MAINSTREAMING INFORMATION AND COMMUNICATIONS TECHNOLOGY

5

I. INTRODUCTION

5.01 During the Eighth Plan, concerted efforts were undertaken to provide a stronger platform for the country's transition towards a knowledge-based economy. Increasingly central to this effort was the promotion of information and communications technology (ICT) as a strategic driver to support and contribute directly to the growth of the economy as well as enhance the quality of life of the population. Substantial investments were made to provide for the communications infrastructure to increase accessibility, as well as to improve the requisite institutional and legal environment. Increasing emphasis was placed on raising the level of ICT usage in the various sectors of the economy, between urban and rural areas and among different segments of society.

5.02 For the Ninth Plan period, advancements in the global digital environment are expected to have a significant impact on the positioning of Malaysia as a competitive knowledge-based economy. With ICT as a key determinant in the development process to move the economy up the value chain, efforts will be intensified to mainstream ubiquitous access to ICT services and facilities and, equally important, to promote the wider adoption and usage in all aspects of everyday life. The pervasive ICT environment will enable Malaysians to have more equitable access to, and participation in, the new and emerging knowledge-driven economic opportunities. Measures will be undertaken to enhance ICT-related skills and competencies as well as infostructure expansion for improved broadband connections for advanced multimedia applications, local content development, greater e-commerce adoption and improved information security.

II. PROGRESS, 2001-2005

5.03 For the Eighth Plan, investment by both the public and private sectors was directed at building the essential ICT infrastructure. This was part of the efforts to establish speedy and efficient network of facilities and services in

order to encourage greater diffusion of ICT in the economy. The Multimedia Super Corridor (MSC) continued to provide the platform and enabling environment to further promote the development of ICT industry. The increased usage of ICT was further enhanced through its wider adoption in commerce, industry, education and health as well as in the mainstream of daily life.

Upgrading and Expanding ICT Infrastructure

5.04 During the Eighth Plan period, priority was given to the promotion of infrastructure expansion in the rural and remote areas so as to broaden access to communications infrastructure. Increased investments were undertaken to enhance accessibility to ICT infrastructure, in terms of basic telephony, public payphones and Internet services, particularly to underserved areas, through Government allocations as well as the Universal Service Provision (USP) Fund contributed by the industry. The USP programme enabled a considerable number of districts as well as rural schools, clinics and libraries to access fixed lines, public payphones and Internet.

5.05 In order to accelerate infrastructure deployment and improve ICT penetration to the general public, including rural and underserved areas, the industry leveraged on wired and wireless technologies to provide broadband services throughout the country. These efforts were part of the overall implementation framework contained in the National Broadband Plan (NBP), to provide for planned operationalisation of the broadband nationwide.

5.06 Arising from increased market liberalisation of the telecommunications industry, there was more competitive pricing of available services leading to a significant increase in cellular subscription from 21.8 per 100 population in 2000 to 74.1 in 2005, as shown in *Table 5-1*. The relatively moderate growth in penetration rates of computers and Internet dial-up was supported by various measures to encourage computer ownership.

5.07 To establish a more conducive and responsive policy and regulatory environment for the overall ICT industry, a number of laws and regulations were reviewed and updated to facilitate the implementation of the USP as well as the fixed line and broadband tariff structure. The liberalisation of the licensing regime for the applications service providers (ASP) in 2000, promoted a self-regulatory environment and lifted restrictions on the number of ASP licences issued for Internet access and Voice over Internet Protocol (VoIP) services.

5.08 The Malaysian Information, Communications and Multimedia Services (MyICMS) Blueprint, completed in 2005, proposed guidelines for the orderly and integrated development of the convergence of the three key sectors in the ICT industry, namely, cellular telephony, Internet and broadcasting. The blueprint

TABLE 5-1

SELECTED ICT INDICATORS, 2000-2010

Indicator	*2000*	*2005*	*2010[e]*
Fixed Telephone Lines in Operation			
Number of Lines (million)	4.6	4.4	-
Penetration Rate (%)[2]	*19.7*	*16.6*	-
Cellular Phone Subscriptions			
Number of Subscriptions (million)	5.0	19.5	24.4
Penetration Rate (%)[2]	*21.8*	*74.1*	*85.0*
Personal Computers Installed			
Number of Units Installed (million)	2.2	5.7	11.5
Penetration Rate (%)[2]	*9.4*	*21.8[1]*	*40.0[3]*
Internet Dial-up Subscriptions			
Number of Subscriptions (million)	1.7	3.7	10.0
Penetration Rate (%)[2]	*7.1*	*13.9*	*35.0*
Internet Broadband Subscriptions			
Number of Subscriptions	-	490,630	3,733,000
Penetration Rate (%)[2]	-	*1.9*	*13.0*

Source: Malaysian Communications and Multimedia Commission and Economic Planning Unit

Notes: [1] As at October 2005.

[2] Refers to penetration rate per 100 population.

[3] Include Personal Digital Assistant (PDA) besides desktop and laptop PCs.

[e] Estimates

was prepared with a view to further expanding the development of innovative ICT services, telecommunications infrastructure and investment in new growth areas, including content development, digital multimedia receivers, VoIP phones, as well as embedded components and devices.

