

## WHITE PAPER

# Staffing Asia/Pacific's Growing Networking Infrastructure: Are Organizations in for a Challenge?

Sponsored by: Cisco Systems (USA)

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## EXECUTIVE SUMMARY

This IDC White Paper is based on a data survey of more than 1,000 middle to senior management respondents in 12 countries in the Asia/Pacific (excluding Japan) APEJ region and IDC's proprietary IT skills model.

It shows that organizations may again face an increasing shortage of people with networking skills. While shortages were found to be lower than those predicted before the onset of the economic downturn in the first half of this decade, the demand for networking skills currently outstrips supply and will continue to do so throughout the forecast period unless a paradigm shift occurs in the supply of networking skills in the region.

- ☒ **Total networking skills.** Overall, IDC estimates a shortage of people with networking skills across the APEJ region of about 210,000 in 2006, increasing to 396,000 by 2009. These figures represent skills gaps as a proportion of total demand of 19% in 2006 and 23% in 2009. The number of skilled people is based on IDC's proprietary skills model, which calculates full time equivalents (FTEs). For the skilled people estimation above, IDC utilized the assumption that people on average spend 70% of their time working with networking technology (please refer to IDC's Skills Glossary in the Appendix).
- ☒ **Advanced network technology skills.** This refers to skills in the areas of network security and new network developments such as IP telephony (IPT), and wireless networking. When considering advanced skills (wireless, VoIP, and security), IDC estimates a skilled people shortage of around 113,000 in 2006 growing to 221,000 in 2009. These figures represent advanced skills gaps as a proportion of advanced skills demand of 22% in 2006 and 26% in 2009. The rapid adoption of these technologies by organizations throughout the region will drive demand for these skills and growth of the gap at a CAGR of 27% from 2005 to 2009.
- ☒ **Datacenter and cross-technology skills.** More than 65% of respondents see these as becoming more important in the future — only overtaken by advanced technology skills. This is a clear indication of the growing importance of networking technology as a platform for supporting critical line-of-business systems, applications, and repositories of data that is found in enterprise datacenters around the region. With this blurring of traditional lines, the networking skill is expected in many organizations in today's context to possess cross-technology skills rather than operate in a completely distinct environment with clear lines of delineation.

- ☒ **In the developing economies grouping (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam)**, IDC estimates the gap between supply and demand for networking professionals will reach about 13,000 by the end of 2006 and rise to 25,000 by 2009, representing skills gaps of 13% in 2006 and 18% in 2009. As a sub-regional grouping the total skills gap falls in the middle of the range of the three sub-regional groupings, with a lower total skills gaps than in India and the People's Republic of China (PRC) and a higher gap than the mature economies in APEJ.
  
- ☒ **In the large growth markets grouping (the PRC and India)**, IDC forecasts that strong economic development and a voracious local and global demand for IT related professionals will lead to a large total skills gap in the future. In the PRC, IDC estimates the skills gap will reach 107,100 (or 23%) by the end of 2006, growing to 192,300 (28%) by 2009. In India, the gap will reach 59,300 (20%) by 2006, climbing to 137,200 (26%) by 2009.
  
- ☒ **In the mature/maturing economies grouping (Australia, Hong Kong, Taiwan, South Korea and Singapore)**, IDC forecasts the skilled gaps in this country grouping will be lower than the regional average, reflective of where these countries are in the development cycle. IDC estimates the skilled people gap for networking professionals in this group will reach about 31,000 (11%) in 2006, rising to 41,000 (12%) by 2009.
  
- ☒ **Changing role of the network.** According to IDC's research, 96% of respondents across the region believe their networking infrastructure will become more important to their organizations in the future.
  
- ☒ **Vendor certification.** IDC research found that increasing numbers of organizations view vendor-based certification as an important attribute when assessing potential staff to fill networking related positions. Of those surveyed, 33% said such certifications are "very important" with a further 55% indicating they were "relatively important".

## IN THIS WHITE PAPER

This IDC White Paper examines the current situation in the Asia/Pacific region with regard to the demand for and supply of networking professionals. Through the analysis of a comprehensive country-by-country survey and the application of the IDC Skills Model, an accurate picture of the current situation is formed, together with predictions of future trends.

The situation in the Asia/Pacific is particularly interesting, with the majority of companies having rebounded from the economic downturn experienced some five years ago. This is leading to a surge in activity and thus demand for skilled IT networking professionals.

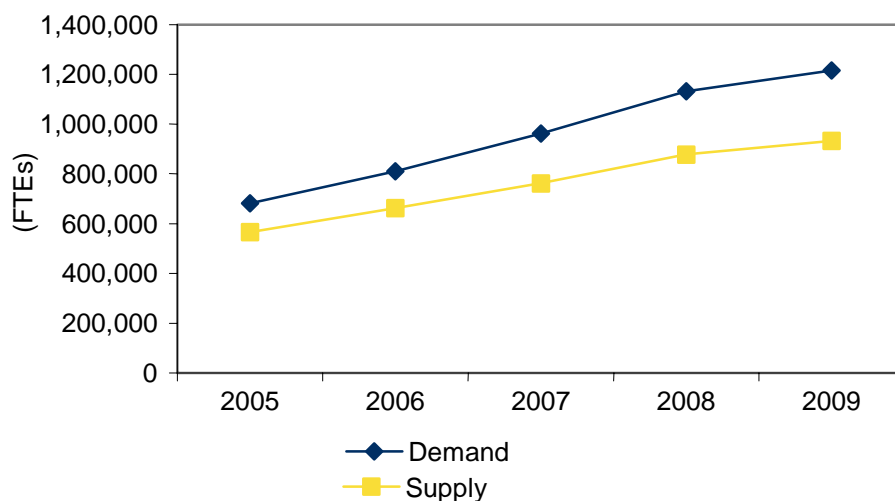
However, because investment in skills and training was curtailed during the economic lull that followed the dot-com boom of the late 1990s, key areas now experience shortages of suitable candidates. Of the areas experiencing the greatest pressure, networking consistently tops the list. In large countries with developing economies, the situation is even more volatile. Here, even relatively small increases in activity can cause dramatic increases in demand. Region-wide, IDC estimates that the demand for networking skills currently outstrips supply and will continue to do so throughout

the forecast period (refer to Figure 1). While the large volume of general networking infrastructure to be deployed is creating much of the demand, the emergence of advanced technologies such as wireless and VoIP is adding to the strain.

The only realistic way to address this growing challenge is by increasing the number of professionals being trained in both general and advanced networking skills.

