia, its managed network services and outsourcing subsidiary. Both aim to take over day-to-day management of companies' "core" communications services: regular telephone calls and high volume private leased circuits, but not actual applications such as accounting or internetworking between computers.

AT&T WorldSource president Simon Krieger says companies believe that the telecommunications network is a strategic resource that has potential for them to gain competitive advantage. But few companies are interested in merely handing over a strategic resource to someone else. "What they do want is to hand over the hassles of managing the network resources," Krieger says. These hassles include negotiating with foreign service providers and running humdrum operations like adding and deleting users, monitoring circuits and equipment and making sure communications are uncongested and static-free. The theory is that when companies are free of these burdens, network managers can concentrate on serving the corporate strategic vision, rather than get bogged down in managing operations. How much users are willing to pay for the convenience of managed network services remains

to be seen. Approximately 1%-2% of a major multinational corporation's costs can be attributed directly to telecommunications, and carriers reckon that firms will spend more for the right services. Premiums could range from 8%-15% over standard tariff rates, depending on the features negotiated in the service level agreement.

4. REGIONAL PRIVATE NETWORKS

Despite the aggressive supply-side push by carriers toward managed network services, traditional private line networks still dominate corporate communications in Asia. Companies deploy a variety of private network designs to serve their Asia Pacific communications needs, reflecting regional presence, network applications, and business growth scenarios. Some firms are content with simple star configuration networks, sending regional low-speed data into a rudimentary network hub, and employing a single high bandwidth circuit across the Pacific. Other companies, dependent on transaction processing, heavy file transfer, or financial data management, are more inclined to duplicate domestic information systems architectures with complex, redundant network topologies. Often regional facilities have grown up in piecemeal fashion: circuits are added when new offices or factories require direct communications with headquarters, with little consideration for a regional plan. The result may be an inefficient, hodgepodge network. As traffic to and within the region increases, weaknesses in design quickly become apparent. To redesign the network, firms need to determine what degree of support and compatibility is required at Asian sites. Today many companies are installing global network platforms with consistent hardware and applications at all locations. This continuity comes at a cost. Creating a universal management environment may require significant upgrade of existing equipment, and a "highest common denominator" approach may not fit the traffic or business requirements in the region. For example, a company may be formalizing its domestic U.S. solutions for LAN/WAN integration, but in Asia, where PC and LAN penetration is limited, the bandwidth support and processing power may not be needed. The issue of network uniformity is complicated further by wide disparities in local infrastructure capabilities and competitive provisioning options. Private networks in Asia characteristically have two tiers, the "backbone" and the "outback." The backbone is the high-speed transit circuits connecting state-of-the-art facilities in the developed countries -- Australia, Hong Kong, Japan and Singapore -- while the outback, or poor quality networks, is almost everywhere else. (See Table 1.) Communications managers sometimes complain that 90% of their traffic is on the backbone circuits, but that 90% of their management headaches come from providing service to the region's developing countries.

Another important consideration in formulating the network topology is a firm's data processing strategy. Some companies, striving to achieve better MIS economies through consolidation of data centers, may attempt to harness "night MIPs" on home-office computers. For example, a subsidiary in Thailand may poll a mainframe in Texas during the Pacific business day when the machine is underutilized, thereby consolidating control at headquarters and reducing regional support costs. Harnessing U.S. or European processing facilities generally implies bigger network transport capacity, which is costly. It also demands a high degree of resiliency and reliability from international circuits and both factors tend to make communications managers nervous. Regional data centers, by contrast, require trained personnel -- a resource in acutely short supply.

Table 1

First Tier "Backbone" Countries

	PTT Restructured	Foreign Equity (Basic)	Competition in Voice	Competition in Data	Alternate Domestic Carriers	Private Network Interconn.	Shared Use of PLC	Private Satellite Earth Station
Australia	○	49%	○	○	1, (12)	○	○	○
Hong Kong	●	100%	●	○	1	○	●	○
Japan	○	33%	○	○	73	○	○	○
New Zealand	○	49.9%*	○	○	1, (6?)	○	○	○
Singapore	○	20%?	●	○	0	○	●	●

Note: Australia and New Zealand allow resale.