Utilisation of ICT

5.09 Recognising the strategic role of ICT in enhancing productivity and competitiveness, investment in ICT expanded at an average annual growth rate of 4.7 per cent, as shown in *Table 5-2*. The ICT expenditure in the various economic sectors contributed to the extensive build up of improved ICT systems and processes as well as the development of more web-based applications, raising productivity and efficiency levels. The ICT expansion in the Government sector was largely due to increased computerisation and IT infrastructure deployment within various agencies. The Public Sector ICT Strategic Plan, launched in 2003, comprised a number of strategic initiatives and smart partnership programmes to improve linkages among agencies, businesses and the public as well as the development of open source software (OSS). In terms of ICT adoption, the penetration of personal computers (PCs) installed almost doubled from 9.4 per

TABLE 5-2

ICT EXPENDITURE BY SECTOR, 2000-2005

Sector	RM million			% of Total			Average Annual Growth Rate (%), 2001-2005
	2000	2004	2005[e]	2000	2004	2005	
Agriculture	200	128	138	0.8	0.4	0.4	-7.2
Mining	222	224	234	0.9	0.7	0.7	1.1
Manufacturing	12,188	13,652	14,367	47.5	45.6	44.6	3.3
Utilities	378	430	470	1.5	1.4	1.5	4.5
Construction	112	126	135	0.4	0.4	0.4	3.8
Wholesale and Retail Trade	1,585	1,735	1,870	6.2	5.8	5.8	3.4
Transport and Communications[1]	1,221	1,581	1,770	4.8	5.3	5.5	7.7
Finance and Business Services	1,894	2,563	2,845	7.4	8.6	8.8	8.5
Other Services[2]	140	62	70	0.5	0.2	0.2	-12.9
Government	1,389	1,981	2,245	5.4	6.6	7.0	10.1
Consumer	6,314	7,440	8,104	24.6	24.9	25.1	5.1
Total	**25,643**	**29,922**	**32,248**	***100.0***	***100.0***	***100.0***	***4.7***

Source: World Information Technology and Services Alliance (WITSA)

Notes: [1] Includes telecommunications services.

[2] Include businesses providing personal, repair, cultural, recreation and entertainment, healthcare, legal, education, social and professional services.

[e] Estimates

100 population to 21.8 in 2005 while Internet dial-up subscription penetration increased from 7.1 per 100 population in 2000 to 13.9 in 2005, as shown in *Table 5-1*.

Development of the Multimedia Super Corridor

5.10 The MSC, established in 1996, set the platform to build a competitive cluster of local ICT companies and a sustainable ICT industry. By the end of 2005, a total of 1,421 companies was awarded MSC-status, of which more than 50.0 per cent focused on software development for general enterprise solutions and data warehousing as well as high-end specialised applications and e-commerce. During the Plan period, the MSC entered the second phase of its operationalisation which, among others, involved the conferring of MSC cybercity status to Bayan Lepas in Pulau Pinang and the Kulim Hi-Tech Park in Kedah.

5.11 While the MSC exceeded its first phase target of 500 MSC-status companies, for the period 1996-2003, however with regard to content development and the extent of cutting edge products and services, these have yet to reach expected levels. Notwithstanding this, with the rising demand for offshore shared services and outsourcing (SSO) activities worldwide, increased marketing and promotional

efforts were undertaken to enhance the competitiveness of the MSC as a global SSO destination. By the end of 2005, more than 50 SSO companies were established, providing 12,000 high skill jobs.

Deployment of MSC Applications

5.12 A key component of the MSC development was the implementation, integration and enhancement of a number of multimedia applications. These included applications development, namely, the Electronic Government, Smart School, Government Multipurpose Card and Telehealth, as well as the R&D Cluster, e-Business and Technopreneurship Programme to create the multimedia environment. The MSC applications, using comprehensive computer-based systems, provided the catalytic multimedia environment to generate innovative business opportunities for private sector participation. More than 300 companies were involved in the development of the multimedia applications and their deployment.

5.13 These applications attracted considerable investor interest both at local and international levels. The establishment of MSC business presence in the cities of Jeddah in Saudi Arabia and Dalian in People's Republic of China (China) promoted partnerships with a view to replicate a number of the MSC applications abroad. In order to bring the products to international markets, emphasis was made on standards compliance to ensure interoperability, modularity and scalability of the MSC applications.

Promoting e-Commerce

5.14 As e-commerce presented opportunities for businesses to increase productivity and improve competitiveness, its development was further intensified through the establishment of the requisite infrastructure, which included the setting up, and promotion, of various electronic transaction mechanisms. The involvement of the private sector, primarily the financial institutions and industry associations, was significant in the establishment of financial exchanges for business to business (B2B) and business to consumer (B2C) online transactions.

5.15 A number of action plans under Internet banking services and the MSC e-Business Programme were piloted to further promote the e-mode of communications and transactions through secure B2B and B2C online business transactions, especially for small and medium enterprises (SMEs). In addition, to promote the uptake of e-commerce as well as address concerns relating to consumer protection and security of information, measures were taken to enact new legislation. These included the Electronic Transaction Bill, the Electronic Government Activities Bill and the Personal Data Protection Bill, currently in the early stages of preparation.

Narrowing the Digital Divide

5.16 As part of the endeavours to ensure that all Malaysians share the benefits of a knowledge-based economy, on-going efforts to narrow the digital divide were further intensified. The strategies included the implementation of the infrastructure plan for universal access as well as making available more affordable ICT products and services. For this purpose, initiatives included the establishment of telecentres in underserved areas, tariff revision for telephone and Internet subscription, and the promotion of PC ownership. In addition, to further promote the uptake of ICT facilities and services, efforts were undertaken to develop customised content and online applications.

5.17 Among the measures taken to bridge the digital divide within the rural communities was the establishment of 217 telecentres under the USP and Government programmes. These telecentres, comprising 42 *Pusat Internet Desa,* 39 *Medan InfoDesa,* 58 Community Access Centres and 78 Computer Literacy Classes were set up to increase computer education and empower rural communities to access and utilise information to improve their economic and social well-being. Specific programmes were also initiated to equip people with disabilities, senior citizens, micro-enterprises, single mothers, youth and urban poor to use ICT services. To further increase ICT literacy among households, the One Home One PC project was launched in 2003.