**FIGURE 1**

Total Networking Skills Trends in Demand and Supply in Asia/Pacific, 2005–2009



Source: IDC, 2006

## METHODOLOGY

In early 2006, Cisco commissioned IDC Asia/Pacific to conduct a study to understand the current and anticipated demand and supply of networking skills in 12 Asia/Pacific countries in the period from 2005 to 2009. This study covers general networking and advanced networking skills (e.g., IPT, wireless networking, and security). The countries covered are:

- ☒ **Developing markets in APEJ:** Indonesia, Malaysia, the Philippines, Thailand, and Vietnam
- ☒ **Maturing/Mature markets in APEJ:** Australia, Hong Kong, Taiwan, Korea, and Singapore
- ☒ **Large-growth markets in APEJ:** People's Republic of China and India

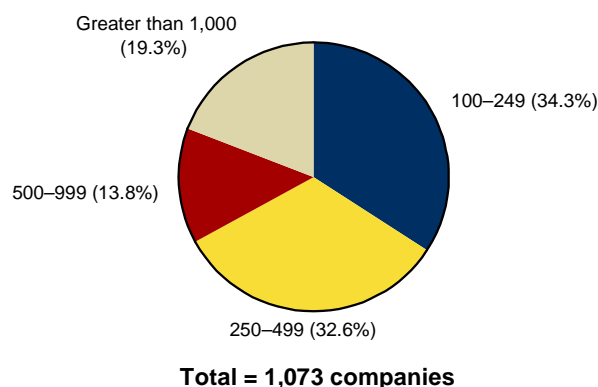
IDC has drawn on the results of a large-scale user survey conducted between February and April 2006 to make predictions about future issues around the use and development of skills, and the role of the network in Asia/Pacific organizations. More than 1,000 senior IT manager telephone interviews were conducted across the following vertical sectors: government, telecoms, healthcare, education, and

enterprise. Respondents represent organizations of all sizes. Several face-to-face interviews were also conducted with international and national information and communication technology (ICT) service providers (SPs).

The survey data has been used to populate IDC's skills model, which is based on economic and statistical indicators, including gross domestic product (GDP), unemployment rates, IT workforce estimates, population growth, and companies registered. Data sources include Asian Development Bank, EUNESCAP, International Labour Organization (ILO), national statistical offices, and the EIU, as well as IDC's own technology and services market forecast data. Please refer to the Appendix for a more detailed methodology description as well as an IDC skills glossary.

**FIGURE 2**

Respondents Interviewed by Company Size



Source: IDC, 2006

## SITUATION OVERVIEW

### A Turbulent Half-Decade

As the world celebrated the dawn of a new millennium in 2000, the economic climate in the Asia/Pacific region looked bright. The rapid growth of the Internet and widespread adoption of IT meant demand for networking professionals was strong.

Attracted by the prospect of large salaries and lucrative share options, the workforce began to gear itself up with a view to securing a long-term career in the technology industry. However, in 2001, the situation changed dramatically. The bursting of the dot-com bubble sent tremors throughout both the IT sector and the global economy.

The effect was immediate. Organizations reigned in their IT budgets, reduced staff headcounts, cut training dollars, and delayed many planned projects. At the same time, undergraduates across a number of countries within Asia/Pacific began to reassess the attractiveness of a qualification in IT.

After a period of slow growth from 2001, confidence and activity have gradually returned. Buoyed by this improvement, organizations are now readopting a "growth" mindset. This change brings with it certain challenges. The legacy of a period that saw reduced investment is beginning to be felt, particularly in the area of skilled IT professionals.

IDC expects new technological developments and a general return to growth in Asia/Pacific economies to have a strong impact on the demand for ICT, including networking skills. As an example, IDC forecasts demand for advanced networking skills, as defined in this study, to grow by an average annual growth rate of 18% between 2005 and 2009. IDC would argue that, based on the findings in this survey, Asia/Pacific could fall significantly short in the supply of the networking skills needed to satisfy this demand.

IDC believes steps need to be taken immediately to ensure these shortages do not have a long-term impact on the ability of Asia/Pacific organizations to take advantage of new opportunities for growth.

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## **Newfound Optimism**

As economic conditions have improved, spending on IT is now firmly back on the agenda. Recognizing the critically important role that systems and networks perform, companies are extending their infrastructures to support new endeavors. Hardware, software, and services vendors have invested heavily over the last five years in creating better products and services in the face of more discerning and ROI-conscious customers. Through this necessary evolution, enterprises are benefiting today from improved probabilities of tangible improvements to operations and the achievement of competitive differentiation through technology adoption.

IDC believes that external IT spending in the 12 countries studied across the Asia/Pacific region will increase at a compound annual growth rate (CAGR) of 9% to reach US\$146.5 billion by 2009. Reinforcing this projection, across the region, IDC found that 66% of all companies expected their IT budgets to increase during the next 12 to 24 months, with investments growing in proportion to company size.

Of the countries surveyed, India displays the highest proportion of companies planning to increase their IT budgets (88%), which is a reflection of the country's current hyper-growth conditions. When examined by industry sector, communication SPs top the list with regard to planned increases in IT expenditure (84% of respondents) with healthcare providers ranked second (73% of respondents).

IDC expects investments in networking infrastructure throughout the region during the next two years to follow a similar trend.

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## **The Evolving Role of the Network in Asia/Pacific**

As organizations across the region rush to take advantage of new growth opportunities afforded by the rebound in economic conditions, the role played by corporate networking infrastructures is becoming more important. Indeed, most organizations now see their network as a critical business tool.

- Of those surveyed by IDC, 96% of respondents believe their network will become more important to their operations in the future.
- Of all respondents interviewed, 47% say that the network is a key platform for process sharing.
- Employees in 46% of all companies interviewed use the network as a means to remotely access enterprise systems.

On a sector-by-sector basis, government and education organizations in Asia/Pacific tend to view their network as an access enabler rather than as a mechanism to improve the sharing of processes. Larger organizations tend to view their networks in a more strategic way across the region, with a higher proportion of employees gaining remote access to core internal systems

In addition to this, the appearance of new technologies such as wireless networking and VoIP is driving IP convergence and is serving to increase the importance of the role played by the networking infrastructure within organizations of all sizes.

These indicators point toward the network truly becoming the backbone of both private and public sector organizations, underpinning internal and external communication and business processes. This is also confirmed by IDC's related market forecasts for the 12 countries studied:

- ☒ Investment in general switching and routing equipment is expected to enjoy a CAGR of 8% until 2009 to reach about a US\$3.9 billion market in 2009.
- ☒ Security appliance revenue will increase at a CAGR of 16% to become a billion-dollar market by 2009.
- ☒ The wireless equipment market is poised to increase at a CAGR of 22% to reach about US\$780 million in 2009.
- ☒ Network management software products are forecast to increase by a CAGR of 11.7% until 2009 (add the revenue size of the market in 2009).

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## Securing Networking Skills Today

As the role and importance of networks within organizations grows, so too does the requirement for skilled IT professionals. Due to the downturn in the technology sector in the first part of the decade (and as discussed earlier in this paper), skills development within the region has not kept up with the demand we are currently witnessing and will continue to witness over the horizon period until 2009. Organizations around the region are already finding it difficult to attract and retain networking related staff in the numbers they require.

