Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission

PUBLIC CONSULTATION PAPER ON EFFECTIVE COMPETITION IN THE ACCESS NETWORK

23 JULY 2003

MCMC/IDD/PRR/ANE/No. 2 of 2003

PREFACE

From the National Policy Objectives, as stipulated in Communications and Multimedia Act 1998 (CMA), one of the key functions of the MCMC is to promote effective competition in the communications and multimedia industry. While the provision of communications and multimedia services has its earnest beginning in a monopoly, more and more effective competition-driven initiatives were introduced as a means to deliver the objectives that a monopolistic environment has failed to bring forth.

This becomes more important in particular where the provision of communications and multimedia services is dependent on the Access Network. The Access Network is the target for effective competition as:

i. The Access Network is the most important link between the customer and the core network and application services;

ii. The Access Network is the most expensive part of the network and has impact on external environment;

iii. The Access Network offers multiple service providers and multiple services;

iv. Utilising existing Access Network avoids duplication of resources and promotes optimum utilisation of the existing resources; and

v. Utilising existing Access Networks enables competitive service offerings (in terms of prices, quality of service and choice).

By introducing effective competition in the Access Network, it will deliver new services and choice of service providers to the customers, hence encouraging growth of the industry. One of the major benefits which can be offered to the customers from introducing effective competition is in the form of the provision of broadband services.

As a result, effective competition in the Access Network is a necessary pre-requisite to achieve a broader level of effective competition in the communications and multimedia industry.

MCMC invites submissions from the interested parties on the contents of this PC Paper. Written submissions should be provided to MCMC by **12 noon, 22 September 2003.** Submissions should be provided in hard copy as well as electronic form and addressed to:

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Any confidential material should be provided under a separate cover clearly marked 'Confidential'

MCMC thanks interested parties for their participation in this consultative process.

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ABBREVIATIONS

ADSL	Asymmetrical Digital Subscriber Line
ANE	Access to Network Elements
ARD	Access Reference Document
ATU	ADSL Transmission Unit
CDMA	Code Division Multiple Access
CoC	Cost of Capital
CPE	Customer Premises Equipment
DLC	Digital Loop Carrier
DPL	Digital Power Line
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
FWA	Fixed Wireless Access
GSM	Global System for Mobile communications
HDF	Handover Distribution Frame
HDSL	High Bit rate Digital Subscriber Line
ISDN	Integrated Services Digital Network
LAN	Local area Network
LLU	Local Loop Unbundling
LMDS	Local Multipoint Distribution Services
LRIC	Long Run Incremental Cost
MCMC	Malaysian Communications and Multimedia Commission
MDF	Main Distribution Frame
MMDS	Multimedia Multipoint Distribution Services
NPO	National Policy Objectives
NTP	Network Termination Point

OFC	Optical Fibre Cable
PSTN	Public Switched Telephone Network
QoS	Quality of Service
SDSL	Symmetric Digital Subscriber Line
SLA	Service Level Agreement
SLCP	Sub Loop Connection Point
VDSL	Very high Data rate Digital Subscriber Line
WTO	World Trade Organization

GLOSSARY OF TERMS

This subsection contains a short glossary of the main terms used in this PC Paper.

“CMA” means Communications and Multimedia Act 1998 [Act 588];

“Access Forum” means a forum designated under section 152 of the CMA;

“Access List” means the list of Network Facilities and Network Services contained in the Commission Determination on Access List, Determination No. 1 of 2001, registered 24 March 2001;

“Access Provider” means a Network Facilities Provider who owns Facilities and/or a Network Service Provider who provides Services that are included in the Access List and includes a holder of a registered licence under section 278 of the CMA; and

“Access Seeker” means a Network Facilities Provider, a Network Service Provider, an Applications Service Provider, or a Content Applications Service Provider who makes a written request for access to Network Facilities or Network Service that are listed in the Access List, including a holder of a registered licence under section 278 of the CMA;

“MAFB” or “Malaysian Access Forum Berhad” means the forum designated under section 152 of the CMA to be the Access Forum;

“MCMCA” means Malaysian Communications and Multimedia Commission Act 1998 [Act 589];

“MCMC” means the Malaysian Communications and Multimedia Commission established under the MCMCA;

“Mandatory Standard on Access” means the Mandatory Standard on Access to be determined at the conclusion of the Public Inquiry process initiated by the MCMC on 30 April 2003;

Section 1: Introduction

1.1 Communications and Multimedia Act 1998 (CMA) and National Policy Objectives

1.1.1 CMA provides for and regulates the converging communications and multimedia industries. It seeks to provide a generic set of regulatory provisions based on generic definitions of market and service activities and services.

1.1.2 CMA is based on the basic principles of transparency and clarity; effective competition and self-regulation; flexibility; generic rules; regulatory forbearance; emphasis on process rather than content; administrative and sector transparency; and industry self-regulation.

1.1.3 Subsection 3(2) of the Communications and Multimedia Act 1998 (CMA) sets out the National Policy Objectives (NPO) for the communications and multimedia industry.

To establish Malaysia as a major global centre and hub for communications and multimedia information and content services;

To promote a civil society where information-based services will provide the basis of continuing enhancements to quality of work and life;

To grow and nurture local information resources and cultural representation that facilitate the national identity and global diversity;

To regulate for the long-term benefit of the end user;

To promote a high level of consumer confidence in service delivery from the industry;

To ensure an equitable provision of affordable services over ubiquitous national infrastructure;

To create a robust applications environment for end users;

To facilitate the efficient allocation of resources such as skilled labour, capital, knowledge and national assets;

To promote the development of capabilities and skills within Malaysia's convergence industries; and

To ensure information security and network reliability and integrity.

1.2 Role of the Malaysian Communications and Multimedia Commission (MCMC)

1.2.1 The MCMC is the regulator for the converging communications and multimedia industry. Its role in the communications and multimedia industry was created based on the powers provided for in the Malaysian Communications and Multimedia Commission Act 1998 (MCMCA) and CMA.

1.2.2 Pursuant to these Acts, the role of the MCMC is to implement and promote the NPOs for the communications and multimedia industry. The MCMC is also charged with overseeing the new regulatory framework for the converging industries of telecommunications, broadcasting and on-line activities.

1.2.3 Section 16(1) of the MCMCA provides that the power and functions of the MCMC shall include the following:

To advise the Minister on all matters concerning the National Policy Objectives for communications and multimedia activities;

To implement and enforce the provisions of the communications and multimedia law;

To regulate all matters relating to communications and multimedia activities not provided for in the communications and multimedia law;

To consider and recommend reforms to the communications and multimedia law;

To supervise and monitor communications and multimedia activities;

To encourage and promote the development of the communications and multimedia industry;

To encourage and promote self-regulation in the communications and multimedia industry;

To promote and maintain the integrity of all persons licensed or otherwise authorised under the communications and multimedia industry;

To render assistance in any form to, and to promote cooperation and coordination amongst, persons engaged in communications and multimedia activities; and

To carry out any function under any written law as may be prescribed by the Minister by notification published in the Gazette.

1.3 Promoting Effective competition

1.3.1 From the NPOs, as stipulated in CMA, a key function of the MCMC is to promote effective competition in the communications and multimedia industry. Specifically, the MCMC has taken various initiatives in particular to promote effective competition – licensing, spectrum, numbering, access and competition regulation.

1.3.2 Specifically, promoting effective competition is consistent with the following NPO:

i. To regulate for the long-term benefits of the end user;

ii. To promote a high level of consumer confidence in service delivery from the industry;

iii. To ensure an equitable provision of affordable services over ubiquitous national infrastructure; and

iv. To create a robust applications environment for end users

1.3.3 Further, promoting effective competition can be perceived as the MCMC carrying out the following functions:

i. To implement and enforce the provisions of the communications and multimedia law;

ii. To encourage and promote the development of the communications and multimedia industry; and

iii. To encourage and promote self-regulation in the communications and multimedia industry.

1.4 Importance and Benefits of Effective Competition

1.4.1 Given the strategic importance of the communications and multimedia industry to Malaysia, numerous initiatives have been introduced with the intent of promoting and enhancing effective competition.

1.4.2 While the provision of communications and multimedia services has its earnest beginning in a monopoly[1], more and more effective competition-driven initiatives were introduced as a means to deliver the objectives that a monopolistic environment has failed to bring forth.

Specifically, introducing effective competition will deliver new services and choice of service providers to the customers, hence encouraging growth of the industry. The approach is potentially a useful mechanism to stimulate development and growth of the industry. Promoting effective competition therefore is important as

[1] In the early days, it was widely accepted that communications network on a nationwide scale is a natural monopoly, a perception that appears to be less relevant in a fast-changing marketplace in light of technological advancements.

an approach to achieving the NPOs in the communications and multimedia industry.

1.4.3 It has to be noted however that introduction of effective competition must not be at the expense of infrastructure duplication, leading to inefficient allocation of resources and unnecessary wastage. It must also encourage and promote optimum utilisation of existing infrastructure. The optimum utilisation of existing network infrastructure for instance can lower market entry costs by allowing a new entrant to gain access to customers and offer broadband services without having to substantially invest in network facilities.

1.5 How can Effective Competition be introduced?

1.5.1 Under CMA[2], numerous initiatives have been taken to introduce effective competition in the communications and multimedia industry. Key initiatives that have been implemented (or planned) with the intent of promoting effective competition are:

i. Communications and Multimedia (Licensing) Regulations 2000[3] including the licensing of network facilities provider individual licensees (providing fixed wireless access (FWA) service);

ii. Guidelines on Dominant Position in a Communications Market and Substantial Lessening of Competition in a Communications Market[4];

iii. Announcement of the structure of the new Internet market and Internet based telephony (VoIP)[5];

iv. Ministerial Direction on Equal Access[6];

v. Ministerial Direction on General Licensing Policies[7];

vi. Commission Determination on Access List[8];

vii. IMT 2000 Spectrum Assignment to Telekom Malaysia Berhad (TMB) and UMTS (Malaysia) Sdn Bhd[9];

viii. Public Inquiry Report(s) on Access Pricing, Local Access Funding and Cost of Capital[10];

[2] Arguably, CMA which came into force on 1 April 1999, is itself a key policy and regulatory initiative on the Access Network
[3] Came into force on 1 April 2000
[4] Issued by the MCMC on 1 February 2000
[5] Issued by Ministry of Energy, Communications and Multimedia on 26 July 2000, followed by the (first) Issuance of Application Service Provider licence to provide IP Telephony on 20 December 2000
[6] Issued by Minister of Energy, Communications and Multimedia on 23 March 2001
[7] Issued by Minister of Energy, Communications and Multimedia on 23 March 2001
[8] Issued by the MCMC on 23 March 2001
[9] Issued by the MCMC on 30 July 2002
[10] Issued by the MCMC on 31 July 2002

ix. Ministerial Guidelines on Class Licenses for Network Facilities and Ministerial Guidelines on Class Licenses for Network Services[11]; and

x. Public Inquiry process on Mandatory Standard on Access[12].

1.5.2 Notwithstanding the ongoing initiatives, more effort must be initiated. It would appear that more policies that promote effective competition should be introduced and existing ones enhanced. As noted earlier, the introduction of effective competition policies is necessary to ensure that the benefits of effective competition will be continuous and pervasive.

1.5.3 The next issue that must be examined is where more effective competition should be introduced. At this juncture, it would appear (and hopefully well established in the succeeding Chapters), having considered the initiatives that have been implemented so far, the Access Network should be targeted for more effective competition-driven policies. This view is also in keeping with the international best practice.

1.5.4 When talking about effective competition in the Access Network, the opening up of access to network elements in order to provide advance application services must be a top priority.

1.5.5 Given that Access Network is prime target for effective competition, naturally the Access Regime will have to facilitate the implementation of such effective competition initiatives. Consistent with the approach taken thus far, key instruments under the Access Regime such as the Access List and the Access Code will facilitate the implementation of the initiatives.

1.5.6 The purpose of this PC therefore is to reflect the current thinking of the MCMC and present proposed set of actions on the way forward with respect to introducing effective competition (in the Access Network).

1.5.7 Equally, it seeks to ask the stakeholders and the general public as to whether more effective competition be introduced. This paper aims to obtain feedback regarding the need and timing for the introduction of effective competition in the Access Network via the implementation of access to network elements, methods and modalities of access and necessary change, if any, envisaged in the existing regulatory framework.

[11] Issued by Minister of Energy, Communications and Multimedia on 17 September 2002
[12] The PI process was initiated by the MCMC on 30 April 2003 and is slated to be concluded on 30 July 2003 with the issuance of a PI Report

1.6 Questions from Section 1

1. Has effective competition in the communications and multimedia industry reached the level anticipated by the NPOs?

2. Are existing competition initiatives sufficient and hence should the MCMC allow time for other effective competition policies to produce the results? If yes, how long?

3. Should the MCMC introduce more initiatives to promote effective competition?

4. What are the policies that can be introduced to promote effective competition in the communications and multimedia industry?

5. Where should the effective competition initiatives be targeted? Should it be targeted at the Access Network?

6. Do you think that promoting more effective competition may have an impact on investment in alternative infrastructure?

Section 2: Effective Competition in the Access Network

2.1 What is the Access Network?

2.1.1 The Access Network is defined as the subscriber network at the last mile connecting the customer to the local switch. Another definition given by ITU defines the Access Network as a system implemented between the local exchange (LE) and the customer.

2.1.2 As discussed earlier, the Access Network for fixed services is considered to be one of the most relevant Access Network that has the potential for providing multiple service offering utilising the existing network components (the local loop) in particular the provision of advanced application services (including high-speed Internet access).

2.1.3 As noted earlier, the Access Network for fixed services collectively connects (as at December 2002), 18.8% of the Malaysian population to the fixed service. By virtue of that connection, 10.5% of the Malaysian population to the (dial-up) Internet access service and almost 20,000 customers to the broadband services (DSL services). Therefore, there is a need to provide additional impetus to the communications and multimedia industry by way of making available broadband services by the introduction of effective competition in the Access Network.

2.2 Why the Access Network?

2.2.1 The Access Provider has traditionally built up his Access Network over a long period in a monopoly framework. After the liberalisation of communications and multimedia industry and allowing effective competition to be introduced in the Access Network, new entrants found it difficult to replicate the Access Network and compete with the incumbents.

2.2.2 The difficulties encountered included access to rights of way, the costs of network construction relative to the revenue growth and difficulty in convincing the customers to change access and/or service providers. Further, the new entrant is faced with the dilemma of infrastructure duplication and wastages or inefficient rollout and investment.