5.18 To establish a more comprehensive and robust plan of action for Bridging the Digital Divide (BDD), a study on a National Strategic Framework for BDD was undertaken. The Framework makes use of a geographical information system (GIS) to map the distribution of ICT throughout the country in conjunction with various demographic and geographical parameters, such as population density, gender and age as well as across states, districts and *mukims*. Early findings show a disparate distribution of Internet and PCs indicating that less than one per cent of the *mukims* have high average index value and these are mainly in the vicinity of major cities. This indicated that while the general access to basic telephony is relatively high, more than 90 per cent of the 927 *mukims* were still at the early stage of using Internet and PCs.

ICT Skills

5.19 As part of the efforts to move the nation towards a knowledge-based work culture, human resource development continued to be a critical aspect of Malaysia's strategy and initiative for ICT. To meet the rising demand for highly skilled computer workers, comprising computer system designers and analysts, computer programmers and computer support technicians, the 48 MSC-status institutions of higher education produced more than 31,000 ICT graduates during the Plan period. Various programmes were initiated to encourage institutions

of higher education as well as other training institutions to work with industries in order to ensure relevancy and marketability of skills acquired.

5.20 Despite the rigorous efforts, the MSC Impact Survey 2005 indicated a shortage of ICT-related personnel in specialised areas indicating a mismatch in the supply of, and demand for practical skill sets required by the industry. Among others, two pilot schemes, namely, the Undergraduate Skills Programme and the MSC Internship Programme for new ICT graduates provided advanced skills training as well as retraining and reskilling to more than 2,000 participants.

5.21 Apart from specific institutional training, continuous industry wide in-service skills upgrading and advanced training also contributed to the enhancement of ICT knowledge and skill levels of the workforce. Under the Human Resource Development Fund (HRDF), RM176 million was disbursed for ICT-related training during the Plan period. This involved the financing of 241,359 training places at 227 training centres nationwide.

Fostering Local Capabilities in Content Development

5.22 The adoption of digital technology to create diverse and original local content for education, entertainment, commerce and industrial activities enabled widespread development of the multimedia content industry for both the local and global markets. The public and private sectors expanded capacity for training in specialised ICT fields such as multimedia, animation and computer graphics as well as interactive software development with the aim to narrow the skills gap for creative content development. Improved incentives such as a licensing fee rebate scheme was introduced to encourage the content applications service providers to develop and promote local content as well as increase collaboration with world class content providers.

5.23 The agenda to develop the creative multimedia cluster as a new area for future growth was strengthened with the launch of the MSC Creative Applications and Development Centre (CADC). Besides working with local companies, the CADC focused on strategic collaboration with institutions of higher education to spawn a number of R&D activities in high value added content development such as visualisation, computer graphics imaging and production design.

e-Learning

5.24 During the Plan period, the increased use of the Internet led to the growth in e-learning as a potential source of online education and training. Apart from the smart school initiatives, a number of institutions of higher education provided increased opportunities for such virtual education. In line with the growing culture with regard to online information sharing, MIMOS developed the

Malaysia Grid for Learning (MyGfL), which serves as a repository and directory for sharing of digital content. A number of e-learning and smart school community projects were also implemented by the Multimedia Development Corporation (MDC). These were essentially private sector-led initiatives to provide the requisite ICT infrastructure, infostructure, and sponsorship of ICT facilities and training in selected schools. E-Learning in schools was further aided with the use of smart school courseware and Internet access via the SchoolNet.

5.25 To ensure more coordinated and coherent development of e-learning initiatives in the public sector, a National e-Learning Consultative Committee (NeLCC) was set up to provide direction and monitor initiatives pertaining to formulation and implementation of strategies and programmes. To ensure more orderly development and adoption of e-learning practices, the NeLCC is to oversee the formulation of the public sector e-learning blueprint.

Information Security

5.26 During the Plan period, various measures were undertaken to address computer abuse and misuse as the economy becomes more connected through networked applications and communications infrastructure. The Government initiated the preparation of a National Information Security Framework to address the requisite legislative, regulatory and technical aspects as well as institutional arrangements to preserve e-Sovereignty, towards increased confidentiality, integrity and availability of the communications network. The National ICT Security and Emergency Response Centre (NISER) provided a suite of services in niche areas of computer forensics, acculturation programmes, policy research, security advisory and assessment of security solutions. The Malaysian Computer Emergency Response Team (MyCERT) provides an independent platform for Internet users to report and seek assistance in dealing with security breaches, misuse and abuse of the Internet.

Funds for ICT Development

5.27 During the Plan period, several sources of funds were made available by the Government to assist companies to adopt ICT in their business processes as well as venture into new ICT-related investment activities. The Malaysia Debt Ventures Berhad (MDV) provided innovative financing facilities for ICT and high growth sectors. By the end of 2005, a total of RM1.1 billion was disbursed to 76 companies. The Malaysia Venture Capital Management Berhad (MAVCAP) disbursed RM82.6 million for seed and direct ventures in information technology, electronics, telecommunications and networking. The Commercialisation of Research and Development Fund (CRDF) managed by the Malaysian Technology Development Corporation (MTDC) as well as the Small and Medium Industries Development Corporation (SMIDEC) launched a number of ICT-related financial schemes to further accelerate the utilisation of ICT, especially by SMEs. The

Demonstrator Application Grant Scheme (DAGS) provided funds for short term projects targeted at creating, developing and promoting new ICT applications for specific users, particularly at the community levels. The DAGS provided funds for a total of 51 projects involving disbursement of RM79.7 million during the Plan period.