IDC's survey of the region found that:

- ☒ A significant proportion of organizations across Asia/Pacific (32%) found it difficult to find networking engineers who have the right skill sets to meet their organizational requirements.
- ☒ More than half (55%) of organizations interviewed in Taiwan and Malaysia found it difficult to find suitable candidates, while 46% of organizations in the PRC and 44% in Korea faced similar problems.
- ☒ More than a third (36%) of organizations interviewed in India found it difficult to fill Network Design related positions. This was a highest proportion of organizations region wide.
- ☒ Difficulty in finding the right combination of skills predominates as the main reason behind the difficulty in finding networking engineers with the right skills.

- ☒ Network security and network generalist positions were the most difficult to fill. This is due to security skills and general networking skills being the two largest skills areas with regard to numerical demand for FTEs.

The problem is compounded by the fact that networking staff are expected to possess cross-disciplinary IT skills and will therefore rarely spend all their working time working within the confines of the networking infrastructure. Just 60% of networking specialists report spending five days a week on networking-related tasks.

## FUTURE OUTLOOK

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### The Forces Shaping the Future of Networking

From our market forecasts and end-user data, it is clear that networks, already an important support structure for organizations, will become an even more essential business tool during the next five years. The factors driving this trend include the following:

- ☒ The digitization of information and transactions, leading to the consolidation of the network's place at the very heart of the business
- ☒ The ongoing convergence of voice and data, leading to rising demand for robust, company-wide networks
- ☒ Growth in the use of emerging technologies such as wireless networking and VoIP
- ☒ An increasing demand for network security, as the value of information and transactions increases

IDC's user survey supports this analysis. When asked about the importance of future skills sets, it is clear that the use of networking technologies is becoming more sophisticated in Asia/Pacific organizations:

- ☒ Of all respondents, **86% indicated that security skills would become more important in the future**, indicating the business criticality of the network; **72% expected wireless networking skills to increase in importance**, showing a more sophisticated use of the network moving forward.
- ☒ Of the respondents, **65% expect cross-technology skill sets to increase in importance and 60% expect the understanding of the network's impact on the business to be more important in the future**. In addition, 54% of respondents expect network-centric applications (such as messaging and videoconferencing) to increase. These results underline the closer integration between the network and the business.

Asked specifically about plans for hiring new skills in the next 12–24 months, security skills ranked highest (64% of respondents), followed by wireless network skills (55%), and general networking skills and datacenter skills (48%). The results varied somewhat by country groupings, with general networking skills rated highest in the developing economies due to ongoing general infrastructure build up while skills in network design and architecture were rated in the top 3 areas where hiring was planned in India. This is in line with IDC's understanding that the main driver in India's demand for skills is the IT-enabled services (ITES) sector.

Of those surveyed by IDC, approximately half of the organizations recognized that they would have to train existing staff in these areas if they are to achieve the number of skilled people they require.

## Total Networking Skills Shortage

To provide further insight into the existing and future requirements for networking professionals across the region, the IDC Skills Model was used to quantify demand, supply, and the subsequent gap. For the purposes of the model, the definition of networking skills included all people needed to plan, design, manage, and maintain networking technologies and infrastructures within an organization.

IDC also used the concept of FTEs to allow direct comparison between countries and industry sectors. FTEs are staff members that spend 100% of their time on networking-related activities. Because research has shown that, on average, networking professionals spend 70% of their time working on networking tasks in Asia/Pacific, the IDC model also uses the concept of skilled people. These numbers reflect the estimation of skilled professionals required, based on the notion that 70% of their time will be spend on networking tasks.

As shown in Table 1, across the Asia/Pacific region in 2006, IDC estimates that demand for networking skills in Asia/Pacific organizations will reach more than 811,000 FTEs. This number represents the total amount of work that needs to be done in the networking space, and the number of people needed to do this work — assuming they all spend 100% of their available time on networking. However, in terms of actual number of people with networking skills, IDC estimates the demand to be around 1.1 million skilled people assuming that people on average spend 70% of their time working with networking technology along with other responsibilities.

Consequently, the undersupply of FTEs in 2006 of 150,147 is likely to represent an actual shortage of skilled people of around 210,000 in 2006, increasing to 396,000 skilled people by 2009. In percentage terms, IDC estimates that the total networking skills gap will increase from 17% in 2005 to 23% by 2009.

**TABLE 1**

Total Networking Skills in Asia/Pacific, Full-Time Equivalent, and Skilled People Estimates

	2005	2006	2007	2008	2009	CAGR (%)
Demand	681,774	811,142	962,007	1,131,766	1,214,918	15.5
Supply	566,159	660,994	762,323	877,093	931,938	13.3
FTE gap	115,615	150,147	199,685	254,673	282,980	25
Skilled people gap estimation	161,900	210,200	279,600	356,500	396,200	25
FTE gap of demand (%)	17	19	21	23	23	

Note: The skilled people gap is estimated on the assumption that on average people with networking skills spend 70% of their time using these skills.

Source: IDC, 2006

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## Demand for Advanced Technology Skills

As described above, the survey showed strong future demand for advanced technology skills across all regions, industry sectors, and sizes of organization within the Asia/Pacific region.

IDC estimates the demand for advanced networking skills will climb to about 370,000 FTEs by the end of 2006 and reach almost 600,000 by 2009. When compared with predicted supply, this will result in an FTE gap in 2006 of about 80,000, rising to 158,000 by 2009 (see Table 2). This represents a percentage gap of 22% in 2006 and 26% in 2009.

Looking at the specific advanced skills in demand, security tops the list. In 2006, the skilled people gap across the region will be 69,800 (21%), rising to 130,300 (24%) by 2009. VoIP networking skills are strongly sought-after, with the skills gap estimated to be 28,300 (22%) by the end of 2006, and growing to 60,300 (28%) by 2009. Wireless networking skills were also identified as being very important to organizations in the region. A gap of 14,700 skilled people (29%) is forecast to grow to 30,100 (35%) by 2009.

Comparisons with general networking skills gaps show a higher percentage gap for advanced skills across APEJ in 2006, and this is forecast to grow at a higher rate than general networking skills across the horizon period.

Such present and future gaps represent a significant challenge for companies across APEJ as network security policy and adoption proliferates, demand for wireless access and ensuing usage of wireless infrastructure increases, and the transition from existing network environment to the new IP-based environment gains speed. These factors will only exacerbate the elevated deficit of highly qualified personnel — wireless networking experts, security systems professionals, and project managers — in the IT industry. While a technologically able workforce exists in the region, there is a shortage of professionals skilled in new technologies. The human resource factor will become critically important in service delivery, as there is a clear correlation between project success and the availability of skilled IT consultants. The education sector, IT industry players and the different agents influencing business competitiveness, should strive to create better conditions that encourage investment in training on innovative technologies.