2.2.3 The facilities-based competition in the Access Network market has enough history to establish the fact that it is very difficult to for the new entrants to compete for the customers. The share of new entrants in even the developed markets such as US and Japan are 9% and 18.5% respectively.

2.2.4 The regulators across the world are taking steps for promoting effective competition in the Access Network by introducing service-based competition in the Access Network. It may initially appear to reduce the investment in new infrastructure by the new entrants but is countered by substantial growth in the competitive service offerings and the options available to the customers.

2.3 Why Effective Competition in the Access Network needs to be promoted?

2.3.1 As earlier noted, promoting effective competition in the communications and multimedia industry is necessary to achieve the NPOs.

2.3.2 This becomes more important in particular where the provision of communications and multimedia services is dependent on the Access Network. By introducing effective competition in the Access Network, it will deliver new services and choice of service providers to the customers, hence encouraging growth of the industry.

2.3.3 As a result, effective competition in the Access Network is a necessary pre-requisite to achieve a broader level of effective competition in the communications and multimedia industry.

2.3.4 In terms of benefits to the customers, the major benefits which can be offered to the customers from introducing effective competition is in the form of the provision of broadband services. Examples of application services which can be provided may include the following:

i. High-speed Internet access;

ii. Real-time multimedia file transfer;

iii. Remote access to corporate LAN;

iv. Interactive video;

v. Video conferencing;

vi. Video-on-demand; and

vii. Voice telephony.

2.3.5 As a result of effective competition, numerous provisions of services will be offered to the customers and they will get a choice of services as well as choice of service providers. The option includes the opportunity to change voice telephony service providers.

2.3.6 In summary, effective competition in the Access Network needs to be promoted for the following reasons:

vi. The Access Network is the most important link between the customer and the core network and application services;

vii. The Access Network is the most expensive part of the network and has impact on external environment;

viii. The Access Network offers multiple service providers and multiple services;

ix. Utilising existing Access Network avoids duplication of resources and promotes optimum utilization of the existing resources; and

x. Utilising existing Access Networks enables competitive service offerings (in terms of prices, quality of service and choice).

2.4 Overview of Demand for New Broadband Services: Customer Perspective

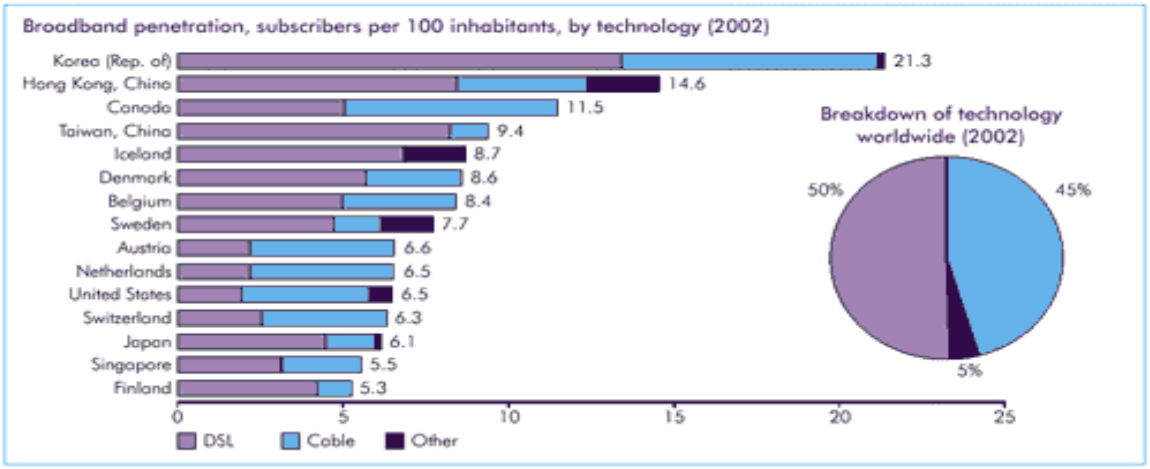
2.4.1 As at the end of 2002, the Access Network for fixed service collectively connects, 18.8% of the Malaysian population to the fixed service. By virtue of that connection, 10.5% of the Malaysian population has access to (dial-up) Internet access service and almost 20,000 customers to the broadband services (mostly DSL services).

Table 1: Customers in the Broadband Service Market According to Service Providers in Malaysia

Year	Customers				
	TMB	Time	Maxis	Others	Total
2001	n.a.	n.a.	n.a.	n.a.	n.a.
2002	18,418	536	322	20	19,302

Figure 1 – Broadband penetration rates around the world

Top 15 broadband economies, worldwide



Source: ITU, Policy and Strategy Trends, April-June 2003

2.4.2 In Table 1, while the number of customers to the broadband service in Malaysia appears to be negligible, the actual demand has yet to be tapped. Figure 1 illustrates significant deployment of broadband services around the world. At the start of 2003, there were 62 million broadband customers worldwide with the Republic of Korea having the biggest broadband penetration rate of 21.3%. In comparison, Malaysia has a broadband penetration of less than 0.1%.

2.4.3 Given that the current service offering in Malaysia is dominated by a small number of service providers, more effective competition at the retail level would drive up demand as service providers compete to offer more advanced services to the customer. Towards that end, the MCMC has introduced effective competition-driven initiatives to promote effective competition and more service offerings to the customer.

2.4.4 Regulatory frameworks that focuses on promoting effective competition in the Access Network are also currently underway in other countries. They also focus on high-speed services, and they note that traditional voice telephony services can also be offered on high-speed networks.

2.4.5 Indeed, broadband access technologies such as DSL technologies would make it possible to convey major spectral bandwidth on existing copper lines and, as a result, promote the development of new services, by providing high-speed services on the Access Provider’s network.

2.4.6 Indeed, the Access Seeker considers a key issue the capability to offer these services to the customers quickly, meeting evolving demands as soon as possible. If the current scenario continues, then the monopoly service providers will provide such services in short run, new entrants would be prevented from satisfying an essential, growing share of the customer demand, which could be a potentially persistent disadvantage.

2.4.7 If incumbents were to face no pressure from competitors, it might be tempted to ease up on efforts to innovate in developing these services or, at the very least, keep their costs high for the customers. It is also possible that some services useful for small groups of customers might never be developed.

2.4.8 Given the cost of deploying network facilities, it is probable that - in some market segments, at least - customers would have no choice in the short term but to use alternative technologies to gain access to high-speed services: mobile networks will probably continue to focus on providing low-speed cellular mobile services and then moving to 3G gradually with focus on high-end customers; satellite networks will face return path capacity limitation problems; cable networks will be able to meet demand only in their deployment zones; the radio local loop is not widely deployed on a commercial scale; alternative networks will be deployed first in high-density zones; and leased lines will continue to be used by the customers having a very large consumption of high-speed services and who are willing to pay the price.

2.4.9 Customer demand for high-speed services is difficult to predict, given the broad range of services available, the diversity of customer behaviour and the innovative nature of these technologies and services. Customers seem willing to pay for these services, although how much they will pay remains difficult to determine. This demand is, therefore, a major source of commercial uncertainty for the service providers.

2.4.10 Thus, for all service providers, for content providers and, for society as a whole, it seems desirable that customers' wants be quickly and better identified, in order

to avoid developing ill-suited services and equipment. To do this, the most important thing seems to be to avoid reining in demand for these services. Encouraging access to these services through broadband access technologies, as soon as they become the best-suited means to provide them in the short term, is one of the means to this end, and could help to expand the service market benefiting all participants and the economy as a whole.

2.4.11 Nevertheless, we need to examine in more detail the link between developing services and networks. As for high speeds, whose value for customers is linked to the provision of content services, the general opinion seems to be that services need to be developed, and, that technologies need to be adapted to meet expectations. By allowing demand to develop quickly, and by providing it with the fastest technology available in the short term, the risk of offering services and technologies poorly adapted to customers' needs will be minimised.

2.4.12 The advantage to this scenario is that in the long run, all technologies will benefit from the development of these services and from a better appreciation of demand. By allowing service providers access to incumbent’s network, in an as yet undetermined way, to provide them with access to high-speed services would reflect this direction which aims to encourage effective competition through high-speed services rather than networks, at least in the short term.

2.4.13 In the longer term, effective competition through services could generate effective competition through networks, once network-service integration proves advantageous for service providers. The risk that effective competition through networks would create more stable behaviour on the part of service providers with respect to their customers seems to be relative.

2.4.14 Service providers’ turnover would be limited in part by their commercial investments as well as those required to obtain access to the Access Provider’s network, and therefore, not only by network investments. Yet, implementation, and notably the contractual obligations of the parties, should encourage stable behaviour, since such behaviour is necessary to ensure a return on investment in highly specialised equipment.

2.4.15 In the long run, based on demand, service providers should be allowed to choose the technology best suited to providing high-speed services from among all the foreseeable possibilities. It is therefore important to ensure that service providers' choices are not affected by the measures applied, and that such measures do not prevent the development of alternative technologies which could prove to be more efficient than DSL technologies on copper cable networks.

2.5 Benefits of Effective Competition in the Access Network

2.5.1 The benefits of effective competition in the Access Network can be summarised as follows:

i. Introduction of various access technological platforms:

a. Public Switched Telephone Network (PSTN) / Integrated Services Digital Network (ISDN);

b. Fixed wireless access (FWA) network;

c. Cellular mobile network (GSM / CDMA / IMT 2000 etc);

d. Cable TV network;

e. Microwave network including multipoint distribution system such as LMDS / MMDS;

f. Wireless LAN (802.11x); and

g. Digital Power Line (DPL) network.

This encourages innovation in technology and is in line with the principles of technology neutrality under the CMA.

ii. Introduction of new application services:

a. High-speed Internet access;

b. Real-time multimedia file transfer;

c. Remote access to corporate LAN;

d. Interactive video;

e. Video conferencing;

f. Video-on-demand; and

g. Voice telephony.

These application services may be provisioned using the various technological platforms as laid out in (i).

iii. Multiplying customer choices:

Effective competition in the Access Network is a way of delivering choice to the customers, encouraging growth of the market and delivery of new services. It enables competitive service offerings.

iv. Reduced market entry cost:

Replaces a large up front capital investment cost with a rental cost, thereby greatly reducing the risk of market entry. The new entrant can make buy or build decisions based on available offers.

v. Optimising resources:

a. Allows the new entrant to benefit from the economies of scale enjoyed by the incumbent;

b. Provides a low cost and relatively quick means of obtaining access to all the customers serve in an area; and

c. reduce duplication and wasteful investment, leading to efficient investment.

2.6 How can Effective Competition be introduced in the Access Network?

2.6.1 As noted earlier, the licensing framework under CMA has been one of the major initiatives implemented to introduce and promote effective competition.

2.6.2 CMA promotes effective facilities-based competition in the Access Network by issuing NFP and NSP licences including the last mile broadband licences. As access in the last mile is based on technology neutrality principle, the service providers use various technological platforms in the Access Network.

2.6.3 The MCMC has also taken the initiatives to promote effective service-based competition in Access Network which includes the following:

i. Equal Access (EA);

ii. IP telephony; and

iii. Internet access service.

2.6.4 In other jurisdictions, one of the mechanisms to introduce effective competition in the Access Network is through local loop unbundling.

2.6.5 This paper aims to obtain comments from the stakeholders regarding the need and timing for the introduction of access to network elements, methods and modalities of access and necessary change, if any, envisaged in the existing regulatory framework. It may be noted that the above initiative by the MCMC is consistent with the provisions of CMA in promoting effective competition in the communications and multimedia industry.

2.7 Is Local Loop Unbundling a Relevant Concept under CMA?

2.7.1 A key initiative that is applied to promote broadband services and increasing customer choice in the Access Network is the concept of local loop unbundling (LLU)[13].

2.7.2 LLU is an example of service-based competition as it promotes effective competition based on service provision without necessarily investing substantially in network facilities. Depending on type, LLU can be considered the extreme end of service-based effective competition policy as it could potentially involve the transfer of "dial-tone" of the incumbent to a new entrant.

2.7.3 In terms of definition, LLU generally refers to the provision of network components on a stand-alone basis. It allows a service provider the opportunity to buy or lease network components of another service provider without the obligation to buy or lease other components.

2.7.4 The CMA has already provided for a licensing framework on an "unbundled" basis in the form of network facilities, network services and application services, therefore the concept of unbundling is inherent or a natural extension of the CMA's objective to "unbundle" the local loop or any other network element for that matter. In other words, the regulatory framework under the CMA offers wider options for introducing effective competition initiatives including effective competition in the Access Network. This can be initiated by expanding the scope of the Access List and the Access Code.

2.8 Does the Answer Lie in Opening Access to Network Elements (ANE)?

2.8.1 Facilitating ANE will enable delivering added choice to the customers, encouraging growth of the multimedia markets and delivery of new services. It has a potential to offer competitive and affordable prices to the customers, complement alternative access infrastructure and offers the prospects of facilitating greater effective competition in the access market. Malaysia needs to develop the greatest variety of feasible means of enhancing effective access competition - including copper cable, FWA and ANE.

2.8.2 ANE involves the process in which the Access Provider leases, wholly or in part, the local segment of their Access Network to the Access Seeker. ANE is a service which is provided at a point between the network termination on the customer premises and the line side of the Access Provider's LE. It provides the Access Seeker access to the Access Network from the connecting point to the customer's premises.

2.8.3 Network elements for the purpose of access could include wireless and wire line media. But wireless mode is already competitive e.g. mobile subscriber can avail the service of an alternate service provider by simply changing the (SIM) card.

2.8.4 Copper cables, being the most important link in the value chain and having significant effect on the environment, is the key network element for the purpose of access.

[13] For a more detailed explanation of local loop unbundling implementation, please refer to Annexure 2

2.8.5 However, the access to network elements should not be limited to copper cables as the CMA envisages wider and more flexible regime for access as compared to the practice of mandating LLU elsewhere in the world.

2.8.6 The provision of ANE for the Access Seeker will increase the level of effective competition and technological innovation in the Access Network, which will in turn stimulate the competitive provision of a full range of communication and multimedia services from simple voice telephony to broadband services to the customers. With the options available, the markets should grow and the economies of scale will ensure competitive prices for these broadband services accessible to a large part of the population.

2.8.7 ANE will enable the promotion of effective competition and dynamism in the offer of innovative services at the local access level, particularly concerning encouraging the use of e-commerce and information society services, including access to multimedia services and high-speed Internet access. Customers will consequently have more choice in terms of services, quality and prices.