Promoting R&D in ICT

5.28 During the Plan period, a total of 192 ICT-related R&D projects was approved under the Intensification of Research in Priority Areas (IRPA) programme amounting to RM46 million. The approved projects included network monitoring, wireless communications, grid computing infrastructure and GIS as well as satellite, sensors and applications for health, business, agriculture and education conducted by a number of institutions of higher education and research institutions. Under the Industry Research and Development Grant Scheme (IGS), a total of 27 ICT-related projects amounting to RM28 million was approved. In the areas of information security, computing, and semiconductor and microelectronics, MIMOS undertook 34 ICT-related R&D projects, of which 30 had potential commercial value.

III. PROSPECTS, 2006-2010

5.29 As concerted efforts continue to be undertaken to strengthen the foundation for a knowledge-based economy, the greater adoption and usage of ICT will become strategically more important. The country will need to increasingly harness ICT to improve productivity and competitiveness as well as progress to high value added and knowledge-intensive economic activities. The Government will build upon and enhance ICT capacity for ubiquitous access, develop core competencies, narrow the digital divide and expand usage of electronic transactions as part of the overall effort to empower the populace to partake in the growing networked economy. Simultaneously, this will allow for the greater expansion of ICT-related industries and services. As such for the Ninth Plan, the focus of ICT development will include:

- ❑ *enhancing Malaysia's position as a global ICT and multimedia hub;*
- ❑ *expanding the communications network to ensure more equitable access to information and services;*
- ❑ *intensifying efforts at bridging the digital divide;*
- ❑ *developing the existing cybercities as well as promoting new cybercentres and MSC multimedia applications;*
- ❑ *fostering new sources of growth in the ICT sector including bioinformatics, a convergence of biotechnology and ICT;*

- ❑ *developing skilled ICT workforce;*
- ❑ *accelerating e-learning acculturation; and*
- ❑ *enhancing information security.*

Enhancing Malaysia's Position as a Global ICT and Multimedia Hub

5.30 During the Ninth Plan period, the country will leverage on the significant progress made in fostering the development of ICT and multimedia industries. Taking into cognisance the increasing competition from other ICT hubs worldwide, efforts will be intensified towards strengthening Malaysia's position as a preferred global location for ICT investment and as a market leader for ICT solutions. Since the provision for a conducive environment, such as reliable infrastructure as well as service availability, affordability, and productivity, is a critical requirement in attracting key players, continuous global benchmarking of Malaysia's position will be important in assessing Malaysia's competitiveness and investment attractiveness internationally. In this regard, the National Information Technology Council (NITC) will continue to be the principal forum to further develop national ICT policy and strategy, coordinate initiatives and monitor implementation.

5.31 The preparation of the National ICT Strategic Roadmap will provide the framework to build new capabilities and technologies vital to improve access and promote investment in ICT-based and knowledge-intensive industries. The Government will continually review the MSC Bill of Guarantees with a view to ensure that its provisions and content remain relevant and competitive to attract potential foreign and local ICT-related investments. The review will consider ways to enhance marketing and branding of the MSC, especially in targeting new markets including the Middle East, China and Europe.

5.32 The implementation of the ICT Strategic Plan for the Public Sector will take into consideration the need for increased interoperability, common standards and guidelines, shared infrastructure, as well as continuous upgrading of ICT skills amongst the Government workforce. The plan will include a one-stop gateway access to wide-ranging applications, including community applications for businesses and citizens, inter- and intra-agency services as well as a knowledge bank and enterprise-wide applications for back-office systems integration.

5.33 Efforts will be intensified to promote domestic R&D institutions and industry players to establish partnerships with international institutions in network technology development. The second phase of the Malaysia Research and Education Network (MyREN) will connect private institutions of higher education, government research institutions and private industry laboratories to further enhance global networking and cooperation in R&D. To facilitate local research communities to establish

linkages with world class research institutions, MyREN will be linked to the International Research Network through the Trans-Eurasia Information Network 2 (TIEN2).

Expanding the Communications Network to Ensure More Equitable Access to Information and Services

5.34 Adequate and reliable ICT infrastructure with extensive capacity to support access and delivery of information will remain a major factor in the support of a knowledge-based economy. A critical component will be the availability of broadband network needed to achieve greater adoption of online multimedia and Internet-based applications. The implementation of the NBP will be accelerated as part of the efforts to ensure rapid expansion and uptake of broadband services to reach 13.0 per cent of the population by 2010, compared to the current 1.9 per cent.

5.35 Apart from increasing access to communications infrastructure, the greater use of broadband services will be promoted through the provision of innovative packages and competitive tariffs. Innovative last-mile technologies that provide alternative connections for homes and businesses such as wireless broadband and broadband over power lines to areas that lack telephone land lines, will be considered. Further downstream, measures will be undertaken to allow service providers to have greater access to infrastructure capacity at satellite and cable landing stations and provide international backhaul and transit services to businesses or third parties. In addition, the provision of Internet exchange in the country will also be further opened up.

5.36 The subscription of cellular telephones in the country is expected to increase from 74.1 per 100 population in 2005 to 85.0 by 2010, largely attributed to convenience, affordability and in keeping with changing lifestyles. To achieve national mobile communications coverage and interoperability, the Third Generation (3G) infrastructure network in terms of service availability, quality and innovative applications, will be expanded in phases. In addition, cooperation amongst mobile operators and local content service providers will be enhanced to ensure extensive provision of mobile Internet to consumers thus further increasing access to Internet-based services such as e-commerce.