Second Tier "Outback" Countries

	PTT Restructured	Foreign Equity (Basic)	Competition in Voice	Competition in Data	Alternate Domestic Carriers	Private Network Interconn.	Shared Use of PLC	Private Satellite Earth Station
Korea	○	0%	○	○	1	○	○	●
Taiwan	○	0%	●	○*	0	●	●	●
China	○	0%	●	●	0	●	●	○
Indonesia	○	0%	●	●	1	●	●	○
Malaysia	○	25%	○	○	1	●	○	○*
Philippines	●	40%	○	○	50*	○	●	○
Thailand*	●	49%	○	○*	2*	○	●	○
Vietnam	●	0%	●	●	0	●	●	○

○ = No

○ = Limited or In Transition

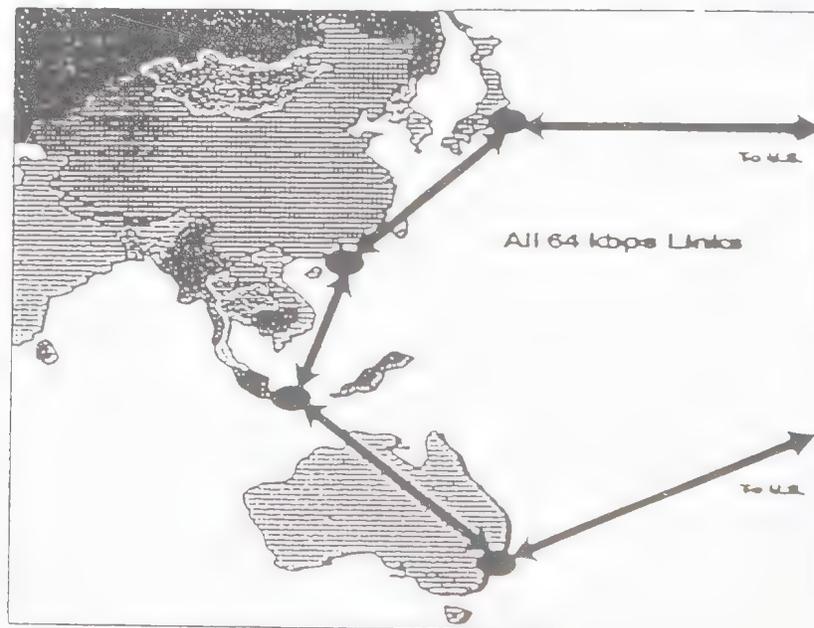
* = Restrictions Apply

5. SAMPLE NETWORKS

Companies develop unique topologies to support regional networks, and the following examples illustrate three basic designs. A simple and reliable network topology, in this case supporting a major hotel chain, is engineered for both high redundancy and maximum flexibility. The architecture is a physical ring (see figure 1), linking the U.S. with Japan, Hong Kong, Singapore, and Australia, and back again to the States. Redundancy is high because traffic can be routed in either direction on the backbone circuits. Under normal operating conditions, primary traffic from Singapore to points south flows through Australia, and primary traffic from Hong Kong north flows through Japan; the circuit between Singapore and Hong Kong is largely quiescent. All sites on this network have the same relative importance, and the probability of failure on a link is the same at each node. As designed, the system can tolerate any single circuit fault.

Flexibility was a central consideration in the design for two reasons: the locations of the reservation offices are subject to change, and the company's plans for new hotels are dynamic, with many projects pending. By establishing a stable backbone, adding or deleting sites is straightforward. Companies that cannot be certain of the full scope of business operations need to devise an architecture that allows flexibility without significant penalty.