2.8.8 In terms of implementation, ANE would require appropriate expansion and amendments in the Access List and the Access Code (or the Mandatory Standard). It has a potential to create a more competitive retail market, both in basic services as well as new broadband services. Incentives for the entry of facility-based competitors may be reduced but this may be balanced by efficient investment by new entrants in upgrading the incumbent network.

2.8.9 In the absence of ANE, limited facility-based competition will emerge and that the Access Provider' control of the Access Network may lead to a continuing concentration in broadband services provision. As a result, more extensive regulations at the level of individual services might be required.

2.8.10 While many arguments have been made that ANE discourages infrastructure development, in reality, ANE is complementary to, rather than a substitute for, infrastructure investment.

2.8.11 The introduction of ANE will also ensure compliance to WTO commitments and in conformity with international best practise.

i. Paragraph 2.2 of WTO's Telecommunications Reference Paper on Interconnection Arrangements has specified that "Interconnection to be ensured "in a timely fashion, on terms, conditions (including technical standards and specifications) and cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided (emphasis added).

2.8.12 The key benefits with the introduction of ANE are as follows:

i. It is also potentially attractive to the Access Seeker as compared to investing in their own Access Network because it replaces a large up front capital investment cost with a rental cost. This greatly reduces the risk of market entry, enabling the Access Seeker to have direct access to the customers;

ii. It presents the opportunity to the Access Provider to expand its service offerings to a new market segment (i.e. offering wholesale services) thus creating additional revenue stream;

iv. It allows the Access Seeker to benefit from the economies of scale enjoyed by the Access Provider;

v. It provides the Access Seeker a low cost and relatively quick means of obtaining access to all the customers serve in an area, allowing optimal infrastructure investments to different types of customers, services or regions;

vi. It increases the section of addressable market segments by increasing the number of customers;

vii. The Access Seeker can focus on the service differentiation offering innovative customized services to the customers

2.8.13 In summary,

i. It stimulates service-based effective competition;

ii. It avoids the unnecessary duplication of the Access Network;

iii. It is a major step towards achieving effective competition; and

iv. It achieves less environmental disruption.

2.8.13 Hence, the most varied services may be provided, from fixed services to high-speed Internet access, including access to multimedia services, at different transmission speeds, supported by different technologies.

2.9 Can ANE Happen on its Own Under CMA?

2.9.1 Notwithstanding the fact that CMA provides for a licensing framework on an "unbundled" basis in the form of network facilities, network services and application services, the "unbundling" of network elements may not necessarily occur without any regulatory intervention.

2.9.2 The strength of the licensing framework can be leveraged if the service providers organise themselves as separate operating firms (for e.g. according to the licences such as NFP Berhad, NSP Berhad, ASP Berhad and CASP Berhad). This will open up the complete supply value chain for the service providers realising the full potential of the existing licensing framework.

2.9.3 However, in practice, service providers have not separated themselves according to the operating licences and appear to retain their vertically integrated structure. Hence, the possibility of ANE to happen on its own appears remote.

2.9.4 Given the scenario, regulatory intervention is necessary to give effect to provide access to network elements (such as to copper cables).

2.10 Can Implementing a Moratorium on ANE work?

2.10.1 Naturally, incumbents use the argument that ANE (or any service-based effective competition initiatives) will discourage the rollout of (new) networks and usually argues against ANE.

2.10.2 As a result, regulators may generally consider a moratorium on ANE in return for the service providers' undertaking for e.g. to achieve a certain target with respect to broadband rollout.

2.10.3 This view is admittedly an alternative to the approach taken elsewhere (e.g. in Australia) where the incumbent is prevented from rolling out its own broadband services until it has "unbundled" its local loop in order to maintain a level playing field.

2.10.4 However, there is a risk in case the moratorium doesn't produce the results.

2.11 Timing for Introduction of ANE

2.11.1 One of the objectives of this PC paper is to gauge the preparedness of the communications and multimedia industry in Malaysia to implement ANE by seeking the views of the public on related issues.

2.11.2 The timing of implementing access to network elements should be dependant on the key issues that must be considered.

i. Market Conditions

Whether it is timely and complimentary to introduce the service-based effective competition policy in the form of access to network elements given the market conditions.

The opening up of the last mile market through the licensing of new NFP individual licensees promotes facilities-based effective competition in the Access Network with the intention of encouraging broadband rollout.

ii. Effective competition in the market

The number of service providers and its mode of selection to allow them to access the network elements (copper / fiber) due to infrastructure limitation such as space and ancillary facilities constraints on the Access Provider's network.

Questions from Section 2

1. Has existing competition in the Access Network reached the level anticipated by the NPO? What are the policies that can be introduced to promote more effective competition in the Access Network? What are the obstacles in development of effective competition in the Access Network?

2. Are existing policies and measures sufficient and hence should the MCMC allow time for other competition policies in the Access Network to produce the results? If yes, how long? Should the MCMC initiate ANE? Is the timing to introduce effective competition in the Access Network by allowing ANE appropriate? Please substantiate your arguments by reasoning.

3. Do you consider ANE to be an appropriate access mechanism for the communications and multimedia industry?

4. Should the MCMC apply a moratorium on ANE to encourage infrastructure investment and rollout of broadband services? If yes, what should be the duration of the moratorium?

5. Do you agree that ANE may at this moment be an appropriate alternative to encourage effective competition in Access Network and to promote innovation? Explain your reasons paying special attention to the alternatives currently available and to the options expected in the short term, as well as to the nature of the services which may be available to the customers.

6. Do you agree with the definition of ANE given in this chapter? In your opinion what could be the alternative definition?

7. What are the expected consequences for development of effective competition in the Access Network using ANE approach (creating new services, forcing incumbents to lower rates, appearance of new, more efficient service providers, impact on existing, competing service providers)?

8. Is it justified to focus on development of high-speed services? What are the implications for Malaysian society and its economy?

9. Do you think the demand for broadband services will be sufficient for encouraging the development of local content and innovative services?

10. How soon would the service providers wish to start competitive and affordable services based on the existing networks or by implementing ANE?

Section 3: Topology of ANE

3.1 Types of ANE

3.1.1 Different countries have followed different approaches in terms of the extent of ANE deployment, but by and large there are 4 broad types under which ANE can be categorised:

i. Full Access (to network elements);

ii. Line Sharing;

iii. Bitstreaming; and

iv. Access to Sub Loop

3.1.2 Generally, the type of access required by the Access Seeker will be a function of the services being offered and will be influenced by technical issues such as, size of Main Distribution Frame (MDF), availability of co-location space, inter working with the Operational Support System (OSS) etc.

3.1.3 Most combinations of the types, method and location of access are practicable. However, not all combinations are appropriate for all the services for which ANE might be used.

3.2 Full Access

3.2.1 Full access means leasing of the copper cables connecting a subscriber to the MDF by the Access Provider to the Access Seeker. In other words, the link between the MDF and the local switching equipment on the provider's premises is re-configured to become a link to the Access Seeker's switch, and the Access Seeker takes over the operation of the Access Network.

3.2.2 Full control of the Access Network will allow the Access Seeker to offer a full range of services, from simple voice telephony to advanced broadband services, using configurations suitable to serve its customer needs. Technical spectrum compatibility requirements, absolute power levels and impedance matching must be respected to avoid interference with the services run by others, including the provider.

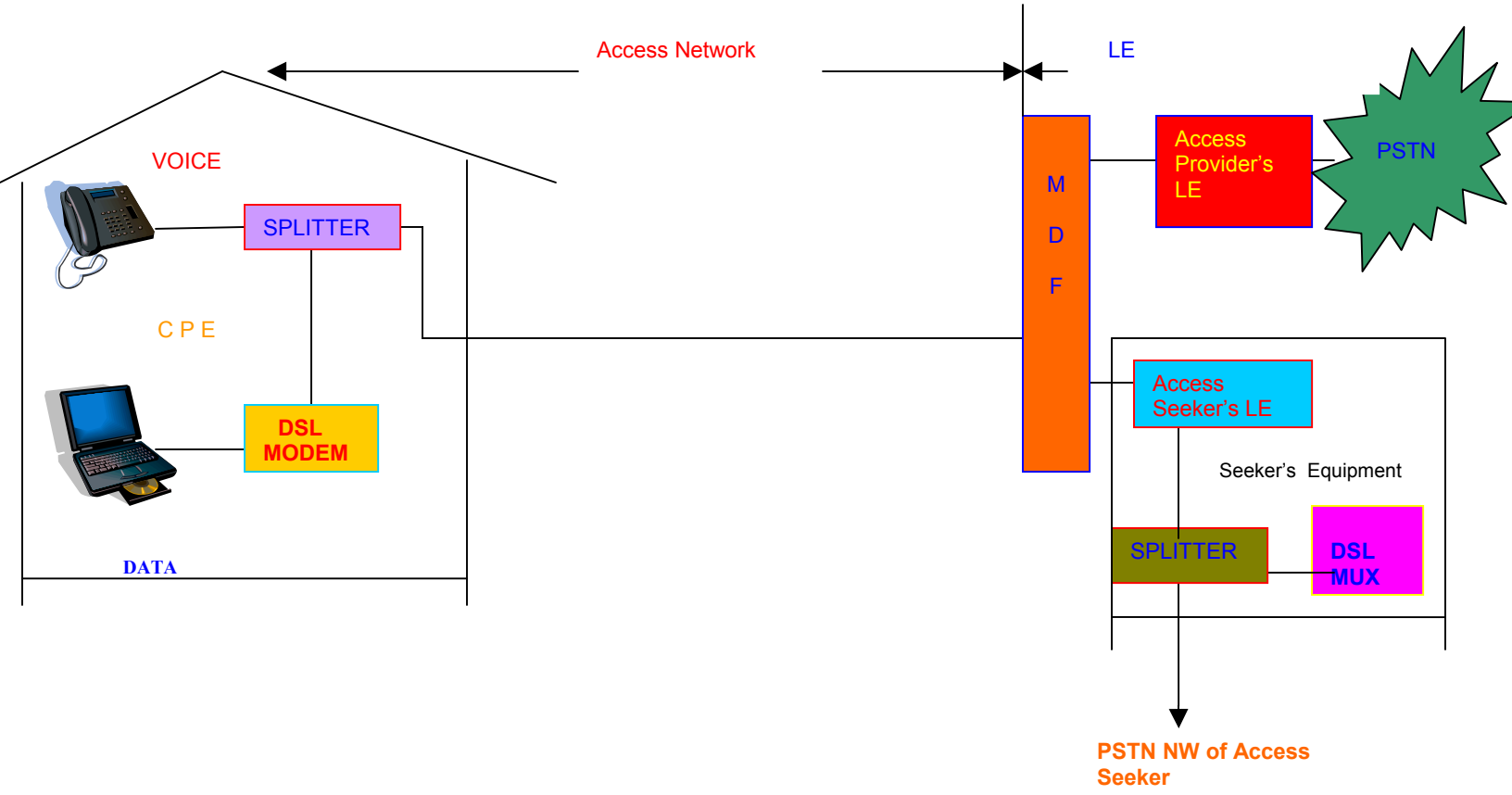


Figure 2.1: Full Access

3.3 Line Sharing

3.3.1 Line sharing allows the Access Provider to maintain control of the copper cable and continue providing some services while allowing an Access Seeker to lease part of the copper cable spectrum and provide services to the same subscriber. In this way, the Access Seeker uses the Access Network to provide high-speed data service to a customer using any type of broadband services (such as DSL services) using its modems.

3.3.2 The customer retains the initial service provider as provider of low frequency services i.e. the voice telephone services. In this way the customer obviates the need for having two telephone lines as two services are available from two different service providers on the same copper lines.

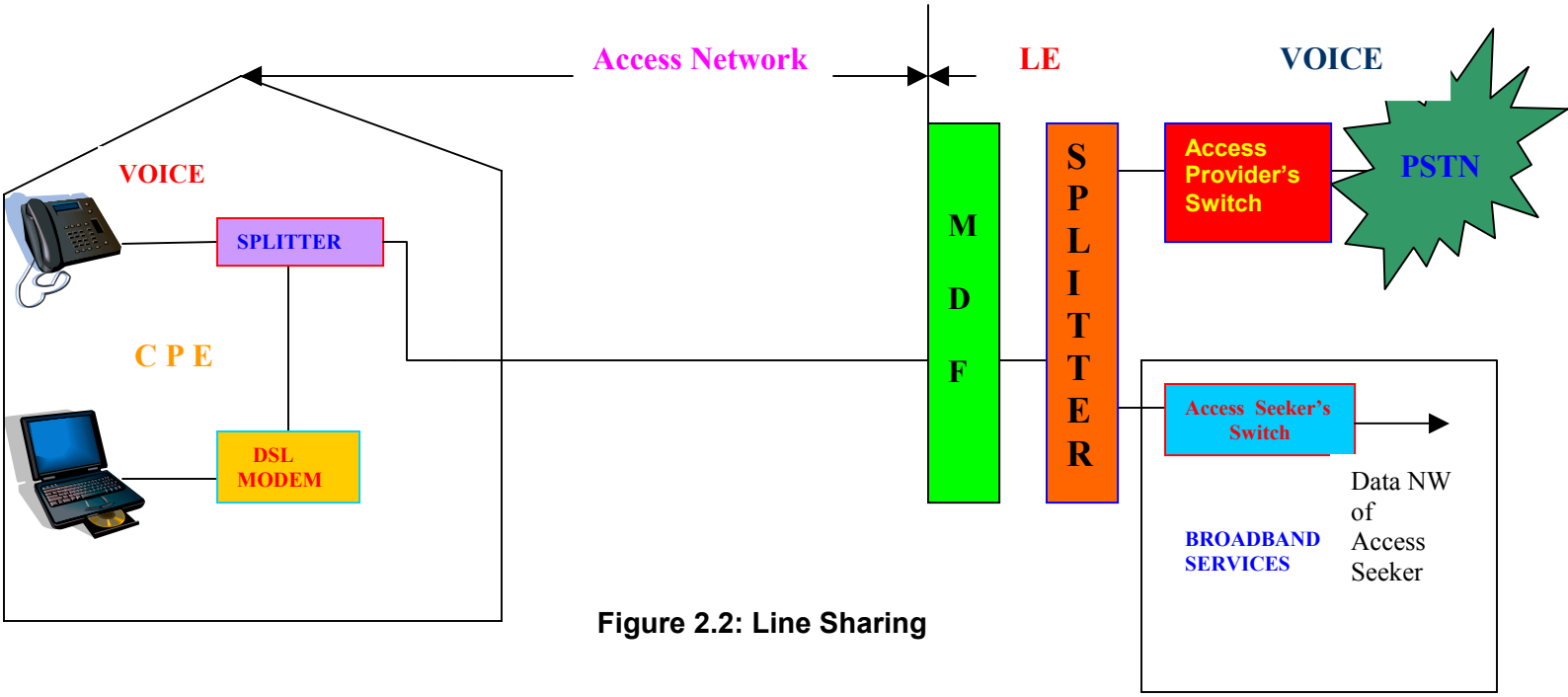


Figure 2.2: Line Sharing

3.3.3 Implementation of line sharing requires close co-ordination between the Access Provider and the Access Seeker particularly in respect to the technical aspects and interfaces. For example the implementation of ADSL with telephony and with ISDN uses different frequency spectrum allocation so that different equipment may be necessary for the splitter and ADSL. In addition, line sharing may also create cross talk when the high-speed data circuits run along the telephone line.