5.37 The phased implementation of the MyICMS will further promote the growth of ICT infrastructure, products and services. This will encompass essentially the increased integration of the Internet, mobile telephony and broadcasting services. To ensure optimisation of communications infrastructure investment, services providers will be encouraged to consolidate and share communications facilities as well as coordinate to set up common facilities and interoperable systems for more efficient delivery of services and more affordable broadband

access. Towards this end, the private sector will be encouraged to provide integrated infrastructure, where necessary, to ensure adequate access and connectivity.

5.38 In the light of the rising demand for Internet address space, the Government will consider the need to migrate the Malaysian Internet network from Internet Protocol version 4 (IPv4) to Internet Protocol version 6 (IPv6) protocol technology. A National Consultative Council was set up to study, among others, the implications of establishing the IPv6 network in terms of policy, regulatory environment, investments, timelines, manpower requirements and infrastructure deployment. Radio frequency identification (RFID) technologies will also be used to create ubiquitous network. Under this environment, the RFID through sensory, tagging and tracking functionalities will be used to intensify information usage thus generating new value added activities and services within the ICT industry.

Bridging the Digital Divide

5.39 As part of efforts to prepare the general populations to meet the challenges of a knowledge-based economy, increasing emphasis will be placed on ensuring more equitable access to affordable PCs and online services. The Government will continue to play a crucial role in bridging the digital divide by providing, initiating and nurturing online services nationwide in order to enable Malaysians to access and utilise Internet-based knowledge and information resources as an integral part of everyday life.

5.40 In line with the anticipated demand for increased adoption and usage of networked applications, the number of PCs installed is projected to increase from 21.8 to 40.0 per 100 population by the end of the Plan period. The One Home One PC initiative will be intensified with the expansion of existing schemes such as *PC Gemilang 2* and *PC Mesti Beli* targeting first time buyers and lower income groups. In this regard, factors such as affordability as well as availability of after sales technical support will also be addressed to ensure continuous usage and adoption.

5.41 The recent National BDD Framework Study identified the locations as well as target groups and strategies for the next wave of BDD programmes. The GIS-based findings will facilitate future planning, implementation as well as monitoring of programmes and projects for the purpose of promoting ubiquitous access as well as wider and more intensive adoption and usage of ICT for economic value creation and improvement in the quality of life. In order to realise the full potential of ICTs, the focus will be on increasing computer literacy and equipping potential users with the requisite know-how and skills for teleworking, distance learning as well as general computing and communications. These will be specifically targeted to benefit not only households, families and businesses but also people with disabilities, the poor as well as women and senior citizens.

5.42 With respect to the development of telecentres, several improved modalities will be considered in order to ensure they remain sustainable and value creating. Existing telecentres will be upgraded to Community Knowledge Centres that provide a wider range of economic and social information to communities. The telecentres will become a one-stop centre including accessing e-Government applications, e-learning and as an information resource exchange. To cater to the needs of sparsely populated districts and remote *mukims*, smaller scale telecentres will be introduced, equipped with computers and Internet, through the USP industry programme. To ensure sufficient and reliable supply of electricity, the implementation of rural electrification programme, namely, the Electricity Supply Industry Trust Account, will target similar underserved areas.

5.43 Emphasis will be given to changing the mindset as well as involvement, and commitment of rural communities towards ICT usage and adoption through building awareness, and realising empowerment programmes. Programmes will be initiated to ensure sufficient availability of up-to-date content in *Bahasa Melayu* and other local languages so as to enable the wider usage of ICT applications including e-commerce services. Business entities and community-based organisations, including non-profit organisations and the non-governmental organisations (NGOs), will be encouraged to collaborate and assist communities and target groups to leverage on ICT to generate economic value and improve living standards.

MSC Phase II and Expansion of MSC Multimedia Applications

5.44 The MSC Phase II will build upon the demonstrated efficacy of programme outputs achieved during its Phase I. During the Ninth Plan, the focus will be on the development of existing MSC cybercities as well as, where viable, newly identified MSC cybercentres in Perak, Melaka, Johor and Sarawak. The proposed development is expected to bring in 250 additional global multinational companies (MNCs). The number of MSC-status companies is projected to increase from 1,421 in 2005 to 4,000 by 2010, generating 100,000 jobs nationwide and 1,400 intellectual properties (IPs), as indicated in *Table 5-3*. Several new strategies will be implemented, including the review and enhancement of the MSC Bill of Guarantees, promoting joint R&D between local and foreign ICT entities, extending MSC benefits via the nationwide MSC expansion, and encouraging the production, usage and adoption of domestically-designed and manufactured ICT products and services. Increased efforts will be undertaken to ensure adequate provision of essential services, including broadband and widespread Internet access as well as transport facilities and improved amenities.

5.45 Cyberjaya will be further developed as a thriving National ICT Hub, with a pro-business environment promoting competition and synergy among related industries and services. Various services including transportation and infrastructural

TABLE 5-3

SELECTED MSC INDICATORS, 2001-2010

Category	*2001*	*2005*	*2010[e]*
MSC-status Company (number)[1]	621	1,421	4,000
- Locally Owned	410	1,033	-
- Foreign Owned	198	349	-
- Joint-venture (50-50)	13	39	-
Job Creation (number)[1]	14,438	27,288[2]	100,000
- Knowledge Workers	12,169	24,252[2]	-
- Others	2,269	3,036[2]	-
Investment (RM billion)	3.16	5.11[2]	12
Revenue (RM billion)	-	7.21[2]	69
Exports (RM billion)	-	1.57[2]	2.5
R&D Expenditure (RM million)	-	670[2]	1,000
IPs Registered (number)	-	119[2]	1,400

Source : Multimedia Development Corporation and Economic Planning Unit

Notes : [1] Cumulative figure.

[2] As at December 2004.

[e] Estimates

amenities will continue to be enhanced to ensure Cyberjaya is more accessible and conducive for work and leisure. In addition, making Cyberjaya a wireless broadband city will provide the wider platform to test-bed innovative applications among the growing ICT-savvy workforce and consumers.