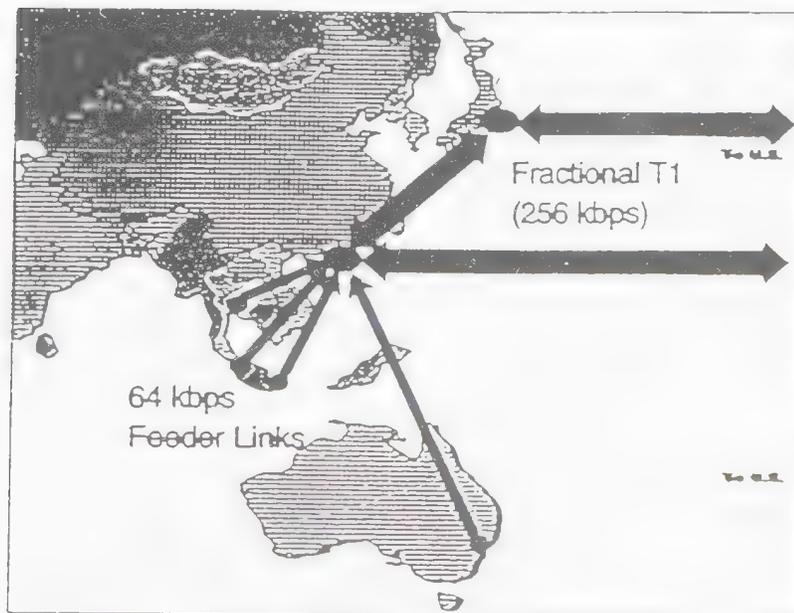
Figure 1



Another common network configuration is for firms to run dedicated circuits into Japan, which often has special traffic demands and applications support requirements, plus a separate star-hub network serving other areas in the Pacific.

Figure 2 below shows the network schematic for a large conglomerate. The Japan-U.S. traffic is routed over fractional T1 circuits (256 Kbps) to a site near the U.S. headquarters data center, and redundant routing is available between Japan and the southeast Asia network node in the event of a serious network outage. The Hong Kong-U.S. route terminates at a second site near the headquarters for security. Hong Kong is the primary feeder site for central and south Asia, funneling traffic from 13 countries on separate 64 Kbps circuits. Interestingly, because of the time zone differences between Asia and North America, peak daytime traffic within Asia -- for instance, between Japan and Hong Kong, which for this firm is a high volume corridor -- can be routed via the U.S. over the fast-packet (frame relay) network, more cheaply than though direct IDDD dialing. The reverse scenario from the U.S. to Asia applies as well, whereby routing domestic U.S. calls through the corporate network -- via Asia -- is in some instances less expensive than dialing over a domestic U.S. VPN. Some companies administer circuits to Japan as a discrete sub-network, with connectivity to a second, southeast Asian hub only for backup.

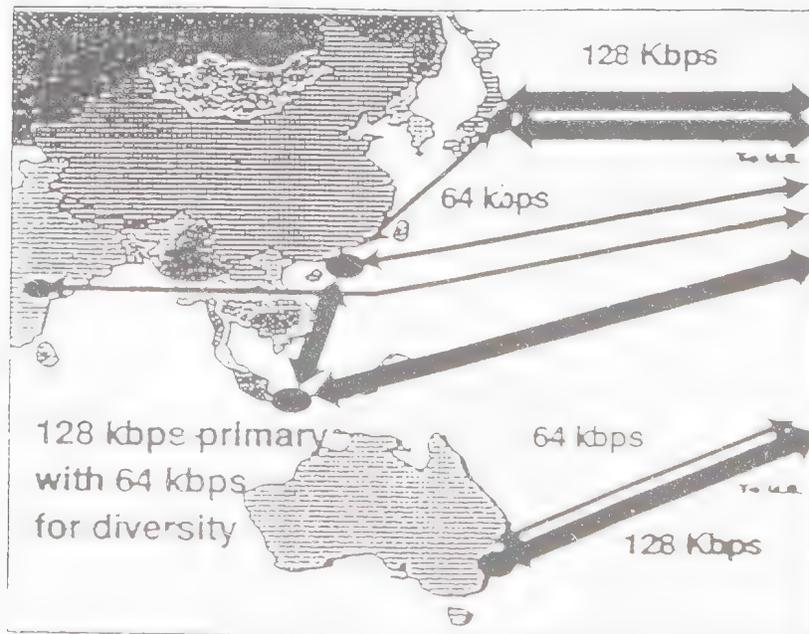
Figure 2



A third scenario, supporting extensive manufacturing, sales, and component sourcing operations, is engineered for high volume data and video conference, with diverse routing throughout. Trans-pacific circuits from Japan are twin 128 Kbps lines, terminating at separate domestic sites. Secondary circuits from Hong Kong and Australia use only 64 Kbps. The company believes that the 64 Kbps capacity will double by year-end 1993 (and that the 128 Kbps channels will grow to 192 Kbps or more), mainly because of increased traffic accelerated by the deployment of TCP/IP-based applications. The company has a number of data centers throughout the region, though Singapore acts as a client/server hub for terminal applications in four different countries: India, Indonesia, Malaysia and Thailand. Hong Kong is a hub for the Philippines and three locations in mainland China, which are triangulated with domestic leased lines -- a complex matter in the People's Republic. Most countries on the network have T1/E1 access domestically.