3.4 Bitstream Access

3.4.1 In this type of access, the bitstream offered is predefined and the Access Seeker can only use this bitstream. The Access Provider has full control over the line and allocates bitstream to the Access Seeker. The technology and the equipments required to offer broadband services are all provided by the Access Provider and the Access Seeker does not have any control over the hardware. It can only offer services within the allocated bitstream.

3.4.2 It is evident from this fact that bitstream access reduces the level of effective competition compared to the full access and line sharing as there is no effective competition at the physical layer and there is no incentive for the Access Provider to deploy new technology. However, for the Access Seeker, a low-level service based effective competition can be expected due to the fact that they can only obtain access to the system that the Access Provider chooses to implement.

3.4.3 Bitstream access can be suited for Internet Service Providers (ISP). While bitstream access has been considered as a form of ANE, some countries do not view it as falling within the ambit of ANE.

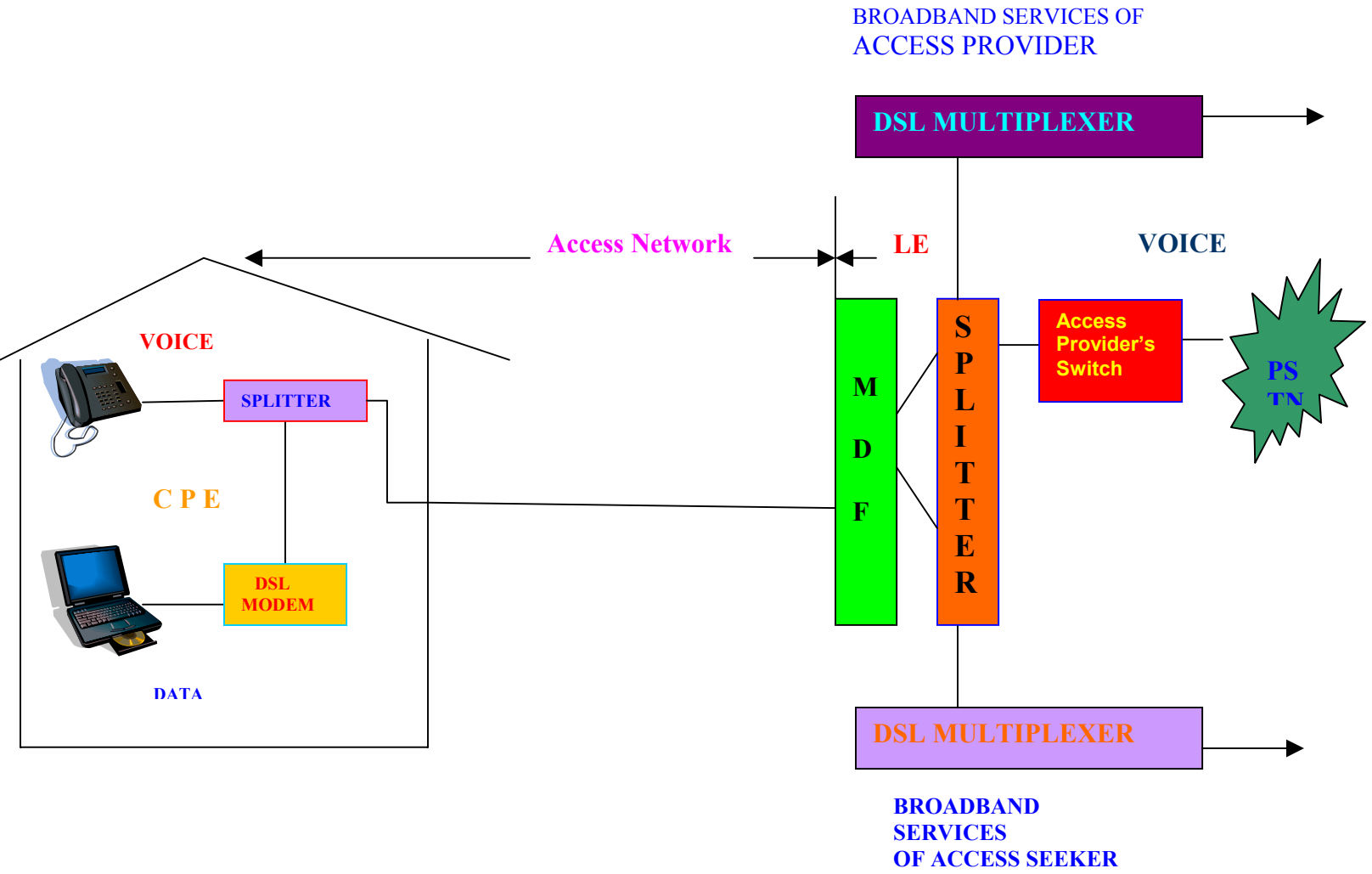


Figure 2.3: Bitstream Access

3.5 Access to Sub Loop

3.5.1 Access to sub loop provides access to the Access Provider's network in between the MDF and the customer premises equipment (CPE). This form of ANE can be useful when there is a possibility of supply of very high bandwidth services which can be transmitted over a limited distance on the copper cable.

3.5.2 Access to sub loop means providing the Access Seeker with access to a partial Access Network connecting the Network Termination Point (NTP) at the customer's premises to a concentration point or a specified intermediate access point in the Access Network. This arrangement is used to distribute very high bandwidth services, which can only be sent a short distance on the copper cable (e.g. using technologies such as Very high Data rate DSL or VDSL).

3.5.3 A sub loop circuit consists of a circuit offering a two-wire point-to-point metallic transmission path between a served customer premises and a joint enclosure connected to a Sub Loop Connection Point (SLCP) within the Access Provider's network. From the relevant SLCP, the Access Provider will be provided a sub loop access tie cable to a joint enclosure. This enclosure provides a controlled interface between the networks of the Access Provider and the Access Seeker. Its role is similar to that of Handover Distribution Frame (HDF) in case of full sharing.

3.5.4 Access to sub loop is a complex process and there is insufficient experience in this area as several countries apply this option. The US has introduced it in 1999 but it was withdrawn in 2003. The EU Regulations require NRAs (National Regulatory Authorities) to implement it. But most OECD countries have yet to implement this option.

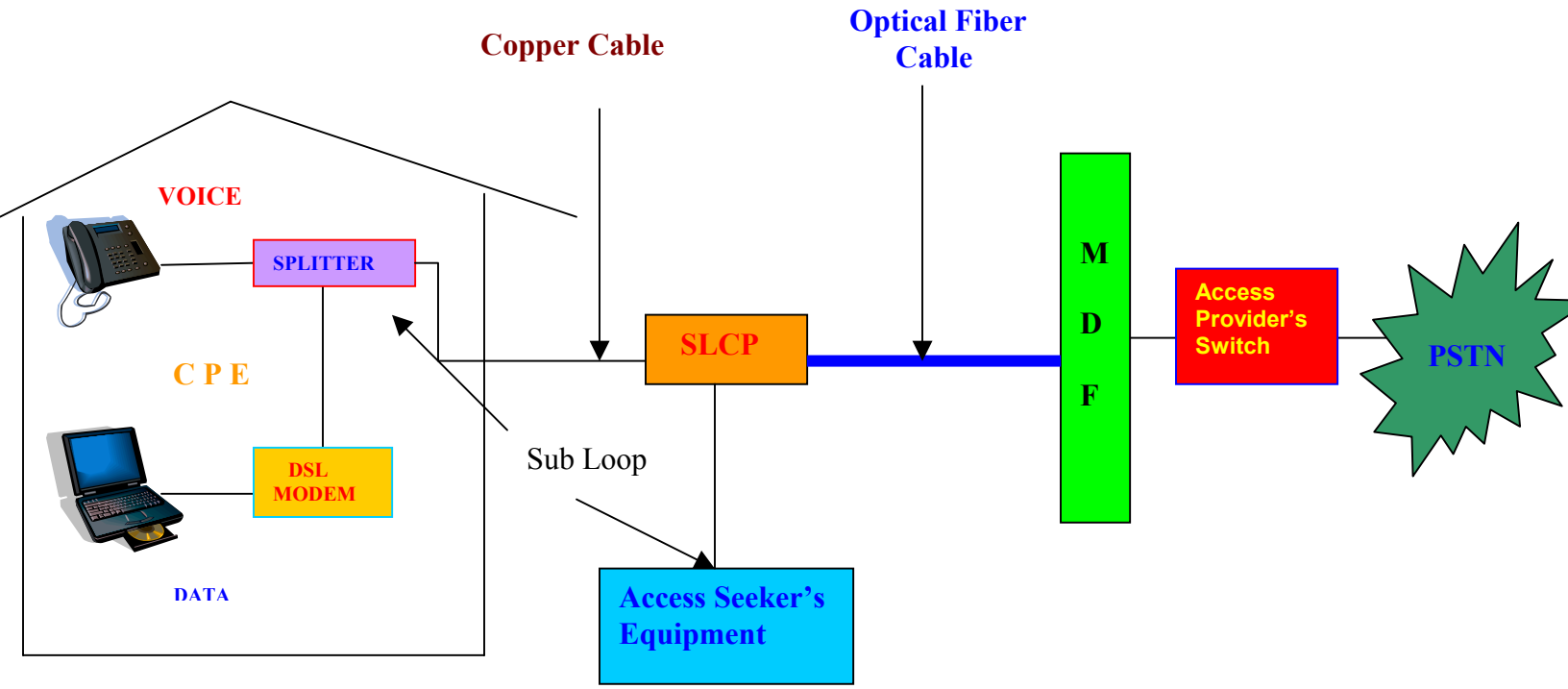


Figure 2.4: Access to Sub Loop

3.6 Technical Issues

3.6.1 There are no major technical problems with the provision of PSTN and ISDN services through ANE, but some important technical issues for higher bit rate services are there. These are the key issues which need to be resolved before provisioning of ANE is used for the benefit of the customers.

3.6.2 These are as follows:

i. Local Access Network requires active management to maintain compatibility. Careful management in respect of the type of equipment and allocation of sufficient spectrum to the Access Seeker will enable more copper cable to use DSL services.

ii. Introduction of higher bit rate services will require change at CPE as well as the LE side.

iii. There will be a limitation in terms of capacity and reach. That means the services cannot be offered indiscriminately to the customers as some of them would be out of reach and also once the capacity limit is reached more customers cannot be accommodated.

3.6.3 From above options it is evident that the customers would have three different service options: customers could choose the new service provider for high-speed services and the existing operator for telephony services, or choose the new service provider for all services (telephony and high-speed), or choose the new service provider for telephony services and existing for high-speed services.

3.6.4 In all three cases, access to high-speed services would be permanent. However, separating telephony and data flows between the two service providers could cause conflict, with each party wanting control over the separating filter, since it is the key to service quality.

3.7 Types of Application Service Offered by ANE

3.7.1 Allowing ANE can offer the following application services:

i. PSTN;

ii. ISDN; and

iii. Broadband services (DSL services)

3.7.2 The Access Seeker can offer competitive PSTN services to the customers on a commercial basis which will further promote effective competition in the fixed services market. In addition, the services which are of greater interests include broadband DSL services due to the fact that it can offer high-speed multimedia services including Internet access, VoD, real time multimedia file transfers, e-commerce and other entertainment services.

3.7.3 Although the download speeds and the length of line over which these can operate are different for different type of DSL technology used. (Please refer to Annexure 1)

3.8 Questions from Section 3

1. Should all the forms of access (for ANE) be required? Please provide reasons for your arguments.

2. Should any of the methods not be implemented for technical, economic, regulatory or other reasons?

3. In your opinion, what management strategies could be employed for each of the above method of access?

4. Is there a need to establish a special working group to resolve the technological and operational issues for provisioning compatible services on each other's network?

5. Do you agree that the services above are those that are likely to be provided over the Access Network? If not, please give reasons.

6. Do respondents believe that other services could be provided over the Access Network? Please give reasons.

7. What is the order in which respondents consider that services would be brought to market? Please provide information and analysis to support your response.

8. What components of network should be included for the purpose of access?

Section 4: Method of Access

4.1 Access to the Access Provider's Network

4.1.1 As a result of the introduction of effective competition in the Access Network and also for the provision of services to the existing customers of the Access Provider, the Access Seeker needs to be provided an access to the copper cable owned by the former. This requires a set of arrangements between the Access Provider and the Access Seeker for the provision of space depending upon the availability in the LE premises. The networks and their interfaces need to be compatible both in respect of physical as well as signaling for interworking requirements.

4.1.2 In addition, ANE will result in the Access Seeker being able to connect equipment to copper cable directly. Operationally, it is essential that the line termination device of the Access Seeker is located as close as possible to the Access Provider's MDF, particularly in cases where DSL services are to be offered, because of the associated limitations on the length of the copper cable with such technologies. This requirement will result in the Access Seeker wishing to co-locate their equipment with, or as near as possible to, that of the Access Provider.

4.2 Co-location

4.2.1 Co-location has been one of the most contentious issues in different countries. The best solution in dealing with this issue appears to be the availability of more than one option in respect of co-location. France, UK and Luxembourg have provided all types of co-locations such as caged, co-mingling, remote co-location. The US provides all form of co-location except virtual co-location.