**TABLE 2**

Estimated Shortage of People with Advanced Technology Skills by Country, 2006 and 2009

	2006			2009		
	Full Time Equivalent Gap	Skilled People Gap Estimation	Gap %	Full Time Equivalent Gap	Skilled People Gap Estimation	Gap %
Australia	2,551	3,600	10%	3,671	5,100	12%
Hong Kong	905	1,300	12%	1,308	1,800	13%
India	21,019	29,400	23%	55,352	77,500	30%
Indonesia	1,136	1,600	16%	2,582	3,600	21%
Korea	6,103	8,500	17%	9,707	13,600	20%
Malaysia	1,703	2,400	20%	3,688	5,200	27%
Philippines	523	700	13%	1,092	1,500	18%
PRC	40,508	56,700	26%	71,178	99,600	29%
Singapore	657	900	8%	931	1,300	10%
Taiwan	3,513	4,900	27%	4,370	6,100	28%
Thailand	1,527	2,100	15%	2,881	4,000	20%
Vietnam	361	500	15%	906	1,300	22%
<b>Total</b>	<b>80,508</b>	<b>112,600</b>	<b>22%</b>	<b>157,666</b>	<b>220,600</b>	<b>26%</b>

Note: \*The skilled people gap is estimated on the assumption that on average people with networking skills spend 70% of their time using these skills.

Source: IDC, 2006

## Country Analysis

### *Developing APEJ Economies: Indonesia, Malaysia, the Philippines, Thailand, and Vietnam*

This group represents some of the developing markets within the APEJ region. IDC research focused on this country grouping shows considerable gaps between the demand for and supply of qualified networking professionals. By the end of 2006, total networking skills demand will be about 71,500 FTEs, while supply is estimated to come in at about 62,000 FTEs, resulting in a gap of 9,500 FTEs or about 13,000 skilled people. This represents a gap of 13% of total demand, which is forecast to widen to 18% by 2009 (see Figure 3).

As a group, the growth in demand for networking skills (14% CAGR) is in line with the economic and IT related investment growth observed, and is expected from the individual countries within this grouping. GDP growth within this sub-regional grouping over the 2006–2007 timeframe is expected to come in at an average of about 5% underpinned by healthy domestic demand and planned government investment in public sector projects in a number of these countries. The exception being Vietnam where stronger economic growth is being fueled by expanding private investment, thanks to the country's expected entry into the World Trade Organization by late 2006. GDP growth is expected to be between 7% and 8% during 2006.

Some of the strongest growth in investments in IT infrastructure and services within APEJ is expected within this sub-regional grouping. IDC expects an average of 11%–14% CAGR from 2005 to 2009 in IT spending from countries within this grouping, and even higher growth rates in Data Communications equipment and IT services spending.

Considering the strong growth in IT investments and demand for networking skills anticipated in this grouping, what is keeping the FTE gaps for networking professionals from spiraling out of control in these countries? This can be explained by two important factors.

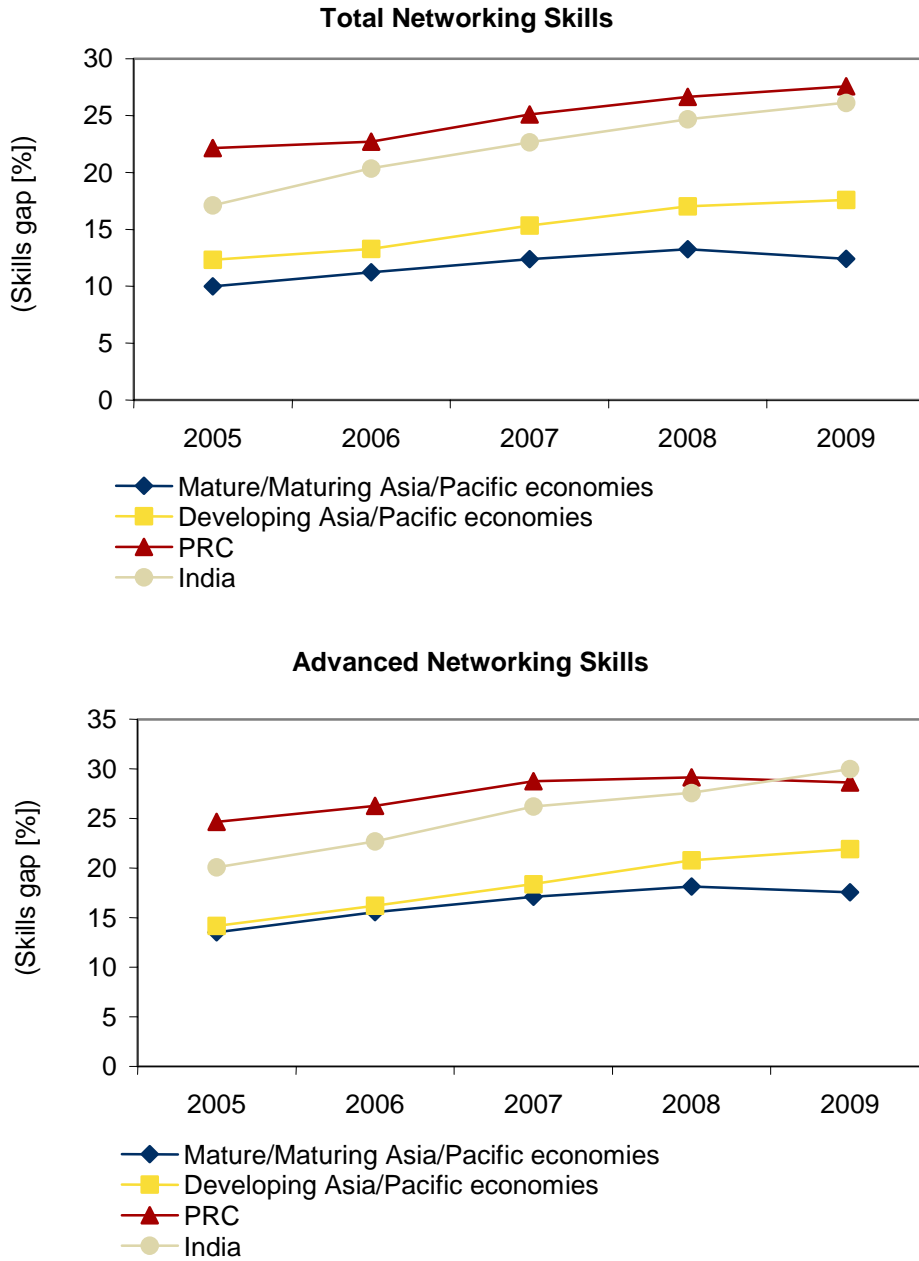
Firstly, there exists an active group of job seekers in each of these developing nations, keen to secure careers in the IT industry and happy to undertake relevant training to enable this. The Philippines is a prime example of this behavior. Secondly, due to the stage at which this country grouping is at within the IT maturity life cycle, typically networking infrastructures within companies in these countries are less complex. This means fresh graduates or those with limited on-the-job experience can fill most vacancies.