While each network has unique characteristics, some common themes are apparent. After analyzing the local competitive environment and internal traffic requirements, each firm identified the need for a physical ring, and the network topologies reflect their respective variations. The hotel's operations are distributed evenly throughout the region, the conglomerate has considerable traffic between its two primary hubs, and the manufacturer has immense requirements in Japan. The manufacturer added smaller backup circuits for key sites, while the hotel chain built in backup capability with a stable, reliable configuration.

Figure 3



6. HUBBING OPTIONS

Selecting an Asian hub site has become a dark science. The options used to be simple, if only because they were so limited. Firms had facilities in Japan and, separately, a hub for the rest of Asia in Hong Kong. With the profound, consistent growth in Asia's economies, the dynamics of regional trade are shifting, and with them, the need for more flexible networking arrangements. Singapore is now the gateway to the vibrant ASEAN region, Australia is claiming its place in the Pacific Rim, and even the stalwart PATS in Korea and Taiwan have begun to recognize that the continued growth in national wealth depends on liberalization of telecoms solutions for large users. Competition among countries -- and not merely among carriers -- makes the choice tangled. Government tax concessions and R&D incentives are bandied about in the same breadth as leased circuit break-even economies and public data network (PDN) processable packet size.

Sorting through hubbing options is complicated, and no reliable rules apply. Likely hub sites may be management offices or large manufacturing facilities, though network hub technology sometimes resides at an entirely independent location. As the preceding section showed, companies will often use a hierarchical network of primary hubs (where multiple circuits or a regional data center resides), and secondary hubs (for redundancy, low volume traffic routing, or regions with new business development). Head office politics sometimes play a big role. The need to establish a local "showcase" office can outweigh traditional networking concerns such as traffic patterns, technical support, circuit costs, and so forth. Hong Kong is still the preferred hub location measured in terms of total regional network hub sites, with Singapore nipping after its heels; Japan and Australia are scrambling to expand minority shares. Assessing infrastructure fundamentals in each country is critical. A few general parameters that are especially important include competitive access and flexible interconnection. Users learn quickly which regulations are "real," and which can be stretched or broken. Only Japan and Hong Kong have direct fiber links and diverse fiber routing with North America. Singapore has just recently gained fiber connectivity via Brunei, and Australia added optical links only in late 1993. Additional considerations include terminal interconnection procedures and restrictions; direct access to satellite facilities, earth station ownership; and local definitions for "group VANs" and circuit reuse or resale.