4.2.2 In order to reduce the start up cost, co-mingling is the better option. Co-mingling is the form of co-location in which the equipment of the Access Seeker is placed together with the Access Provider's own equipment. In the UK, OFTEL, the industry regulator requires the incumbent to provide for co-mingling unless there were objective reasons on the grounds of technical feasibility or network security. The Japanese regulator has also mandated co-mingling in the premises of the incumbent. Other countries permitting commingling are Australia, Belgium, Canada, Denmark, Ireland, Korea, Norway, Spain and Sweden.

4.2.3 In Australia, where the main new entrant decides the rollout of co-location space, the parties through a process of commercial negotiation, have so far resolved issues of co-location. Thus the regulator, ACCC has not had a role in regulating such factors as number, price or timing of co-location space provided. However, ACCC keeps informal records of co-location spaces for monitoring purposes. The record keeping rules requires the incumbent Telstra to provide information on provisioning, fault rectification time process etc. in order to ensure that Telstra is providing its competitors with prompt access to its local loops.

4.2.4 The time required for the provision of co-location space affects the implementation of ANE. Guidelines from the regulators for making the co-location space available can highly expedite the process.

4.2.5 Based on the requirement of accessing the loop of the Access Seeker and the arrangements for locating the equipments, the following are the methods of access:

i. Physical Co-location;

ii. Distant Co-location; and

iii. Virtual Co-location.

4.3 Physical Co-location

4.3.1 In this method, the Access Provider provides the space for housing the equipments of the Access Seeker in its own premises. The Access Provider is required to provide technical resources and the connections of technical equipment to the Access Seeker. The Access Seeker chooses, installs and operates the equipment needed. It therefore, requires access to the staff of the Access Seeker.

4.3.2 Physical co-location can be provided in two different ways. The most common is the caged co-location which establishes a physical separate space from the rest of the Access Provider's exchange by wire mesh or solid partition. Another type is co-mingling (or cageless co-location), in which the equipment of the Access Seeker is placed together with the Access Provider's own equipment.

4.3.3 For the co-location to be effective, the Access Seeker keeps their equipment in the exchange of the provider. Co-mingling is normally cheaper as compared to caged co-location but if the Access Provider insists on caged co-location, the provision of the space should be based on the principle which does not treat Access Seeker in a discriminatory way in terms of cost.

4.3.4 Several countries such as Canada, Japan and the UK are trying to persuade the Access Provider to provide co-mingling unless there are objective criteria against it relating to technical feasibility or the need to maintain network integrity. The co-location space is normally allocated on 'first come, first served' basis principle.

4.3.5 The space for co-location at the LE is usually determined by the Access Provider. However, the Access Seeker might require different LE to be conditioned for rolling out for co-location.

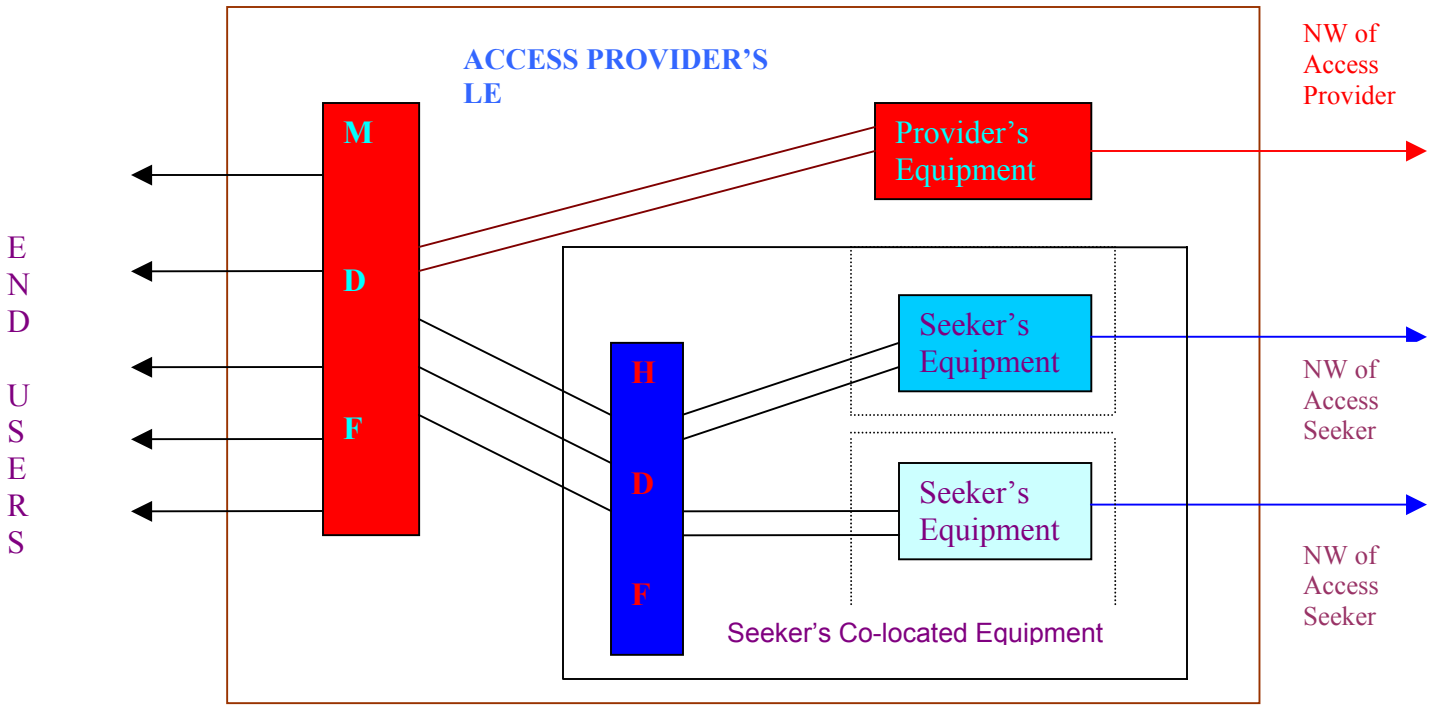


Figure 5: Physical Co-location

4.4 Distant Co-location

4.4.1 In some cases, it may not be possible for the Access Seeker to gain physical co-location space, and hence, an alternative site for equipment to be housed should be sought. This site should be as close as possible to the Access Provider's MDF fed by multiple pair cables. This is known distant co-location. The link between the co-location room and the Access Provider's premises can be bought from a leased line provider or can be part of the co-location contract.

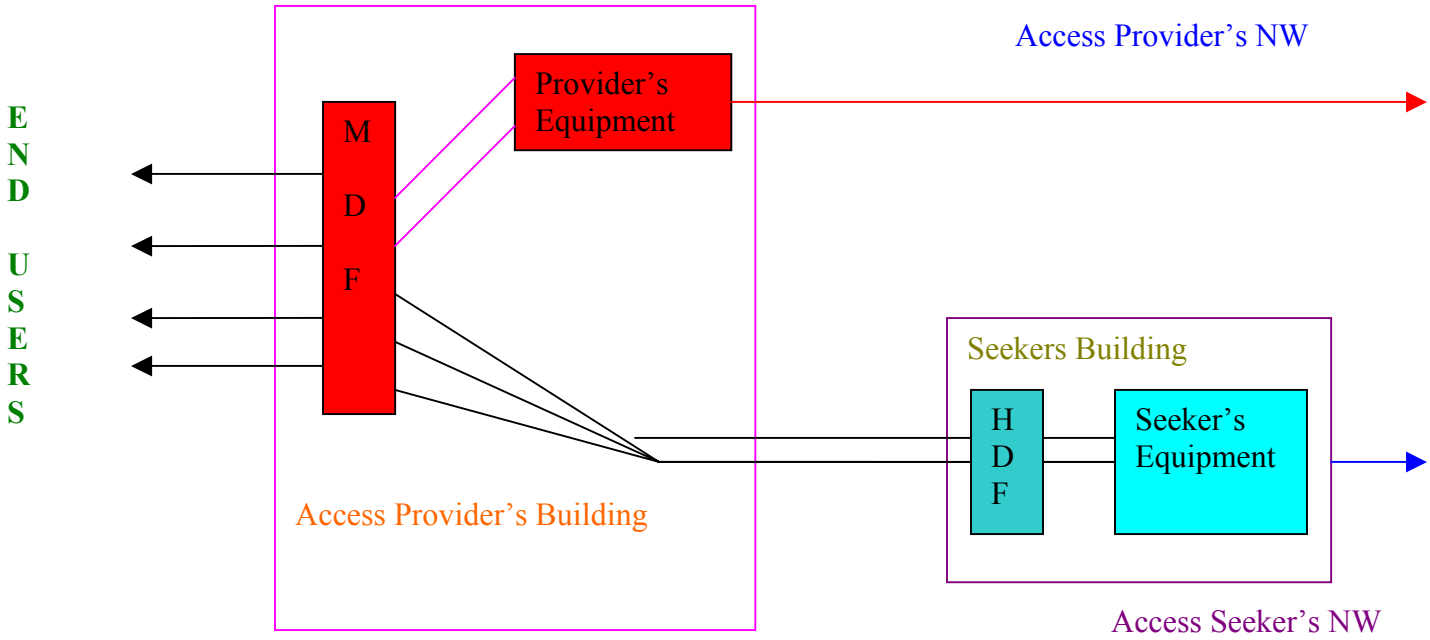


Figure 6: Distant Co-location

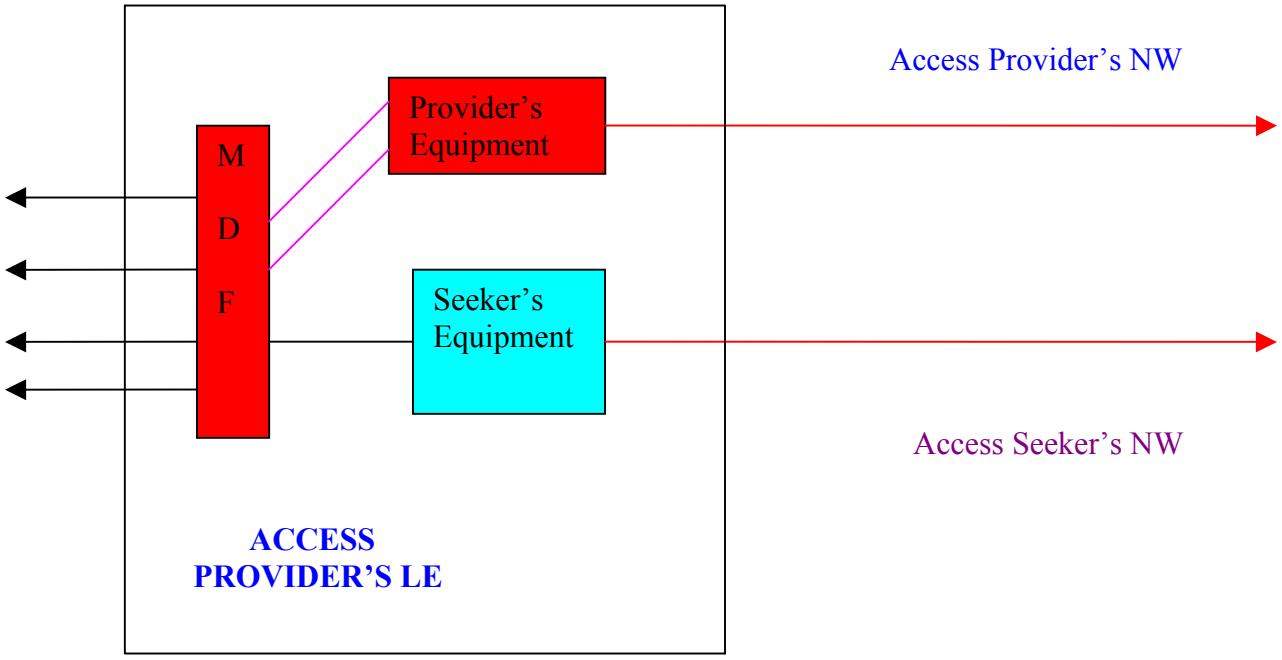
4.4.2 It is possible to have other variants of the above configuration. In one of the combinations, many seekers might share a single distant co-location site, or each Access Seeker has their own building near to the Access Provider's site. In distant co-location, the handover distribution frame (HDF) acts as a point of demarcation between the networks of the Access Seeker and the Access Provider.

4.4.3 In both physical and distant co-location, the HDF marks the point where the Access Provider's responsibility for the Access Network ends and the responsibility of the Access Seeker begins.

4.5 Virtual Co-location

4.5.1 In this case, the Access Seeker chooses and supplies the equipment but the installation and operation is carried out by the Access Provider. The Access Seeker must ensure that the staff of the Access Provider are adequately informed and trained to operate the equipment. In some cases the equipment is sold or leased to the Access Provider.

Figure 7: Virtual Co-location



4.6 Issues in Co-location

4.6.1 Co-location of equipment is not a new idea but some issues are general and others are specific to the ANE. The following issues need to be considered by both the parties during co-location negotiations:

i. facilities available;

ii. availability of suitable space;

iii. allocation rules;

iv. reservation of space;

v. timescale of provisioning;

vi. access to space;

vii. restrictions on use;

viii. security and privacy of the Access Provider; and

ix. security and privacy of the Access Seeker.

4.6.2 Co-location implies that the Access Seeker needs to install, operate and maintain its equipment on the premises of the Access Provider. This involves access by the staff to the sites that may not be staffed all the times. Access may include issuing new electronic passes and providing some segregation between these passes and normal employees' passes.

4.6.3 Co-location also requires access to the premises to the competitor. This raises issues of security because of the possibility that the equipment could be tempered with. There are also issues of privacy. For example, a service provider that is innovating may not wish other service providers to know what equipment or supplier it is using.

4.6.4 The Access Provider may wish to secure its equipment from the Access Seeker. This may be achieved by controlling access to different rooms or by adding a screen in the rooms that are shared.

4.6.5 The Access Seeker may also wish to secure their equipments. In the US, Germany and some other countries, the issue is resolved by protecting equipment in cages or separate rooms. While certainly granting security and privacy, such separation can be expensive and inefficient.

4.6.6 The process for provisioning of co-location space need to be documented in the Access Reference Document (ARD)[14], including agreed timescales for each stage of the process. Where these timescales are not met the party concerned should offer an explanation for delay and may be subject to pre-defined penalties and/or sanctions.

[14] Please refer to the Public Inquiry Paper on Draft Mandatory Standard on Access, 30 April 2003

4.7 Price of Co-location

4.7.1 The price of co-location service varies from country to country greatly so international comparison is quite difficult. The general perception is that the prices are high and it may not be encouraging for the Access Seeker to take the advantage of ANE.