Malaysia is the exception to this group with a higher than expected gap percentage in 2005 (15%), which is expected to grow to 22% in 2009. The growing complexity of IT and networking environments in Malaysia relative to the other countries in this group has created a demand for higher skilled networking professionals. This demand is believed to exceed the current pool of professionals within the market and is believed to be discordant with the profile of graduates fresh out of Malaysian academic institutions. Suspected higher than average unemployment levels among local IT graduates is an indication of the skills mismatch that has developed in the country.

End-user survey results for Malaysia paint a similar story with 55% of respondents who hired networking professionals in the last 12 months having found it difficult to find engineers with the right combination of skills. In addition, 73% of companies interviewed in Malaysia have graduate training programs instituted to deal with this problem — the highest proportion out of all 12 countries studied.

**FIGURE 3**

Total and Advanced Networking Skills Gap Percentage by Country Groupings, 2005–2009



Note: Mature/Maturing Asia/Pacific economies: Australia, Hong Kong, Taiwan, Korea, and Singapore; developing Asia/Pacific economies: Indonesia, Malaysia, the Philippines, Thailand, and Vietnam.

Source: IDC, 2006

*Maturing/Mature APEJ Economies: Australia, Hong Kong, Taiwan, Korea, and Singapore*

This grouping comprises the mature economies within the APEJ region that are experiencing lower than average FTE gaps for networking professionals. In these markets, growth in IT spending tends to be more restrained due to the mature nature of the economies, low rates of greenfield IT adoption, and the fairly developed IT infrastructure that already exists within organizations operating in these countries. IT spending CAGR within these countries is forecast to range only between 4–8% from 2005 to 2009.

Demand for networking skills within this group is estimated to be about 194,400 FTEs in 2006 while supply is about 172,600 FTEs. This results in a gap of about 21,800 FTEs or about 30,500 skilled people (11% of total demand). IDC forecasts this gap will grow at a CAGR of 14% and increase to 41,400 skilled people, representing a gap of 12% in 2009.

This trend of relatively high gap magnitudes but low gap percentages (as a percentage of total demand) is reflective primarily of the large relative sizes but low growth rates of the technology markets that exist in these countries. Lower gap percentages and gap growth rates can be explained further by the fact that in all countries complex IT infrastructures have been in place for some time and, as a result, there is a relatively strong and regulated supply of general and advanced skills. This regular supply of manpower is better able to keep pace with domestic demand for IT skills than with the growth markets observed as part of this study. In addition, the educational systems in these mature economies are at a more evolved state and tend to produce better skilled graduates that are employable and better poised to feed the needs of business. Lastly, in more mature markets there is a tendency for organizations to make use of external resources, often by outsourcing some or all of their IT requirements to a third-party provider, or by importing foreign talent to fill skill requirements that are difficult to secure.

It can also be observed that despite the lower growth in technology spending that is forecast for these economies, the enthusiasm for new technologies such as VoIP and wireless networking will also drive the gaps in advanced skills in this group of countries. Over the horizon period, the gap for advanced skills is expected to remain ahead of general skills for these countries as a group. IDC forecasts that by 2009 the skilled people gap for wireless and VoIP networking skills for this group will be 20%, while the gap for general skills will be 8%.

Consequently, although these countries will need to consider action in order to fill these gaps, this could be achieved through targeted investments in education and training without having to make major alterations to educational policy.

The exception to this group is Taiwan. An uncertain political scene is making conditions difficult to accurately predict, and although the country's manufacturing sector appears healthy and demand for exports is expected to remain strong, a number of large operations have moved to the PRC in search of lower costs. This, along with low forecast growth rates in IT, the Taiwanese IT market (4% CAGR from 2005 to 2009) may be causing Taiwanese IT professionals to view the PRC as a more dynamic environment for employment. Despite this, many organizations in Taiwan are increasing the complexity and reach of their IT infrastructures as they

search for competitive advantages. This is driving domestic demand for networking skills. These conflicting situations have resulted in a higher than average percentage gap for networking skills in Taiwan as compared to its counterparts in this country group.

### *Large Growth Markets in APEJ: People's Republic of China and India*

As the largest IT and networking market in the region, the PRC has a massive demand for qualified professional staff. The country is still firmly in a growth phase and demands are expected to continue to increase through the forecast period.

The PRC's economy enjoyed a GDP growth rate of 9.9% in 2005 and a CAGR of 12% is forecast for the period until 2009. The country's IT spending will reach US\$49 billion by 2009, representing around 33% of the entire regional market at that time. IDC forecasts that spending on services and software will increase at twice the rate of that for hardware. Looking at vertical sectors, IDC forecasts transportation, media, manufacturing, and utilities will be among the fastest-growing sectors. The country's IT industry along with IT adoption and expansion will remain concentrated in the eastern regions, but will see an expansion to tier 2 and 3 cities in Western China such as Xi'an, Chengdu, Chongqing, Lanzhou and Nanning, as we progress toward the end of the decade. Strong economic growth, industry upgrades, and rapidly developing domestic demand from small and medium-sized businesses (SMBs), foreign businesses, and state-owned enterprises (SOEs) will continue to drive IT spending across the horizon period.

Interestingly, LAN penetration within organizations in the PRC is only at approximately 28%. Just a 2% increase in this figure would result in about 30,000 additional companies requiring the services of networking professionals. Besides sheer volume, the complexity of networks within PRC companies is also growing, especially in tier 1 cities, as more adopt emerging technologies and use them to connect core systems. IDC estimates that spending on external networking-related services will experience a CAGR of 18% from 2005 to 2009.

All these factors are working in tandem to drive the immense demand we are seeing for networking skills in the PRC. IDC estimates a demand of about 337,000 FTEs in 2006, while supply is about 260,000 FTEs. This is resulting in a shortage of about 77,000 FTEs or about 107,000 skilled people, representing a gap of 23%. This gap is estimated to grow at a CAGR of 21% to reach a 28% gap percentage in 2009.

India, too, is experiencing strong growth, resulting in GDP growth of 8.5% in 2005–2006. While this is forecast to slow down to 7.5% in 2006–2007, the economy will remain healthy. Manufacturing and services sectors are particularly active. Aspirational consumers continue to drive demand for products and services, and the country has succeeded in attracting significant investments from international corporations keen to set up facilities in one of the world's largest consumer markets. The economy is assisted by a pool of young, qualified workers that provides a relatively inexpensive source of labor by world standards. This can be attributed to the nation's solid education system.

Looking forward, many economic analysts believe that 10% annual GDP growth is sustainable for an extended period. The country's total domestic IT spending is forecast to reach US\$12,357 million by the end of 2006 and enjoy a massive CAGR of 20% through until 2009, by which time it will have reached US\$20,047 million.

Both the public and private sectors will drive this, with the government announcing its intention to focus on rolling out Internet infrastructure and increasing its use of e-government programs. The Indian government's National e-Governance Action Plan (NEGAP) will drive significant demand for skilled networking professionals. Under the plan, State Wide Area Networks are earmarked as the core infrastructure needed to support these initiatives. The Department of IT has allocated a significant budget to support the activity. This will cover establishment, operation, and maintenance of these networks.