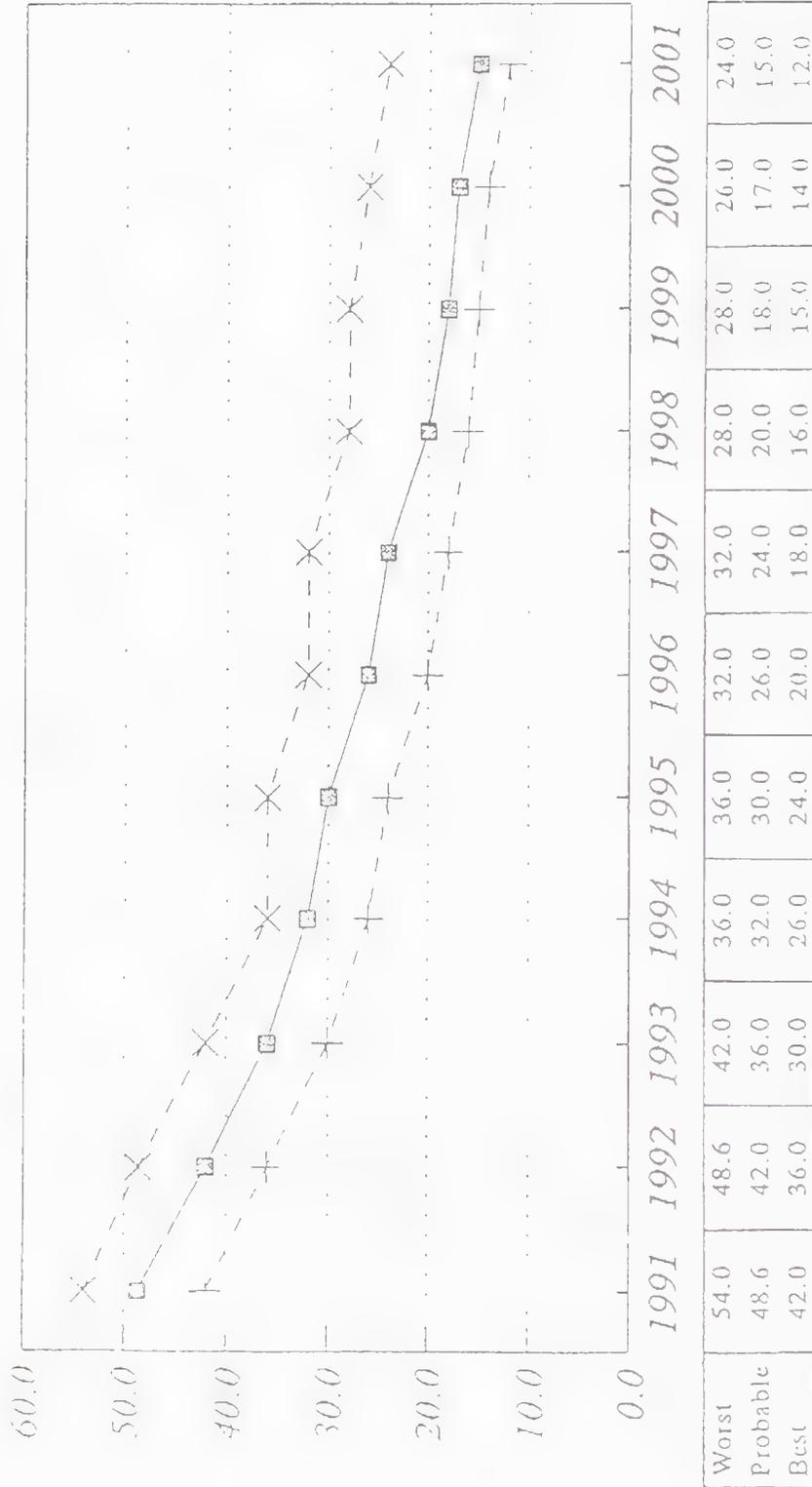
Generally speaking, circuit pricing remains the weightiest concern in hub site selection. The cost of inter-regional circuits are characteristically equal to or only marginally less expensive than trans-Pacific Routes, and aggregate discounts have been a strong incentive for establishing a hub. Carriers in Hong Kong, Singapore, Japan, and Australia all offer volume and aggregate circuit pricing schemes. Most are encouraging migration to digital circuits and considerable economies can be achieved at higher line speeds; 64 Kbps DS0 channels have become the basic building blocks of regional enterprise backbone networks. Countervailing accepted logic (at least as it is espoused by the U.S. carriers), the U.S. to-anywhere portion of an Asian network is not necessarily the cheapest leg of the journey. See Table 2 on the following page.

Table 2

JAPAN-U.S.

T1 HALF CIRCUIT CHARGE PROJECTION

(thousands \$US per month)



1 US\$ = 130 Yen

x Worst □ Probable + Best

6.1. Hub Choices

Hong Kong, still very much the Pearl of Asia, has long been the preferred regional networking center, and commands some 60% market share of Asian MNC hubs. Uncertainty over the Colony's political future after its June 1997, reunification with the PRC leaves some communications managers wondering if their investments will be safe. Several firms have pulled hubs out of Hong Kong, notably Reuters and Federal Express, but they are clearly the exception to the rule. Most China watchers concur that the changes pending in Hong Kong will be more cultural and political than economic: few believe that the transition of sovereignty will impact foreign business operations in a material way. Popular opinion actually maintains that because Hong Kong is the undisputed gateway to China, the importance of Hong Kong as a telecommunications hub will actually increase, as the economy on the mainland continues to boom.