4.7.2 However, it is also widely established fact that with the innovation in technology and demand escalation, the cost can come down substantially. For example, the co-location prices in Spain were about twelve times higher than the current prices.

4.7.3 Australia has the co-location prices based on the marker rate whereas Germany has different monthly charges for different LE. The Netherlands has a price structure which includes one-off costs for the construction of co-location spaces and recurring costs for power use and rent per square meter.

4.7.4 In the case of the UK, the quarterly charges for co-location space set by the incumbent will be dependent on the market prices for the location of the LE, the area occupied by the service provider, the equipment to be installed in the room etc.

4.8 Questions from Section 4

1. Should the Access Provider be required to offer all forms of access? If not which one should be require?

2. Which method of access would be preferred and why?

3. How appropriate are the different types of co-location? What are their advantages and disadvantages? In particular, what impact would each of them have on the QoS?

4. In the event of insufficient space for physical co-location in the Access Provider's building, what are the alternatives?

5. Which conditions may be necessary to assure in order to guarantee the security and to preserve the integrity of the network in the event of physical co-location?

6. Do you consider distant and virtual co-location to be viable alternatives to physical co-location? Under what circumstances?

7. What should be the characteristic of co-location offer in terms of maintenance?

8. What technical and operational information do service providers need for the above options? Which information is absolutely necessary?

9. Should the Access Provider be required to provide leased lines or other links from the premises where the copper cable ends, and to backhaul bitstream services in some form through the network to a central location?

Section 5: Quality of Service (QoS)

5.1 Issues in QoS

5.1.1 Any truly feasible solution to effective competition in the Access Network must allow the Access Seeker to offer their customers guarantees of service and quality. Indeed, guarantees are indispensable, whether for services provided and their availability at subscription, contracts or, more generally, the quality of service offered.

5.1.2 QoS focuses on two main problems:

i. How can the quality of the Access Network (local loop) be defined and guaranteed?

ii. What type of relationship between service providers, especially for contracts or in exchanging information, would make it possible to guarantee good service quality?

5.1.3 The experience in some countries has shown that line quality and the risk of interference were key parameters in delivery of broadband services using DSL technologies. However, the question of line quality is less important if the pair is used for low-speed services.

5.1.4 Indeed, unlike narrowband technologies, broadband technologies impose major restrictions on usable pairs (length, diameter, etc.) because of how signals are propagated. Moreover, the introduction of high speeds causes interference between pairs. Thus, prior to using DSL technologies, lines must be checked to determine whether they can be used, and if they can, under what conditions.

5.1.5 This procedure, called "line qualification", requires that the intrinsic characteristics of lines be suited to their planned use, that they do not cause cross-talk or receive it from lines supplying other services using DSL technologies or supporting more traditional services, such as ISDN.

5.1.6 Another question is how long such qualification would be valid, since the results of these tests can change over time, depending on whether other equipment is added to the network and, in particular, the load on the cables used for conveyance and distribution via DSL technologies.

5.1.7 Interference problems are more complex as different kinds of equipment used by several service providers need to co-exist on shared resources. The Access Provider and the Access Seeker need to use compatible technology / interfaces, in order to avoid interference and related issues. Spectrum management and using standard interoperable interfaces and equipments should be encouraged by the service providers.

5.1.8 The Access Seeker would be dependent on the Access Provider for a major part of the provision of service to customers. The area of service that is most important is the fault repair. There could be a risk of discrimination in that the

Access Provider may correct problems on the Access Network used by itself more quickly than on the parts used by the Access Seeker.

5.1.9 Quality issues would therefore need to be included in service level agreements (SLA) between the Access Seeker and the Access Provider, and the time limits for repairs, performance statistics and rebate clause has to be included in SLA for the service quality rendered below what is specified in the SLA.

5.1.9 Loop testing is another area on which the Access Seeker and the Access Provider must co-ordinate as there are equipments and solutions are available to sufficiently and accurately locate the cause of the fault on either side of the connection point. The service providers need to work out detailed procedures in this regard.

5.1.10 To ensure equitable competitive conditions, the Access Provider would also have to meet the demands of the Access Seeker under the same conditions as it meets its own, whether in managing priorities, lead-times, interfaces or quality.

5.1.11 Another sensitive point would be the time required to change over existing lines from the Access Provider to the Access Seeker, and vice versa. Downtimes will have to be as short as possible.

5.1.12 Finally, operational information exchange procedures between the service providers seem to be at the heart of effectively implementing these solutions. It seems necessary to set up procedures aimed at ensuring optimum effectiveness to reduce time lags.

5.1.13 It has to be noted that these details need to be worked out by the Malaysian Access Forum Berhad (MAFB) as the Access Forum and an Access Code would be a comprehensive instrument addressing all the above issues in details.

5.2 Questions from Section 5

1. How can the quality of ANE be defined and guaranteed?

2. What QoS parameters and indicators do you consider relevant to define in the scope of ANE?

3. What levels of QoS would the new service provider need?

4. What type of relationship between the Access Provider and the Access Seeker, especially for contracts or in exchanging information, would make it possible to guarantee good QoS?

5. Can the issues of QoS and maintenance be dealt in the SLA? Are there other preferred ways of dealing with this issue? Should the MAFB undertake the development of a model SLA? Please provide details.

Section 6: Technical Implications of ANE

6.1 Framework to Resolve Technical and Operational Issues

6.1.1 The framework to establish a process for resolving technical and operational issues related to implementation of ANE should have clearly defined principles.

6.1.2 Fault management including repairs and maintenance is a critical requirement for rendering trouble-free delivery of service. The joint efforts by the Access Provider and the Access Seeker are required to develop detailed guidelines to address the issue.

6.1.3 The basic and uncontroversial principle applied in most countries is that the Access Provider should not treat Access Seeker less favorably that it treats its own retaining operation when supplying the equivalent services.

6.1.4 In Australia, for instance, the standard access obligation (SAO), requires an Access Provider to take all reasonable steps to ensure that rectification in relation to the regulated service, the fault detection handling and rectification in relation to the regulated service, and timing offered to an Access Seeker are equivalent to those which the Access Provider provides to itself.

6.2 Development of Technical Specifications

6.2.1 The development of technical specifications to implement ANE is very complex. Since ANE requires a number of operations, it inevitably has some technical limitations, which might slow the speed of implementation.

6.2.2 For example, a technical problem could arise when the Access Provider extends fibre beyond the LE to customers' premises. In this case, the exchange area is usually converted to a digital carrier transmission standard and the copper cable will terminate at the point between the LE and customers' premises instead of on the MDF.

6.2.3 The interface point between fibre–in-the-loop systems might expand if the Access Provider might rollout more digital loop carrier (DLC) systems to support their own broadband services. Since the DSL modem must electronically match the digital interface at the remote terminal, the Access Provider may have difficulties to provide their own broadband services if the Access Provider seeks to limit the equipment that can be placed at the terminal.

6.2.4 Since DSL technologies are influenced by the length of the copper loop from the premises of the customers to the LE, it is difficult to implement ANE in rural / remote areas.

6.2.5 The Access Provider might place an upper limit on the number of local loops that it can technically provision for the purpose of ANE in each LE area per day in the process of disconnecting and reconnecting the lines.

6.2.6 The ANE provides an option to the customers for changing the service provider, it becomes all the more important for both the Access Provider and the Access

Seeker to deploy technical loop testing facility so that the faults of the customers from either side could be trouble-shot in a coordinated and cost effective manner.

6.2.7 A person's residential and a business phone number gives that person identity and provides a way for the person's friends and family to stay in touch. Number portability makes it possible implementing this requirement through call forwarding. But the call forwarding requires a call to be processed twice and thereby loading the switches. In order to avoid this, the service providers need to install local number routing, through a central database so that each call is processed once.

6.2.8 However, it is important to note that these problems are not fundamental enough for the Access Seeker to be sources of failure in switching lines for ANE. Problems arising in practical implementation may be resolved by negotiating appropriate contracts.

6.2.9 In the event of ANE, there will be a change in responsibility in respect of certain parts of the network elements from the MDF to the CPE. In this case the Access Seeker and the provider need to identify the network components or activities for which the Access Provider and the Access Seeker will each be responsible. The technical and operational issues relating to each part of the network element need to be identified and clear responsibility need to be assigned to each party.

6.2.10 In addition there has to be consideration with respect to the interference limits between many possible technologies that may appear on the loop. Rules for spectrum compatibility need to be established.

6.2.11 In view of the complexities of technical and operational issues, it is desirable that an industry body take up all the relevant issues which can be formulated as an Access Code by MAFB (as the Access Forum). This will provide a comprehensive set of codes / guidelines while different service providers trying to interconnect each other's networks.

6.3 Questions from Section 6

1. Which eventual impairments must be taken into account with regard to compatibility of equipment and its electromagnetic characteristics?

2. How can risk of interference with other existing services and between different technologies be taken into account? Are there solutions other than test specific to each ANE request?

3. What types of test may be needed to analyse the technical feasibility of the provision of a service on certain copper cable?

4. How can we take into account the fact that the number of lines offering ANE services in the same cable can affect the speed of these lines and the quality of service offered on adjacent pairs?

5. How efficiently the problems relating to operating and maintaining equipment from different service providers on shared resources be dealt with? Does the Access Provider need to define the type of equipment which can be used, notably for DSL technologies?

6. Should restrictions for spectrum mask be placed to safeguard compatibility?

7. Should MAFB undertake the development of technical specifications dealing with operations and maintenance issues?

Section 7: Implementing ANE

7.1 Requirement on the Access Provider and the Access Seeker

7.1.1 In order to implement ANE, the Access Seeker and the Access Provider are required to take several steps:

i. The Access Seeker must provide forecasts to the Access Provider regarding the LE areas in which they wish to provide services using ANE, their estimates of initial and future co-location space, as well as the number of lines during the forecast period.

This in itself can be problematic since forecasts will often tend to be optimistic which may result in incumbents committing excessive resources. At the same time, the Access Seeker might hesitate to provide detailed forecasts due to the possibility that it would disclose their commercially sensitive information.

Nevertheless, it is important for the Access Seeker to provide appropriate forecasts in view of the fact that a number of Access Provider's sites are unlikely to accommodate all the seekers' requests at a given time through co-location.

It should be noted that the obligation to provide forecasts must be counterbalanced by the Access Provider's obligation to make necessary resources available in time. In other words, care must be taken to distribute the share of planning risks equally to both sides. In certain circumstances, there might be a need for regulatory intervention to enforce the adoption of SLAs.

ii. In response to pre-ordering information by the Access Seeker, the Access Provider must inform the Access Seeker of their network information as well as line qualification information and individual customer information. Network information, such as the number of loops per LE area, enables the Access Seeker to plan their services using ANE.

It will also help to give the Access Seeker a choice as to whether they wish to request ANE at a particular MDF without formal inquiry process for co-location space and individual lines. Line qualification information, such as line types for particular services, will help the Access Seeker to make an assessment of the potential availability of their services before making commitments to customers.

The issue of making available individual customer information, such as billing name and address, can be contentious since the customer database of the Access Provider is often the only complete source of information.

The Access Provider is usually concerned that providing customer information to the Access Seeker will result in the latter contacting customers to persuade them to change service provider. The Access

Seeker tends to think that the customer is entitled to authorise its new service provider to have access to that information.

iii. Line qualification testing is required by the Access Provider to determine whether the Access Network, mostly at the switch, is qualified for provision of broadband services including DSL services. An issue is whether the Access Provider must test their loops on demand for each order from the Access Seeker.

On demand testing might slow the process of implementation of ANE, whereas comprehensive testing (pre-qualification) can be a burden to the Access Provider. However, it is expected that the development of DSL services will spur the improvement of efficiency in testing with the emergence of new testing technologies.

iv. The Access Seeker requests the Access Provider to install and disconnect services for their customers by sending the order form. Once the order is confirmed, the actual cutover process is to disconnect the loops from the Access Provider's network and reconnect it to the Access Seeker's network. This work should be undertaken by the Access Provider.

It is also often the case that the Access Provider refuses to undertake the cutover beyond business hours, which can have a negative impact on business customers.

v. The Access Seeker, after notification from the customers, is obliged to report faults resulting from ANE after its implementation to the Access Provider. A decision has to be made as to whether the faulty network element is the responsibility of the Access Seeker or the Access Provider.

Because of the number of different steps involved in ANE, it is important that there is *close co-operation between the Access Seeker and the Access Provider*. Because such co-operation is difficult to impose through regulation, self-regulatory frameworks, which encourage all market players to reach an agreement on the different technical and commercial aspects of ANE, are important. In some cases, the extent of conflicting interests on ANE is too great to be able to rely on a voluntary regulatory mechanism in the market.

In the event the industry is not able to arrive at an acceptable solution and has exhausted the options provided for by the Mandatory Standard on Access or the Access Code, the party to the dispute may invoke the relevant dispute resolution mechanism under the CMA to the MCMC.

7.2 Actual Implementation of ANE

7.2.1 ANE in principle comprises the following services on the part of the Access Provider:

i. Supply of preliminary information necessary for implementation of ANE;

ii. Complete access to the network elements including delivery and maintenance of the copper cable and service guarantees;

iii. Co-location to allow the Access Seeker to install their equipment on the Access Provider's premises; and

iv. Connection of co-located equipment to the networks of the Access Seeker.

7.2.2 Even though the Access Provider earn revenue from ANE and their costs of implementing ANE should be recovered from the Access Seeker they have little incentive to voluntarily implement ANE.

7.2.3 One of the difficult tasks of regulators is to find ways to motivate the Access Provider to implement ANE. Creating such an incentive is more difficult where the incumbent is already providing DSL services.

7.2.4 Because of this in some countries incumbents have been prohibited from providing DSL services until ANE was launched. For example, the Australian government ensured that the incumbent would not commercially launch its own ADSL offerings before providing LLU to competitors.

7.2.5 In Japan, the regulator required incumbents to implement LLU when they provided trial for DSL services so that competitors were able to provide such services in the same manner.

7.2.6 Another approach is to include so-called 'Sunset Clause' in LLU regulations, in which the period for regulations is time limited. Canada and Netherlands took this approach, although in the case of Canada the sunset clause was suspended. This policy is based on the idea that new entrants will need a certain period to deploy their own infrastructure and after that period Access Network would not be subject to unbundling as by that time there will be sufficient development of commercial local loop market.