Besides public sector investment, domestic private sector IT consumption is primarily being driven by infrastructure build-up in India's main metros, and greenfield IT and network adoption outside these metropolitan cities is also growing at a steady pace. Without a doubt, the primary driver of the growth is the Indian technology markets and the largest consumer of skilled professionals is the Indian ITES segment.

India's domestic IT services market will be worth US\$3.55 billion by the end of 2006, growing to US\$6.34 billion by 2010. Although significant, the domestic IT services market is relatively small compared to the export market for Indian IT services. Indian companies exported a whopping US\$10.94 billion worth of IT Services to North America, EMEA, and Asia/Pacific in 2005. Both the domestic and export IT Services markets in India, including the BPO market, will continue to drive the high levels of demand for networking professionals through to the end of the decade. IDC estimates a demand of about 208,300 FTEs in 2006, while supply is about 166,000 FTEs. This is resulting in a shortage of about 42,000 FTEs or about 59,000 skilled people, representing a gap of 20%. This gap is estimated to grow at a CAGR of 39%, the fastest rate in the region, to reach a 26% gap in 2009.

### *Country Rankings*

Another way to look at the gaps in networking skills is to examine how the sizes of the forecast percentage gaps for each country compare against one another. Such examination provides an interesting ranking of countries (see Table 4). While the position of each country in the table is indicative of the situation faced when it comes to skills shortfalls as a proportion of total demand in each country, it is also important to examine how the magnitude of the gaps (skilled people estimates) relate to the relative sizes of the technology markets that exist in each of these countries. This allows for a clear picture of the challenges ahead.

In 2006, Singapore is ranked top for the region, with the lowest overall networking skills gap. IDC forecasts it will retain this position through until at least 2009. Government related IT related bodies such as the Infocom Development Authority (IDA) has been an active steward of the IT industry in Singapore, ensuring that Singapore's domestic technology roadmap is well-planned and its status as a regional IT and datacenter hub is maintained in a pro-active manner.

Meanwhile Australia, which is ranked second in the region, has a skilled people gap of 5,600 in 2006, which is forecast to increase to 7,100 by 2009. While the country fares well when compared with its geographic neighbors, it is obvious that such a gap will have an impact on networking-related projects, especially those encompassing advanced networking technology rollouts. Gaps in advanced skills currently make up the lion's share of Australia's skilled people gap and will grow to make up about 70% of the total skills gap in 2009 as IP convergence continues to drive the agenda in the

networking arena. Consequently, although Australia will still need to consider action in order to fill these gaps, this could be achieved through targeted investments in education and training without having to make major alterations to educational policy.

Interestingly, the model shows that Korea, Indonesia and Taiwan each stand to improve their rankings over the forecast period. However, by 2009, their skilled people gaps will have risen to 20,600, 6,300, and 9,300, respectively.

In terms of raw numbers, the PRC will continue to face the largest challenge. Its skills gap of about 107,000 people in 2006 is forecast to rise to 192,000 by 2009 — by far the largest number in the region.

Because there is a clear correlation between the success of networking projects and the availability of skilled IT consultants, the challenge must be allocated a significant priority by governments, educational institutes, employers and industry associations in each of the APEJ markets.

**TABLE 3**

Total Networking Skills Gap Index

Description	2006		2009	
	Ranking	Skilled People Gap Estimate	Ranking	Skilled People Gap Estimate
Singapore	1	1,400	1	1,500
Australia	2	5,600	2	7,100
Hong Kong	3	2,000	3	2,800
Philippines	4	1,300	4	2,400
Vietnam	5	800	5	1,900
Thailand	6	4,000	8	6,600
Korea	7	14,400	6	20,600
Indonesia	8	3,000	7	6,300
Malaysia	9	4,200	10	8,100
Taiwan	10	7,000	9	9,300
India	11	59,300	11	137,200
PRC	12	107,100	12	192,300

Note: \*The skilled people gap is estimated on the assumption that on average people with networking skills spend 70% of their time using these skills.

Source: IDC, 2006

### The Staffing Challenge

IDC's regional research clearly shows that demand for skilled networking professionals is already outstripping supply in all markets. There is no sign that this situation is going to change within the forecast period. The fact that the majority of organizations (67%) indicate they have not hired any network engineers during the past 12 months is testament to this.

IDC believes a two-pronged approach is required to address what is a growing problem throughout the region:

- ☒ Larger numbers of young people need to be encouraged to consider IT and networking as a long-term career option while existing ICT professionals need to be made aware of the potential of obtaining networking-related qualifications and experience. Access to relevant industry training and education is key to achieving this.
- ☒ Organizations must encourage their existing networking staff to undertake ongoing training to ensure their skills remain current and they are able to implement and manage advanced networking technologies. They must also be prepared, where possible, to cover the associated costs.

Across the region, organizations also report constant problems with finding staff with the right combination of skill sets. While generalists and graduates may be available, sourcing professionals for more complex IT environments with on-the-job experience is more challenging. Of those surveyed by IDC, 32% reported difficulties in this area.

Overall, 68% of companies surveyed reported difficulties with finding professionals who have the right set of skills to meet their particular internal requirements. Of the particular skills required, the most difficult to hire was network security (identified by 47% of respondents) and networking generalists (37%). This is in line with the relative size of the networking security and general networking (switch and router) markets in Asia/Pacific.

Looking to the future, IDC's research showed the skill areas deemed to be of most importance for organizations when considering their networking infrastructures are:

- ☒ Networking security skills
- ☒ Wireless networking skills
- ☒ Datacenter and cross technology skills

Most organizations recognize that, to have any hope of meeting their future skill requirements, existing staff would have to be retrained. For them, the challenge is to find training that delivers measurable value to the business.

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## **The Role of Vendor Certification and Training**

As growing numbers of organizations grapple with the challenge of ensuring they have sufficient numbers of qualified networking professionals, the appeal of vendor certification is increasing.

IDC research conducted across the Asia/Pacific region found 33% of respondents felt such certification was "very important" with a further 55% indicating they felt it was "relatively important" when recruiting networking staff.

On a country-by-country basis, India stands out with 50% of respondents indicating they felt certification was "very important" when choosing staff.

For employers, vendor certification brings a number of benefits:

- It ensures employees have the latest skills and knowledge relating to new and developing technologies.
- It reduces overdependence on external support when implementing and managing new infrastructure projects.
- It provides a cost- and time-effective method of providing on-the-job training for existing staff without a significant impact on productivity.
- It provides a global benchmark for the setting of job descriptions/requirements, which eases the transfer and flow of skilled professionals between country and regional operations of large organizations.
- It allows organizations to extract the maximum benefit from their investments in networking systems.

Of the organizations surveyed by IDC in the region, almost half (44%) felt vendor certifications would become increasingly valuable in the future. This attitude was particularly prevalent in the education and communications services sectors.