More pressing problems for network managers in Hong Kong include soaring inflation (perhaps 13% in 1992), extremely high staff turnover, and escalating technical staff salaries and bonuses. At the same time, the advantages of Hong Kong remain: general business practices are highly efficient, and the local telephone company, Hong Kong Telephone, is highly responsive to MNC planning needs. Further, taxes are lowest in the region: 16.5% for corporations, 15% for individuals. Whereas Hong Kong is the gateway to China, Singapore is the window on ASEAN (Singapore, Indonesia, Malaysia, Philippines, Thailand, and Brunei). As such, many companies are designing networks to leverage the advantages of each site. Singapore is actively courting hubbing business, hoping to capitalize on the perceived political instability in China -- and the "dirty, disorderly and crime-ridden" qualities of Hong Kong life. Singapore seems intent on becoming the Switzerland of Asia, a manicured, tightly managed financial center with calculating government oversight. Of the four major hub sites, Singapore has by far the most aggressive government incentive programs for attracting business, coordinated by its Economic Development Board and National Computer Board. Firms can obtain generous tax holidays for committing to R&D and local investment. While Singapore Telecom has long shouldered a reputation for inflexibility, the tide may be changing. The recent corporatization of the carrier suggests that it has the potential to become more sensitive to the market, both at home and abroad. Like Hong Kong, Singapore has high technical staff turnover and fast rising salaries.

As the most powerful economy in Asia, the largest financial center, and the country with the highest volume of inbound and outbound traffic, Japan is also a critical hub site for Asia. The difficulty of establishing facilities is cost. While international tariffs out of Japan have become competitive with regional counterparts, the general costs of doing business locally has not. High real estate, technical support and labor rates far exceed any other region in the world. On the up side, Japan has extensive competition in services provision, and technical standards are unparalleled. Companies bound to Japan have begun to move data centers and network control centers to suburban locations, south along Tokyo Bay and to Yokohama, to defray exorbitant overhead expenses in Tokyo.

Australia has intensified its bid to become a regional hubbing anchor, underscoring the national commitment to the economies of the Pacific; Australia's trade with Asia now exceeds that with North America and Europe. The government offers modest tax and investment concessions, incentives which help mitigate the high standard corporate tax rate of 39% (the maximum rate for individuals is over 48%). Extensive fiber facilities into Australia will not be available until 1994, but good satellite coverage is in place today. Some user questions

how Australia, some 4,500 miles distant from both Hong Kong and Tokyo, could serve as a hub. In the reality of information networks, however, regional physical distances are arguably irrelevant. Telstra is clearly the dominant carrier in Australia, though Optus, the newcomer led by BellSouth, will be sure to concentrate on attracting MNC customers from its home territory in the U.S.

Both Malaysia and Taiwan hope to become popular corporate network hub sites. Malaysia is situated strategically in ASEAN's "growth triangle" and government planners believe that Kuala Lumpur can rival Singapore as the local of choice for regional headquarters. Market liberalization is encouraging the emergence of a second national carrier, Time Engineering, and Telekom Malaysia is keen to capture international revenues it is losing to Singapore. Taiwan is poised for fundamental market restructuring in 1994, beginning with corporatization of the national carrier, the Directorate General of Telecommunications (DGT), and redefinition of network access parameters and opportunities for value-added services. With foreign reserves topping \$80 billion, the world's eighth largest stock exchange, and a government eager to earn political recognition to match its economic might, Taiwan will soon cultivate a broader regional presence in telecommunications.

7. CONCLUSION

Users have no clear cut choice for networking in Asia. Firms inclined to trim staff or rely on outside experts might prefer an increased role for carriers through managed network services. But management must be convinced that agreements among several international telephone companies can do a better job running their communications than in-house experts can themselves. Other firms are keen to maximize technological control and to exploit falling circuits charges by continuing to manage their own networks. When the corporate business -- and the telecommunications manager's job -- depends on keeping things working, many are still reluctant to delegate core operations to a carrier. Because competition among countries is so intense, users are in an excellent position to negotiate for discounts and special treatment. In addition to pricing flexibility on published and group discount tariffs, users can bargain for circuit service level agreements, traffic engineering studies, tax concessions, facilities management terms and conditions and flexibility on terminal interconnection. By the mid-1990s, basic public networking facilities in Asia's largest information ports will be comparatively equal, and even variances in circuit pricing will cease to be a competitive variable. The real differentiating factors will lie in international alliances, networking management and outsourcing capabilities, customer service and local.