7.2.7 In order to accelerate broadband access rapidly, it is possible to seek alternative solutions for not delaying the implementation of DSL services. For example, regulator could request the Access Provider to make a wholesale DSL offer before launching their own DSL retail offer. The provision of a wholesale derivative of the Access Provider's DSL offer was the solution actually adopted in the UK, France and Italy.

7.3 Questions from Section 7

1. Should there be any obligation on the part of the Access Seeker to provide forecasts to the Access Provider? If yes, what information and timeframes do you think necessary to include in the forecasts?

2. In response to pre-ordering information, should there be an obligation on the Access Provider to provide network- and customer-related information? If yes, what are the relevant information required for this information?

3. Should the MCMC include Sunset Clause while introducing the ANE? If yes what is the duration for which it should be invoked?

4. The cable pairs might need conditioning in some cases, who will bear the cost of such activities, Access Providers or Access Seekers or should it be shared between them?

5. For fault repair and maintenance purposes the Access Seekers will be required to access the OSS of the Access Providers. Who should pay for the cost?

6. Which eventual impairments must be taken into account with regard to compatibility of equipment and its electromagnetic characteristics? In the event that such impairments exist, what solutions do you propose to minimise them? What types of test may be needed to analyse the technical feasibility of the provision of a service on a certain copper cable?

Section 8: Costs and Benefits from ANE

8.1 Introduction

8.1.1 The MCMC has taken various initiatives to promote effective competition, which include licensing, spectrum, numbering, access and effective competition regulations. As noted earlier, ANE is potentially useful additional mechanism to stimulate growth and effective competition. Provisioning of ANE is a step forward in delivering choice to the customers, encouraging growth of the market and delivery of new competitive service offerings.

8.1.2 The main aim for providing the Access Seeker with ANE of the Access Provider is to encourage customer choices and to deal with the possibility that customer demands for higher bandwidth access remain unsatisfied because the incumbent has significant control over network upgrades, rollout of services or technological choices and hence the investments and service offerings remain sub-optimal. Therefore, the key objective to consider in introducing ANE in Malaysia is to help stimulate effective competition by reducing the costs of direct access to customers, thereby providing additional choice to customers.

8.1.3 Notwithstanding the objective, introduction of ANE in Malaysia in general and in the communications and multimedia industry in particular, will have benefits as well as associated cost implications. One of the most obvious costs is the regulatory cost for the introduction, monitoring and compliance of ANE. Therefore, a cost benefit analysis is carried out below in order to ascertain whether the introduction of ANE is in the overall interest of the customers, the communications and multimedia industry and Malaysia in the long run.

8.2 Implications of ANE

8.2.1 ANE has both benefits and costs. A move to ANE may lead to:

i. A new requirement to regulate ANE by establishing the appropriate regulatory framework;

ii. Increased effective competition in the provision of local access at the retail level;

iii. Additional effective competition in providing new broadband services by service providers using the infrastructure of the Access Provider;

iv. Possible disincentives or delay to the entry of facilities-based competitors relative to a situation without ANE; and

v. Efficient investment by the Access Seeker in upgrading the network of the Access Provider

8.2.2 Such a broad classification of market developments may not be adequate to examine the costs and benefits of ANE in detail. However, in practice, the development of the market will depend on a range of factors that interact in a

complex way in determining precisely how effective competition will develop over time. These include:

i. The level of demand for existing and new services;

ii. Factors affecting the cost of rolling out alternative Access Network e.g. population distribution and geographical condition, the existence of alternative infrastructures that might be upgraded to provide communications and multimedia services and the availability of spectrum for wireless fixed access technologies; and

iii. the overall regulatory framework that determine the incentives faced by the Access Provider and the Access Seeker to invest in infrastructure, to offer new services and to develop new markets.

8.3 Associated Benefits

8.3.1 Malaysia needs to develop the greatest variety of feasible means of enhancing effective competition in the Access Network - including copper cable, fixed wireless access and ANE.

8.3.2 Facilitating ANE will enable the delivery of choice to customers, encourage the delivery of new services and promote growth of the communications and multimedia industry. It has a potential to reduce the cost of access to the customers, complement alternative access infrastructure and offer the prospects of facilitating greater effective competition in the access market.

8.3.3 The provision of ANE for the Access Seeker will increase the level of effective competition and technological innovation in local Access Network, which will in turn stimulate the competitive provision of a full range of communication and multimedia services from simple voice telephony to broadband services to customers. With the options available, the market will grow and the economies of scale can be achieved. Further, this will lower the prices for these broadband services and becomes more accessible to a large part of the population.

8.3.4 ANE will enable the promotion of effective competition and dynamism in the offering of innovative services at the local access level, particularly concerning encouraging the use of e-commerce and information society services, including access to multimedia services and high-speed Internet access. This will create appropriate platform for development of local content in the communications and multimedia industry. Customers will consequently have more choice in terms of services, quality and prices.

8.3.5 ANE has the potential to create a more competitive retail market, both in basic services as well as new broadband services. Incentives for the entry of facility-based competitors may be reduced but this may be balanced by efficient investment by new entrants in upgrading the incumbent network.

8.3.6 On the contrary, the absence of ANE may lead to a situation where only limited competition will emerge and that incumbent control of the Access Network will lead to a continuing concentrated monopoly in broadband services provision. As

a result, more extensive regulations at the level of individual services might be required.

8.3.7 While many arguments are made that ANE discourages infrastructure development, in reality, ANE is complementary to, rather than a substitute for, infrastructure investment.

8.4 Categories of Cost

8.4.1 This section outlines the costs for ANE. The costs of ANE comprise three specific components. These components are:

i. Local set-up costs:

These are the costs of establishing the capability for accessing the network elements between the Access Provider and the Access Seeker and in a particular location. These include the costs of co-locating equipment, establishing connecting points and establishing transmission links from these points to the service providers' switches.

ii. Line access costs:

ANE requires a new physical cross connection to be established and tested at the distribution frame. These costs depend on whether the distribution frame is integrated within the local switch or situated remote from it.

iv. Regulatory Cost:

The general system set-up costs are the costs of establishing the capability for ANE regardless of the actual demand for ANE. These costs are largely manpower related. They include the regulatory cost for efforts required for bilateral negotiations, development of Access List / Access Codes / Mandatory Standard on Access and solving regulatory disputes and arise inside the Access Provider, the Access Seeker and the regulator.

8.5 Questions from Section 8

1. In your opinion, what are the economic benefits of introducing effective competition in the Access Network?

2. Should the cost-based rate be a pre requisite for introduction of ANE?

3. What are the likely cost estimates for setting up ANE? Please provide information in support of your answers.

Section 9: Costs and Pricing

9.1 Principles in Costing and Pricing

9.1.1 The MCMC's policy is to encourage the development of effective competition in all parts of the market where this is viable. This includes effective competition in services and effective competition in the provision of facilities. However, promoting effective competition and at the same ensuring that efficient allocation and utilisation of resources requires a careful examination of the costs involved so that the pricing charged will facilitate the most efficient entry decisions into the market.

9.1.2 This inevitably points to a cost methodology set on the basis of forward-looking incremental cost. This should result in entry by those who believes their costs would be lower than those of incumbent, but not by the entrants who believes their costs would be higher. In other words, efficient entry is encouraged and inefficient entry discouraged. Any pricing set below this level could have the effect of deterring efficient infrastructure based investment.

91.3 Access pricing - the sound economic signal - should provide the basis for a build-or-buy decision for the Access Seeker. Therefore, only costs of efficient service provisioning should be taken into account.

9.2 Cost Orientation

9.2.1 In order to avoid lengthy disputes on pricing between the Access Seeker and the Access Provider, it is desirable to have pricing methodology and the actual parameters used to calculate the cost. As long as the level of effective competition in the access market is insufficient to prevent excessive pricing of ANE, the prices for network elements follow the principle of cost orientation.

9.2.2 In principle a forward-looking cost will foster fair and sustainable effective competition and providing alternative investment incentives. Common and joint costs have to be catered for and appropriate cost of capital (CoC) has to be taken into account. The principle of cost orientation prevails that costs are only to be recovered once.

9.3 Non-discrimination

9.3.1 The principle is of non-discrimination is applied where the Access Provider provides its own broadband services using DSL, the Access Seeker should be provided access to the network elements at the same price which the Access Provider imputes to its own DSL services. The 'non-discrimination' pricing rule would also apply to the access by the Access Seeker of associated facilities such as co-location, leased lines transmission capacity in the core network as used by the Access Provider to support its own DSL services.

9.4 The Choice of Cost Standard

9.4.1 The MCMC is of the view that access pricing should be established based on forward-looking long run incremental cost (LRIC) of an efficient service provider. The MCMC considers that LRIC is an appropriate base from which to start to consider pricing of access to network elements.

9.4.2 In this PC, the MCMC would like to receive views on whether any deviation from the LRIC standard is justified in the specific case of ANE. For example:

i. The use of current costs may be inappropriate for ANE. Valuing the Access Network using current costs will usually lead to higher prices than using historic costs, whereas the opposite is usually true when valuing the core network. There is then a danger of setting ANE prices above economically efficient levels, and encouraging over-investment in alternative Access Networks. It may be better to set prices somewhat below current costs, in order to take account of the external costs that would be borne by third parties if an entrant invests in alternative infrastructure (e.g. the costs of disruption, delay and environmental damage when roads are dug up); and

ii. Higher rates of return on capital employed (ROCE) may be appropriate for some ANE services. It may be reasonable that, for these components of the Access Network, the Access Provider is able to achieve a rate of return which is higher than the rate which the Access Provider uses as an average for its sunk investment. For instance, to provide higher bandwidth services, the Access Provider may need to invest in new access technology such as multiplexers and DSL modems etc. This investment could be risky, both because the technology has yet to achieve maturity and because the use of the new network components relies on demand from a third party (the Access Seeker).

9.5 Costs of ANE

9.5.1 The issue of ANE has brought to the forefront the requirement to rebalance the retail rates and in particular fixed line rates so that they accurately reflect the cost of provision.

9.5.2 Generally, customer line rental rates, in particular for residential services, were said to be traditionally priced below cost and was cross-subsidised through call rates. There has been a gradual effort at the part of the regulators worldwide to rebalance the retail rates. Rebalanced rates are important for the Access Seeker waiting to take opportunity to implement ANE since without the rebalanced rates the Access Seeker with business model focusing on low value services can be caught in a price squeeze and may be unable to offer service at competitive prices.

9.5.3 There are mainly two kinds of costs associated that the Access Provider may incur in implementing ANE. All these need to be recovered in the price charged to the Access Seeker. These are:

i. Price for the Access Network:

a. Price for connection, installation or transfer of the line or disconnection prices;

b. Monthly rentals;

The general principles of cost orientation should apply when dealing with the monthly rental for ANE. International bench marking is also another option for pricing the rentals. However, the fact that the line rentals are below cost in some countries makes a direct comparison with the monthly rental fee for ANE difficult.

The preferred approach for calculating the one time installation charges (also known as one-off cost) involved by line testing, and handing over the loop to the Access Seeker's distribution frame is an average per line basis.

ii. Price for co-location:

a. Price for installation or adaptation of space;

b. Monthly charges;

c. Price for internal and external tie cables;

d. Price for installation, operation and maintenance of equipment (in case of virtual co-location);

e. Price for other associated, ancillary or associated facilities (such as power with or without interruption);

f. Staff training; and

g. Security of own equipment

Up front co-location costs incurred for setting up co-location facilities might vary largely with the situation at the different sites. The Access Provider should be allowed to pass on the costs incurred for the additional (construction and adaptation) work needed to the Access Seeker.

It is furthermore advisable that the Access Seeker be allowed the opportunity to check the costs of the proposed construction work beforehand. Therefore the Access Provider should give a formal, detailed, offer which can be checked by the Access Seeker in order to ensure that the costs of setting up co-location are minimised. The burden of proof of cost- orientation should be on the Access Provider as in standard business practice.

9.5.4 Bearing in mind that regulation is a substitute for non-fully competitive markets, there is no need to regulate in areas where a competitive market already exists. As a market exists for renting space, a preferred approach is to set the monthly rates at a market price level.

9.5.5 Of course the Access Provider has to apply these same transfer prices internally, as otherwise cross-subsidisation might occur, which eventually results in a price squeeze. Where no reliable data for rentals are available, a non-discriminatory pricing mechanism has to be set up.

9.5.6 A number of aspects need to be taken into account in calculating the appropriate price for ANE. In addition to the cost of capital CoC) and interest rate, one of the basic elements to consider is the depreciation period of the underlying installations (loops, ducts, manholes, buildings etc.). The Access Seeker tends to maintain that the basic infrastructure (copper loops) has very long duration, which can be seen by the time the loops have already been buried in the ground.

9.5.7 On the other hand, the Access Provider normally argues for short depreciation periods. First, they argue that the technical life is shorter than the one suggested by the Access Seeker. Then they argue that given the fast change of technology new technical improvements could make the underlying technical infrastructure (copper loops) obsolete in the near future and therefore a short depreciation period is rectified. Furthermore such costs as maintaining the copper loop network have to be catered for.

9.5.8 As for the calculation of interconnection charges, the methodology for cost calculation is usually based on forward-looking, long-run incremental cost (LRIC).

9.5.9 The provision of a retail high-speed bitstream access offered by the Access Provider to its customers has to be unbundled from the basic telephone service offerings. The availability of other wholesale offerings (e.g. full access and shared access) as well as other retail offerings (e.g. broadband offered through alternative access technologies), will provide market pressure that serve to keep the Access Provider’s prices at competitive levels.