Many organizations also see vendor certification courses as a way to train fresh graduates for roles that require more developed or complex skill sets and which have to date been difficult to fill. This is found to be more prevalent in larger companies (>1,000 employees).

Certifications are also a method whereby existing IT staff working in other areas can be trained in the required networking skills. This can be a cost- and time-effective way to overcome staffing shortfalls.

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## The Challenge Ahead

The challenges presented by the increasing gap between the number of required and available networking professionals across the region are significant. As this IDC research has shown, by 2009, there will be a skilled people gap of more than 396,000 people throughout the Asia/Pacific region. There is no question that, if future economic growth is to be maintained, this challenge needs to be urgently addressed.

For companies, the biggest challenges are:

- Finding and retaining sufficient numbers of networking professionals to allow existing infrastructures to be maintained and future projects to be completed.
- Ensuring the skills of existing staff remains current and relevant, in the light of a range of emerging technologies.
- Having the ability to train staff to enable them to undertake hard-to-fill positions.

Governments throughout the region also face challenges. As well as finding sufficient skilled staff for their own internal projects, they need to create and maintain a suitable climate to foster the development of larger numbers of professionals moving forward. Any new increase in supply of skills will take a while to work through the system,

potentially slowing down planned initiatives. Therefore, governments need to address the supply side of skills at the same time as they address their initiatives to make sure that the foundation is in place. Government challenges include:

- ☒ Positioning IT courses as a rewarding, long-term career option for students enrolling in university.
- ☒ Extending facilities and places at universities for IT-related education.
- ☒ Encouraging employers to invest in skills development and retraining initiatives.

## CONCLUSION

By conducting end-user organization interviews and through the use of the skills model, IDC has identified a widening gap between the demand for skilled networking professionals and the number that are available throughout the APEJ region.

The situation is a legacy of the downturn that followed the dot-com boom of the late 1990s, reducing the attractiveness of careers in IT and levels of corporate spending on training. Now that IT investments are once again increasing around the region, there are growing concerns that planned initiatives may be delayed or affected by a lack of suitably qualified IT staff.

The effects include:

- ☒ Companies face the prospect of paying more to attract appropriate staff and may find themselves in bidding wars with their competitors.
- ☒ Some organizations may find it difficult to take advantage of new technologies because of a lack of staff qualified to implement and manage them.
- ☒ Developing economies may find a "brain drain" occurring as qualified staff moves to other countries to take advantage of higher salaries and improving working prospects.

When considering the pervasiveness of networking technologies and the increasingly business-critical role of the network in organizations of all sizes, any potential shortage of skills can have implications for adoption of new technologies that could improve efficiencies. A shortage could hold back the APEJ region's competitiveness in the global market.

The composition of skills needed by APEJ organizations, especially those in the mature APEJ economies, is changing. Not only is the linkage between business and ICT becoming much clearer and stronger, so too is the convergence of the network with other IT technologies is creating a major change in the skills needed by IT-related staff. It is increasingly difficult to imagine, for example, that an application developer can work without any knowledge of network technologies or without an understanding of how his/her work affects (or is affected by) the network. Hence, organizations are increasingly looking for people with cross-technology skills, and people who understand how to best use ICT to support business goals, strategies, and processes.

Steps that should receive immediate attention include:

- The promotion of university courses specializing in IT and networking skills to prospective students.
- A push for organizations to hire networking staff with the intention of supplementing their training to ensure they are able to fill emerging gaps in particular technical areas.
- Recognition of the increasing importance of vendor certification in the education mix for networking and other IT professionals.
- Realization that there is no "quick fix" for the problem, and that it will require a period of sustained focus and investment to overcome.

## APPENDIX

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### IDC Skills Glossary

The definition of networking skills used in the model is: people needed to plan, design, manage, and support the networking technologies in the organization. The definition of skills needs to be broad due to the proliferation of networking technologies in organizations of all sizes. IDC further uses the following two classifications of skills:

- ☒ **FTEs:** IDC's model is based on assessing the demand and supply of FTE networking skills, since this provides the most reliable foundation for modeling. FTEs are defined as spending 100% of their time working with the networking technology.
  
- ☒ **Skilled people:** However, it is clear that most people with networking skills do not spend 100% of their time working with networking technologies. For example, in many companies, IT staff tends to perform several tasks outside its core area of expertise. This may include activities such as PC software and hardware installation and desktop support. IDC estimates that, typically, networking professionals will spend 70% of their time on networking tasks. Interestingly, in very small organizations, networking tasks often become the responsibility of people with non-IT jobs, such as office managers. Consequently, for this study, IDC defines skilled people as people that have, as part of their job function, some involvement in the planning, design, management, and support of networking technologies.

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### IDC's Proprietary Skills Model

This section describes the methodology behind IDC's skills model, which forms the basis for developing networking skills demand and supply numbers for Cisco, as commissioned in February 2006. The document further describes the data sources and official statistics that have been used as input into this model.

During the late 1990s and early 2000s, IDC was commissioned by Cisco on several occasions to provide assessments and forecasts of the demand and supply situation for skills in the network technology arena across different regions around the world. The technology market was at this time booming and there was a real need to quickly attract new talent into the market in order to fulfill demand.

With the slowdown in both technology markets and economies in the early 2000s, organizations introduced extreme cost control and reduced headcounts wherever possible. However, as markets have picked up across Asia/Pacific, demand is again increasing and with this the need for technology skills.

At the beginning of 2006, Cisco again commissioned IDC to provide a view of the demand and supply of networking skills across Europe and the Middle East. However, the brief was this time to provide a more detailed view of specific skills — general networking skills, and advanced skills (security, wireless networking, and VoIP) — as well as basing the data on a model that could potentially roll out across the world.

As important factors and assumptions had changed dramatically since the original model was constructed in the late 1990s, such as much lower growth expectations for both country GDP and IT spending overall, a new model that reflects these changed environments has been constructed, the methodology of which is described below.

This updated skills model has been leveraged for the Asia/Pacific networking skills study, but populated with data and assumptions that are unique to the Asia/Pacific region.

### *Model Methodology*

As well as collecting qualitative data through the survey, IDC used its Skills Model to provide quantitative data to assist in developing an accurate picture of existing and future demand for networking professionals.