5.46 The MDC will increase its capacity and capability to function as an ICT investment promotion agency to attract new, and retain existing, local and foreign investments especially within the cybercities and cybercentres. In this regard, strategic marketing and promotional programmes in collaboration with the private sector will be vigorously pursued, to promote Malaysia as a dynamic and competitive ICT investment destination in this part of the region. Among others, in order to penetrate global markets, the MDC will work towards forming strategic alliances and joint-ventures among leading foreign MSC-status companies and Malaysian enterprises to participate in SSO as well as creating new growth-generating activities.

5.47 Building on past achievements, the next wave of the MSC Applications deployment will further catalyse the Government's plans towards utilising ICT as a platform to promote access to efficient, user-friendly and timely information and services as well as provide opportunities for high value added economic activities and job creation. Towards this end, the lead agencies will intensify

efforts to expand the multimedia applications taking into account changes in the business and working environment as well as increased monitoring and impact assessment of programmes and projects.

5.48 The MDC will also be geared towards providing a wide range of consultancy and technical services to guide lead agencies to accelerate the implementation of the MSC multimedia applications. In this regard, a new applications centre will be established to generate and test-bed new technologies, keep pace with technology advancements and build up core competencies. For this purpose, the MDC will optimise resources available and leverage on existing infrastructural facilities and expertise to generate new products and services from the MSC Applications deployment, both for local and overseas markets.

5.49 The *e-Government* Programme will enhance the public delivery system through the provision of integrated and efficient ICT solutions to ensure easier and speedier access to Government services, especially by rural communities. With regard to the e-Services project, more Government services will be introduced and made accessible from a single Government portal. In addition, considering that there is an increasing demand for Malaysia's e-Government solutions overseas, efforts will be focused on integrating the various Government applications to ensure compliance with global standards through international benchmarking.

5.50 The *Government Multipurpose Card* (GMPC) will continue to be developed as the common platform to incorporate additional features for more convenient usage and improved security. New applications for the GMPC will be developed to increase the usage of *MyKad* with the focus on integrating and standardising applications.

5.51 During the Ninth Plan period, the *Smart School* applications will be further strengthened to provide more comprehensive coverage. Towards this end, the deployment of web-enabled smart school applications will be accelerated. This is to ensure continuous access to the latest online content and e-learning applications by teachers and students. The SchoolNet will provide a cost effective means of deploying widespread smart school courseware.

5.52 *Telehealth* will continue to leverage on wireless and high-speed communication networks, inter-linking various medical institutions across geographical and spatial boundaries. This is with a view towards increasing health information sharing, optimising specialist resources and facilitating data management. Private medical institutions will be encouraged to participate and collaborate with Government hospitals in the implementation of the Life Health Plan (LHP) services, which will contribute to improved national health planning and execution.

5.53 Under the *Technopreneur Development Programme* more incubators will be established to develop competitive ICT SMEs. This will be undertaken in collaboration with selected MNCs and government-linked companies (GLCs), as well as the academia and R&D institutions. The mode of assistance will go beyond the provision of matching funds to include the provision of a wide range of mentoring assistance and technology risk assessment services. For this purpose, pre-seed, seed and early stage financing will be made available.

5.54 The R&D Cluster initiative during the Plan period will emphasise the creation of an innovative research community in the MSC. The MDC will play a key role in identifying and encouraging leading local and international technology companies to establish world class research centres within the existing cybercities and proposed cybercentres. Emphasis will be given to the promotion of collaboration among foreign and local companies, research institutions and universities to increase commercialisation of R&D and creation of spin-off companies.

New Sources of Growth in ICT

5.55 The emphasis on ICT infrastructural development as well as application usage and adoption will provide the private sector with extensive investment and employment opportunities. Among the new sources of growth within the major segments of the ICT sector, include digital content development, e-commerce, SSO and bioinformatics. The aim is to increase the number of new companies as well as specialists capable of producing customised technological solutions in niche areas. Particular emphasis will also be given to the promotion and usage of local products and services.

Digital Content Development

5.56 The digital content industry, which includes creative computer animation, digital games, edutainment programmes, mobile applications and services, interactive television, digital archiving, digital publishing as well as multi-industry and multimedia applications, will be further promoted and developed as a new growth area. To further promote the industry, ICT-related activities focusing on creativity and technology innovations will be encouraged through the introduction of new and improved incentives. This will be with the aim to attract international world class content developers, broadcasting companies as well as global design and production houses to set up operations in the existing cybercities and potential cybercentres.

5.57 Considering that the ICT content industry is an aggregation of diverse disciplines including architecture, design, music, film making, publishing, advertising and graphics, the focus will be on nurturing human creativity as an economic resource, linking entrepreneurs, technology and innovation. In this context, a

special RM150 million content fund will be established to support local digital content development for improved communications, information, edutainment and commerce.

5.58 The Government will work closely with relevant ICT-related industries, involved in promoting and nurturing creative content developers, to further enhance the effectiveness of existing incubator programmes. Improved support mechanisms will be introduced to enhance capacity and capability for innovative multimedia products and services as well as knowledge applications technologies, both for the local and overseas markets. Focus will also be given to building key competencies through accreditation programmes with local and international content industry associations. The designation of Digital Media Zone in Cyberjaya as a digital content development hub and the setting up of Creative Zones in newly designated cybercentres are expected to add to the sustainable pool of digital content providers. These zones will leverage on existing infrastructure and generate specialised technologies required for content development.

5.59 The convergence of broadcasting television and the Internet will provide an alternative network to deliver digital information and content. The coming onstream of digital television (DTV) services will serve as an alternative conduit for extensive content value creation and diffusion. The services will be offered through terrestrial transmission beginning with the Klang Valley before being extended to other areas. The adoption of these convergent technologies will enable more interactive information diffusion and acquisition.

5.60 During the Ninth Plan period, there is expected to be increasing uptake of mobile computing by the working population. This is likely to boost demand for new and improved content applications by consumers as well as businesses, thus providing a range of opportunities for potential content designers, engineers and developers.

5.61 In order to further promote growth of the local content industry, the relevant regulations need to effectively prescribe the requirements for local content, particularly in broadcasting. Licensing and regulations pertaining to content creation will be reviewed to increase coordination in application and approval procedures among a number of agencies and reduce any constraints to developing new and improved local content. Government assistance in the form of grants, tax rebates and funds will be further explored to assist the growth of local talents and proliferation of creative industries.

5.62 At the same time, the legal framework for intellectual property registration (IPR), particularly patents, trademarks and copyrights for ICT-related products and services will continue to be reviewed with the aim to combat piracy and promote greater innovation among potential content creators. Efforts will also

be made to streamline various content regulations among different ministries and agencies involved in developing, promoting and regulating the content industry.

e-Commerce

5.63 Special focus will continue to be given towards providing and encouraging the wider use of e-commerce as an alternative way of doing business. While the Government will continue to play a catalytic role in promoting e-commerce, the private sector and in particular the industry associations will be encouraged to spearhead initiatives, leveraging on the existing networked environment to access online information on products and services as well as improve effectiveness and efficiency of operations along the supply chain, including real-time pricing. These initiatives are expected to pave the way for e-commerce to be a major mode of transaction in the economy, while at the same time generating new and innovative business opportunities.

5.64 As proposed in phase 2 of the study on National e-Commerce Strategic Directions, the focus will be on the establishment of a wide array of B2B and B2C e-commerce and networking applications. The solutions will support the industry supply chain management and logistics networks within several sectors, primarily agriculture, tourism, construction, manufacturing related services (MRS), manufacturing and retail. The various on-going and new programmes will be encouraged to leverage on the networked environment to facilitate end-to-end delivery as well as access to local and global markets.

Shared Services and Outsourcing

5.65 In order to sustain the growth of SSO activities, a holistic approach will be taken to promote a pro-business environment. Efforts will be made to build upon the existing comparative advantages by improving the requisite infrastructural facilities and services, as well as building up the requisite skill sets to attract SSO businesses to Malaysia. At the same time, investment incentives will be continuously reviewed with the objective of ensuring that the available fiscal incentives remain relevant and effective. The provision of customised incentives as well as venture capital financing particularly for the promotion of R&D and product innovation will also be emphasised.

Bioinformatics

5.66 Bioinformatics represents a potential new growth area for Malaysia to build upon, taking into account the country's strong ICT foundation. The National Biotechnology Policy placed emphasis on development of bioinformatics, which is the convergence of biotechnology and ICT, to support the country's nascent biotechnology industry. The global bioinformatics market is estimated at US$1.4

billion and is expected to grow at an average annual rate of 15.8 per cent, to reach nearly US$3 billion by 2010, reflecting the immense potential of bioinformatics.

5.67 Initiatives recommended for the advancement of bioinformatics and grid computing will be with a view to undertaking research to support product and process development for the agriculture, healthcare and industrial sectors. In addition, a bioinformatics benchmarking centre will be established to facilitate the benchmarking of bioinformatics applications in line with accepted global standards and practices. These initiatives will leverage on existing R&D facilities including the MyREN network.

Skilled ICT Workforce

5.68 As ICT becomes increasingly pervasive, the demand for high quality, skilled and creative ICT personnel will expand rapidly to enable the use of existing, and development of new, technologies as well as maintain the competitive edge of Malaysia's ICT products and services in the world market. The total ICT workforce is expected to increase at a rate of 10.4 per cent per annum from 183,204 in 2005 to reach 300,000 by 2010. To meet the increasing demand for highly skilled ICT human resources, related education, training and skills development programmes will be stepped up. This will require expanded formal, professional and technical training at various levels as well as on-the-job training of specific skills, especially by ICT-related industries and services.

5.69 ICT education and training programmes will be intensified and expanded to cover schools, pre-university levels as well as institutions of higher education. Among others, development of core skills in multi-disciplinary fields such as software development in life sciences and knowledge applications will be encouraged. Local institutions of higher education will be given the flexibility of a 10 per cent pre-approved curriculum so that they can periodically develop the topical courses in collaboration with the industry. Industry experts will be encouraged to teach these courses and incentives will be given to industries that support such initiatives. Post-graduate studies and specialisation in core areas of ICT such as in software development, semiconductor and chip design, digital content development, information security and bioinformatics, will be encouraged.

5.70 During the Ninth Plan, measures will continue to be undertaken to increase employability of ICT graduates through collaborative efforts of the Government and industry. Apart from the on-going programmes, another initiative will be the MSC Professional Development Programme. This programme will be conducted in cooperation with MSC companies to develop highly skilled ICT specialists and ICT-related management personnel that are highly demanded, especially those in new and emerging technology areas. An ICT Development Institute will be established to match the capacity of training institutions with industry requirements

especially in terms of facilitating the marketability of skills acquired by ICT graduates.

Accelerating e-Learning Acculturation

5.71 With increasing digitisation of the economy, computer and web-based education and training is expected to become more pervasive. In this regard, in promoting lifelong learning, e-learning programmes in businesses and Government agencies will be enhanced during the Plan period. The promotion of e-learning initiatives in the formal education process, which includes schools, universities and other training institutions, will continue to be given high priority to cater for the anticipated rise in demand for e-learning applications and content. Similar initiatives within informal processes will be promoted to equip rural communities, senior citizens and people with disabilities with the basic tools to increase usage of ICT to improve socio-economic well-being.