To ensure the accuracy of the model's outputs, and allow results to be compared across countries, the following criteria were followed:

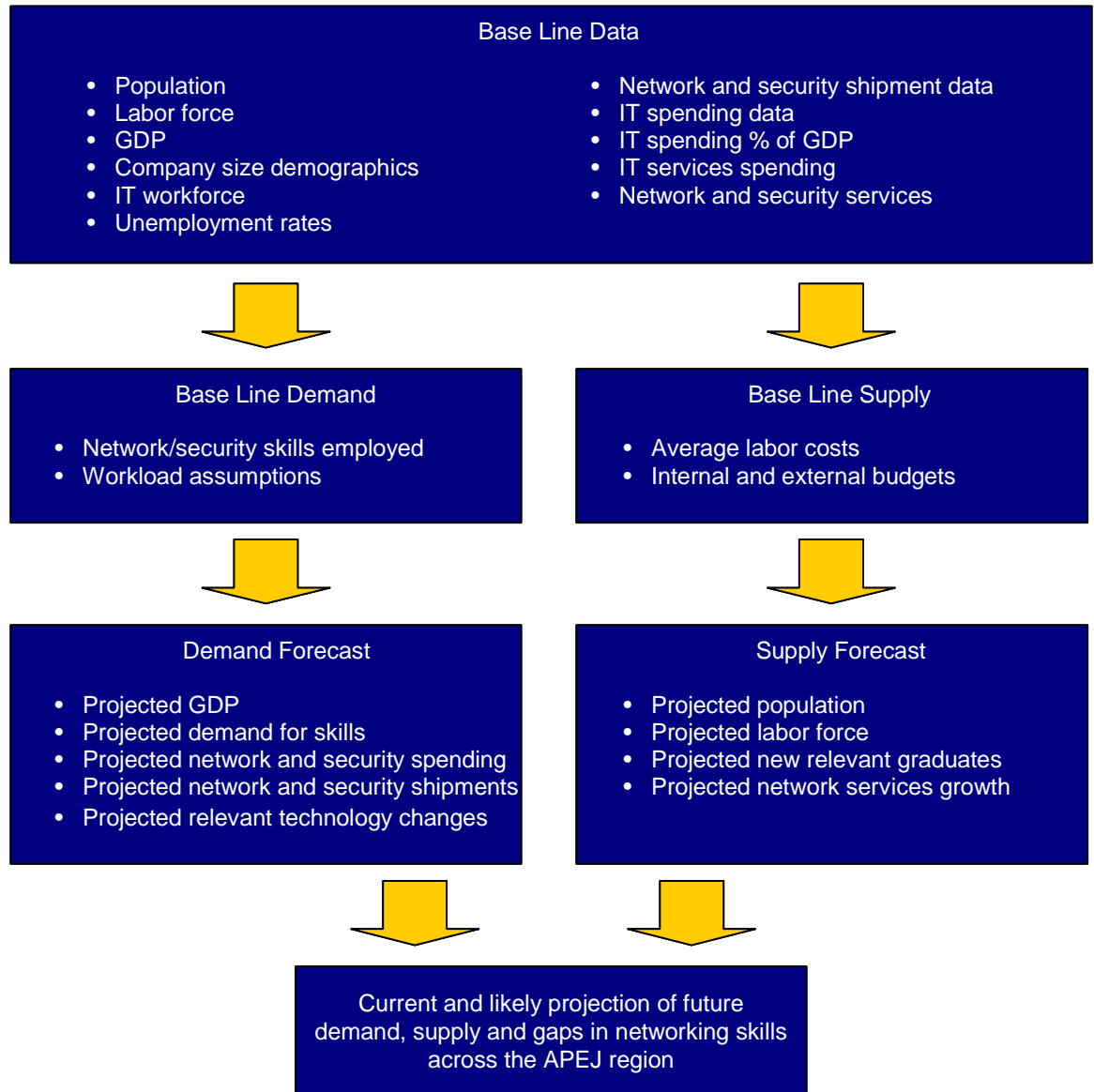
- ☒ Only statistical information from reputable sources was used. These statistics must have been available in a wide range of countries to ensure consistency.
- ☒ The model must take into account economic developments in each country, based on both historical data and official forecasts. It must also include details on employment and unemployment rates.
- ☒ Must form part of a holistic view of the IT and workforce markets to ensure that there is no "suboptimization".
- ☒ 2005 was identified as a base year for the purposes of calculations.

As a first principle in developing the model, IDC established 2005 as a baseline year, since several factors are known or, as a minimum, have high confidence factors attached, such as GDP in each country, employment/unemployment rates, IT spending, IT services spending on network and security related services, network- and security-related shipment data, and others.

Forecast for supply and demand of skills have then been developed based on several data points and predictions from IDC and recognized international sources. Figure A-1 shows an overview of the model in terms of the data inputs and relationships for the development of the supply and demand skills numbers.

**FIGURE A-1**

Model Architecture and Data Inputs



Source: IDC, 2006

### *Data Sources*

Sources of information used in the survey that underpins this White Paper include:

- ☒ ASEAN Statistical Yearbook 2003 ([www.aseansec.org](http://www.aseansec.org))
- ☒ Asian Development Bank ([www.adb.org](http://www.adb.org))
- ☒ United Nations Economic and Social Commission for Asia and the Pacific ([www.unescap.org](http://www.unescap.org))
- ☒ Australia Bureau of Statistics ([www.abs.gov.au](http://www.abs.gov.au))
- ☒ Hong Kong Monthly Digest of Statistics
- ☒ Hong Kong Trade Development Council
- ☒ Hong Kong Government Information Center — Census and Statistics Department
- ☒ Economic Census All India Report (1998)
- ☒ Ministry of Human Resource Development
- ☒ Ministry of Statistics and Program Implementation, India ([mospi.nic.in/](http://mospi.nic.in/))
- ☒ Census of India ([www.censusindia.net/](http://www.censusindia.net/))
- ☒ Ministry of Labour ([www.indiabudget.inc.in](http://www.indiabudget.inc.in))
- ☒ Statistics Indonesia ([www.bps.go.id](http://www.bps.go.id))
- ☒ Korea National Statistical Office ([www.nso.go.kr](http://www.nso.go.kr))
- ☒ Department of Statistics, Malaysia ([www.statistics.gov.my](http://www.statistics.gov.my))
- ☒ Ministry of Education (<http://www.moe.gov.my>)
- ☒ Economic Planning Unit (<http://www.epu.jpm.my>)
- ☒ Statistics New Zealand ([www.stats.govt.nz](http://www.stats.govt.nz))
- ☒ National Statistics Office, Republic of the Philippines ([www.census.gov.ph](http://www.census.gov.ph))
- ☒ China Statistical Yearbook 2003
- ☒ National Bureau of Statistics of China ([www.stats.gov.cn](http://www.stats.gov.cn))
- ☒ Statistics Singapore ([www.singstat.gov.sg](http://www.singstat.gov.sg))
- ☒ Economic Survey of Singapore, Economic Development Board ([www.sedb.com](http://www.sedb.com))
- ☒ Manpower Research and Statistics Department, Singapore ([www.mom.gov.sg](http://www.mom.gov.sg))
- ☒ Monetary Authority of Singapore ([www.mas.gov.sg](http://www.mas.gov.sg))
- ☒ Directorate General of Budget, Accounting and Statistics, Taiwan ([www.dgbas.gov.tw](http://www.dgbas.gov.tw))
- ☒ National Statistical Office Thailand ([www.nso.go.th](http://www.nso.go.th))
- ☒ Office of Small and Medium Enterprises Promotion, Thailand ([www.sme.go.th](http://www.sme.go.th))

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