5.72 The private sector will also be encouraged to provide a conducive environment for e-learning as work cultures change, leading to demand for knowledge sharing and knowledge applications at the workplace. New and improved incentives will be considered to expand e-learning capacity and capability as digital acculturation impacts upon the performance and ability of the workforce to innovate and contribute to the design and usage of knowledge applications, which in turn will further enhance productivity and competitiveness. The National Vocational Training Council will provide a blueprint, incorporating content, standards, systems and accreditation processes to implement e-training programmes.

5.73 The Public Sector e-Learning Blueprint, in the final stages of completion, will provide the details on the guidelines, modalities, standards and resources required to promote an e-learning culture among the Government workforce. The implementation of the blueprint will be a crucial requirement to support future ICT usage and adoption as well as knowledge management in the public sector.

Enhancing Information Security

5.74 During the Plan period, efforts will be intensified to improve information security in order to enhance confidentiality, integrity and availability of online information systems. In this regard, the National Information Security Framework Study, initiated by the Government, will provide more comprehensive guidelines on information security management, mechanisms for institutional networking and coordination as well as strategies for specialised intellectual capital development. This is with the aim to enhancing the integrity of networked systems, increasing trust and confidence in online mechanisms and improving quality of services, among others, through compliance with information security

management standards and best practices. In particular, these aspects will be of specific importance to agencies operating critical national information infrastructure.

5.75 Recognising the importance of security assurance of ICT products and solutions, measures will be undertaken to provide information security assessment based on international standards and certification. For this purpose, a number of evaluation laboratory facilities will be established to undertake risk assessment and security evaluation of local products with a view to facilitating market entry and consumer acceptance. To further reduce online fraud and security breaches, capacity building measures and support structures within relevant agencies will be enhanced to ensure that the existing cyberlaws and related regulations remain relevant and enforceable.

5.76 During the Ninth Plan, while focusing on a wider outreach of online computing among the general populace, priority will continue to be accorded to the ethical usage of ICT. The Government will further strengthen existing guidelines on the responsible usage of the Internet, especially among home users and schools. NISER will promote awareness programmes to increase the level of competency in safe computing, particularly on measures requiring immediate corrective action. These efforts will be further fortified through initiatives by Internet service providers to provide filtering options for Internet subscribers.

IV. INSTITUTIONAL SUPPORT AND ALLOCATION

5.77 During the Ninth Plan period, the various computerisation programmes will be driven by the relevant ministries and agencies. For the BDD infrastructure development programme, the Ministry of Energy, Water and Communications will continue to take the lead in telecommunications infrastructure development as well as support and upgrade the telecentres and SchoolNet in close collaboration with the Ministry of Rural and Regional Development and the Ministry of Education. The MSC Multimedia Applications will be deployed by key implementing agencies, namely, the Malaysian Administrative Modernisation and Management Planning Unit, Ministry of Education, Ministry of Health and Ministry of Home Affairs. The Ministry of Science, Technology and Innovation, together with MDC will lead MSC developments and promotions, while MIMOS will take the lead in ICT R&D.

5.78 A total of RM12.9 billion will be allocated for ICT-related programmes and projects as shown in *Table 5-4*. A major portion of this allocation will be for the computerisation of Government ministries and agencies as well as BDD initiatives largely for the supply and maintenance of computers and Internet access. Specific funding will be made available to promote ICT content and entrepreneurship development.

TABLE 5-4

DEVELOPMENT EXPENDITURE AND ALLOCATION FOR ICT-RELATED PROGRAMMES, 2001-2010

(RM million)

Programmes	*8MP Expenditure*	*9MP Allocation*
Computerisation of Government Agencies	**2,125.0**	**5,734.2**
Bridging the Digital Divide	**2,433.1**	**3,710.2**
School	2,145.1	3,279.2
Communications Infrastructure Service Provision Programme	254.0	150.0[1]
Telecentres	18.1	101.0
ICT Training / Services	15.9	180.0
ICT Funding	**1,125.6**	**1,493.0**
MSC Multimedia Applications	**1,153.1**	**1,100.5**
e-Government	537.7	572.7
Smart School	363.9	169.8
Telehealth	91.8	60.0
Government Multipurpose Card	159.7	298.0
MSC Development	**320.8**	**377.0**
ICT Research and Development	**727.5**	**474.0**
Total	**7,885.1**	**12,888.9**

Source: Economic Planning Unit

Note: [1] A larger proportion will be provided through the USP contributed by the industry.

V. CONCLUSION

5.79 During the Eighth Plan period, Malaysia made significant progress in increasing the information and knowledge content in all sectors of the economy as well as ensuring that the ensuing benefits accrued to all segments of society including the rural communities. In moving forward towards a knowledge-based economy, the country will leverage on the networked environment alongside the next wave of the MSC expansion including the development of cybercities and where feasible, cybercentres. This is with a view to harnessing ICT as a new source of growth and wealth creation, and sustaining Malaysia's position as a competitive global multimedia hub destination particularly in SSO. Further initiatives will be undertaken to attract investments in existing and new areas. These will include provision of improved incentives, review of investment-related laws and regulations, with a view to provide a more conducive environment for investment as well as making available adequate funding.

5.80 These strategic initiatives will be complemented by parallel efforts in nurturing human resources, building local content, strengthening IPR protection, enhancing information security and increasing e-enabled activities among the general populace. At the same time, the necessary infrastructure, infostructure and pro-business environment will be strengthened to provide greater access to ICT advancements as well as more opportunities to participate in the global digital economy.