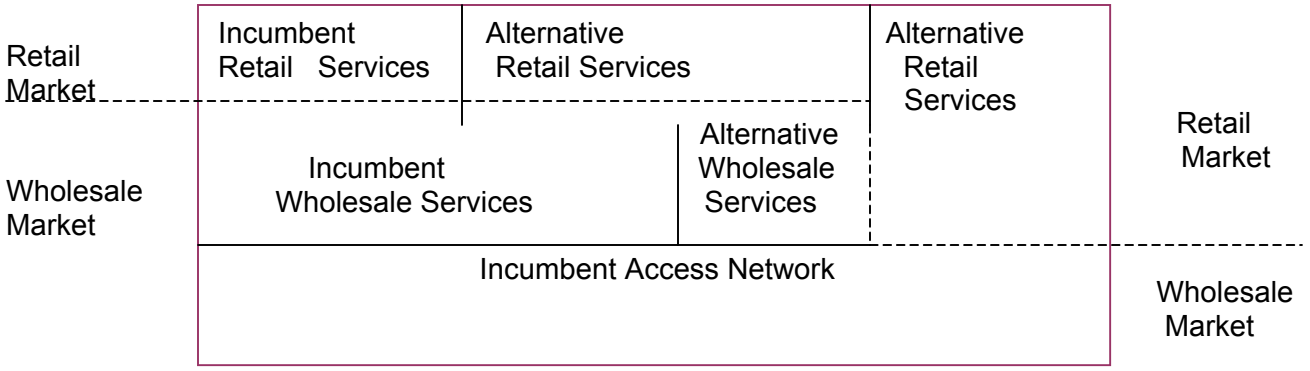
9.6 Wholesale Offering

9.6.1 In general, the Access Provider provides the service to the customers through retail offering and provides access to the Access Seeker through wholesale offering. The MCMC notes the need to take into account the conflict between the theory of effective competition and the reality of an incumbent-dominated Access Network market. The incumbent should not be able to abuse its control of 'means of production' resulting in unfair competition. Hence, the offer of ANE should also be made at wholesale level to promote effective and fair competition.

9.6.2 New opportunities for the Access Provider to develop new business models for a wide range of broadband access to IP and data services have been created through ANE, the availability of technologies such as xDSL and new opportunities for value added services. Wholesale market is quite a different market when viewed by incumbents from the retail market and this trend may obstruct growth at the wholesale level while pursuing aggressive rollouts at the retail level. The provision of wholesale for a range of services to prospective service providers may stimulate market growth and generate a new revenue stream.

9.6.3 In the event ANE is mandated by the MCMC, the Access Provider will still be able to offer bitstream and resale services to other service providers. The combination of unbundled network element, bitstream and wholesale offers would provide a competitive business opportunity in addition to building their own infrastructure. The Access Provider needs to view it as a business opportunity and treat the alternative providers as their wholesale customers. This proposition is in mutual business interest and also provides options to the customers in terms of competitive service offerings.

9.6.4 One of the objectives of the MCMC is to promote effective competition in the Access Network at the retail as well as at wholesale level. Competition at retail level will stimulate innovation and bring down prices. However, unless there is also competition at the wholesale level, the degree of differentiation at the retail level will be limited by the incumbent. Competition at the wholesale level will allow for greater differentiation by the competitive service providers. Alternative service providers offering wholesale services are likely to do so alongside their retail offerings to drive volumes and share common costs. The competitive market structure will be as follows:



(Source: Ovum)

Fig 8: Market Structure in a Competitive Market

9.6.5 The new opportunity for the service providers may open additional channels for creating new business models. The Access Provider provides the customer through a retail service offering and also provides access to the Access Seeker or to other service providers through a wholesale offer. The model is shown below:

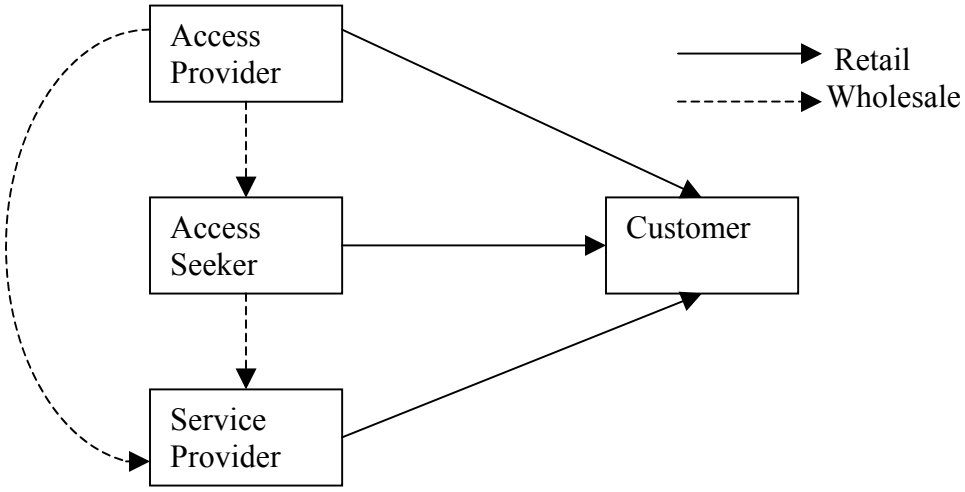


Fig 9: Wholesale Model

9.6.6 Some of the countries, for example the US, Australia and the UK, have mandated the wholesale of communications services including broadband services. The incumbents are obliged to offer wholesale services to the alternative service providers.

9.6.7 The Federal Communication Commission (FCC) has mandated that Regional Bell Operating Companies (RBOCs) unbundled 14 different network elements and make them available to Competitive Local Exchange Carriers (CLECs) on a wholesale basis. Of these 14 elements, unbundled local loop (ULL) is clearly the most strategic Unbundled Network Element (UNE) and arguably a key determining success of a LE Carrier.

9.6.8 In Australia, the Australian Consumer and Competition Commission (ACCC) regulates the supply of ULL service which would enable competitors to use Telstra's copper cables to deploy technologies such as DSL in order to deliver voice and high-speed data services.

9.6.9 Since then, there has been concerns that Telstra will deploy its own retail and wholesale ADSL services before making its copper lines available to competitors. The ACCC sought written assurance from Telstra that it would not commercially launch its own ADSL offerings before providing an equivalent opportunity for others to also offer similar services through the use of Telstra's copper network.

9.6.10 Similarly in the UK, the incumbent British Telecom (BT) offers ULL as well as wholesale services to the alternative service providers.

9.6.11 While the decision for the Access Provider to offer the range of services and products are primarily driven by commercial considerations, however, the new regulatory requirement will enable them to offer the following services:

i. ANE services;

ii. xDSL wholesale services;

9.6.12 The main areas of concern is that in case the wholesale price of ANE is not set at the right level (not too low as to deter the investment in alternative infrastructure and not too high as to prevent efficient entry using the Access Network of the Access Provider), there could be a possibility of margin squeeze which may arise where the retail rates in the relevant market are not much different than the wholesale rates offered by the Access Provider. The pricing principle must ensure that there is no market distortion, in particular margin squeezes between the prices of wholesale and retail services offered by the Access Provider.

9.7 Questions from Section 9

1. What are the most important concerns which should be taken into consideration by the MCMC while establishing the pricing principles?

2. Which pricing principle should be recommended?

3. Should the price for ANE be based on cost of service provision? If not please provide reasons.

4. Which are the relevant costs to be included in prices for ANE? Please give reasons supporting your arguments.

5. Is the methodology based on forward looking costs appropriate?

6. Does ANE introduce special circumstances which justify deviation from the LRIC standard for establishing interconnect prices?

7. If so, what adjustments are appropriate and why? Please give reasons for your answer and supporting analysis if possible.

8. If unbalanced rates continue, is it correct that charges based on retail rates are likely to erode incentives to build / upgrade infrastructure in the Access Network?

9. Do you think that the price of ANE may have an impact on investment in alternative infrastructure? What other mechanisms (apart from the regulation of prices) do you deem appropriate to promote investment in an alternative infrastructure in the medium and long term following the implementation of ANE?

10. Should the Access Provider offer wholesale as well as retail rates to the Access Seeker for ANE?

11. How do you define Wholesale? Do you agree that the Access Providers need to offer ANE services before introducing its own wholesale services?

12. What constitutes a ‘margin squeeze’ between the retail prices and wholesale price of ANE services provided by the Access Provider? What mechanism should be used to counter the possibility of margin squeeze?

Section 10: Next Steps

10.1 Implementing ANE: Requirement for Modification and Change to the Regulatory Instruments

10.1.1 As noted earlier in Chapter 1, the purpose of this PC Paper is to reflect the current thinking of the MCMC and present proposed set of actions on the way forward with respect to introducing effective competition in the Access Network.

10.1.2 The PC Paper also seeks to ask the stakeholders and the general public as to whether more effective competition in particular in the Access Network should be introduced. Further, the paper aims to obtain feedback regarding the need and timing for the introduction of effective competition in the Access Network via the implementation of ANE, methods and modalities of access and necessary change, if any, envisaged in the existing regulatory framework.

10.1.3 With respect to the regulatory framework, it is envisaged that with some modifications and change in the relevant regulatory instruments, the current framework can facilitate the implementation of ANE. Specifically, with some modifications and change to the current Access Regime, ANE can be facilitated.

10.2 Access Regime and ANE

10.2.1 In the current stage of Access Regime, access to network services such as to interconnection services including EA Call-by-call is already available. The availability of the relevant access and interconnection services has provided service providers and their customers with choices to access variety of services.

10.2.2 In terms of implementing ANE, the relevant regulatory framework must facilitate ANE and this can be facilitated by the existing Access Regime. However, for that to happen, the current Access List needs to be expanded to include network elements necessary to facilitate the offering of more advanced application services.

10.2.3 Specifically, the Access List will handle the issues such as which network facilities and/or network services must be opened for access.

10.2.4 Correspondingly, the MCMC would have to ensure that the currently drafted Mandatory Standard on Access can accommodate the requirements of implementing ANE especially as it involves a detailed explanation and description of obligations on the part of the Access Provider.

10.2.5 Notwithstanding, the MCMC may also seek MAFB, the Access Forum to develop an Access Code to implement ANE. In the event that industry is able to commercially negotiate the implementation of access to network elements, the MCMC shall be supportive of the approach.

10.3 Proposed Expansion of the Access List: List of Potential Network Facilities or Network Services

10.3.1 Which network facilities and/or network services must be opened for access?

i. Copper Cable:

a. Provision and maintenance of a twisted copper cable extending between the customer's network terminating point (NTP) and the serving or equivalent distribution point closer to the customer premises. It includes any metallic path that can be provisioned in accordance with a minimum set of technical standards; and

b. The Access Network does not necessarily have to be the existing customer's telephone line, spare pairs can also be used, where a connection is or can be made available. More generally, the Access Seeker should be able to request and be supplied with a loop, even when this requires the establishment of parts of a new local loop within the existing infrastructure;

ii. Optical Fibre Cable (OFC):

The Access Network may not always consist of copper cables. A portion of it may consist of OFC. The Access Provider shall also provide access to OFC to the Access Seeker. This will include associated transmission equipments and ancillary facilities.

iii. Co-location Service:

a. In order for an Access Seeker to provide service over an Access Network, a co-location facility will be needed. Moreover there are a number of other services needed to support co-location and these will vary depending on the form of co-location an Access Seeker chooses to adopt;

b. Co-location Access Seeker should have the option to choose from three different forms of co-location:

1. Physical co-location - where an Access Seeker can request space to locate its equipment within the Access Provider's local MDF site or equivalent distribution point closer to the customer premises, either in the building containing the MDF or in other space that could be made available in the site (such as adjacent buildings, car parks or warehouses). This space can either be shared with other Access Seeker or be in a separate room, depending on the requirements of the requesting the Access Seeker and the availability of suitable space;

2. Distant co-location - where an Access Seeker can choose to use its own premises and connect to the Access Provider's local MDF

site or equivalent distribution point closer to the customer premises; and

3. Virtual co-location - where the Access Provider houses, owns and runs equipment located in its premises at the MDF site or equivalent distribution point closer to the customer premises on behalf of the Access Seeker;

c. Hand-over distribution frame (HDF) – An HDF will be needed to terminate the tie cables which extend the local loop from the MDF or equivalent distribution point closer to the customer premises to the Access Seeker' co-location space. The Access Seeker should be given the possibility to choose either to self provide the HDF or to request the Access Provider to supply it;

d. Tie cables - Tie cables, consisting of twisted copper pairs, should be provided between the MDF and the HDF. When the Access Seeker is physically co-located with the Access Provider the tie cable will remain inside the Access Provider's building (internal). Whereas, when the Access Seeker is employing distant co-location, the tie cables will need to connect the MDF site and the Access Seeker premises. In this case the Access Seeker will need a tie cable which runs inside the Access Provider's building (internal) and a tie cable that runs outside the Access Provider's building (external). Therefore the Access Provider should supply:

    1. internal tie cable - provision, including testing, termination and maintenance of a twisted copper pair between the MDF and the HDF (if the Access Seeker is physically co-locating) or between the MDF and the Access Provider's joint in cable chamber (if the Access Seeker is employing distant co-location); and

    2. external tie cable - provision, including testing, termination and maintenance of a twisted copper pair between the Access Provider's joint in cable chamber and the HDF in the Access Seeker's distant co-location space (if the Access Seeker is employing distant co-location). The Access Seeker should have the option to self provide the external tie-cable;

e. Access Seeker's external tie cable pull-through service – The Access Seeker who wish to employ distant co-location should have an option of self-providing the external tie cable. In this case the Access Provider should provide a cable pull through service from a defined footway box adjacent to the MDF site or equivalent distribution point closer to the customer premises, so that the Access Seeker's cable can be drawn into the MDF site or equivalent distribution point closer to the customer premises and subsequently connected to the MDF, either directly or by the use of internal extensions. This service should

include co-operative end-to-end copper cable circuit testing and labeling;

f. Power – For physical co-location the Access Seeker should be supplied power by the Access Provider. The Access Seeker will need to negotiate whether this will be AC and/or DC and whether it is generator and/or battery backed-up;

g. Air conditioning / chilling / heating as relevant;

h. Access to co-location space at MDF site - the Access Provider should endeavor to provide unescorted access options to the co-location facilities located in its MDF Sites or equivalent distribution point closer to the customer premises. However, there may be special circumstances where such access cannot be provided; in which case the Access Provider should provided escorted access services that meet reasonable demand (including access at short notice to repair faults);

i. Equipment moving assistance - where lifting / hosting apparatus is needed.

iv. Transmission and backhaul services:

a. The Access Seeker will need to connect the equipment in their co-location space to their core networks (a process referred to as backhaul). The Access Seeker should be able to either request backhaul from the Access Provider or to provide their own backhaul. In the latter case, the Access Provider should provide a pull-through and routing service to enable the Access Seeker fibre to reach its co-location space;

b. The Access Provider should also provide access to its duct space. The Access Seeker may also wish to choose an alternative supplier to the Access Provider for backhaul and, if this supplier collocates in the same site, they should be able to make the connection within the co-location site;

c. Figure 10 shows the configurations that can be used to connect the customer to the HDF in either the service provider’s co-location space or own premises.

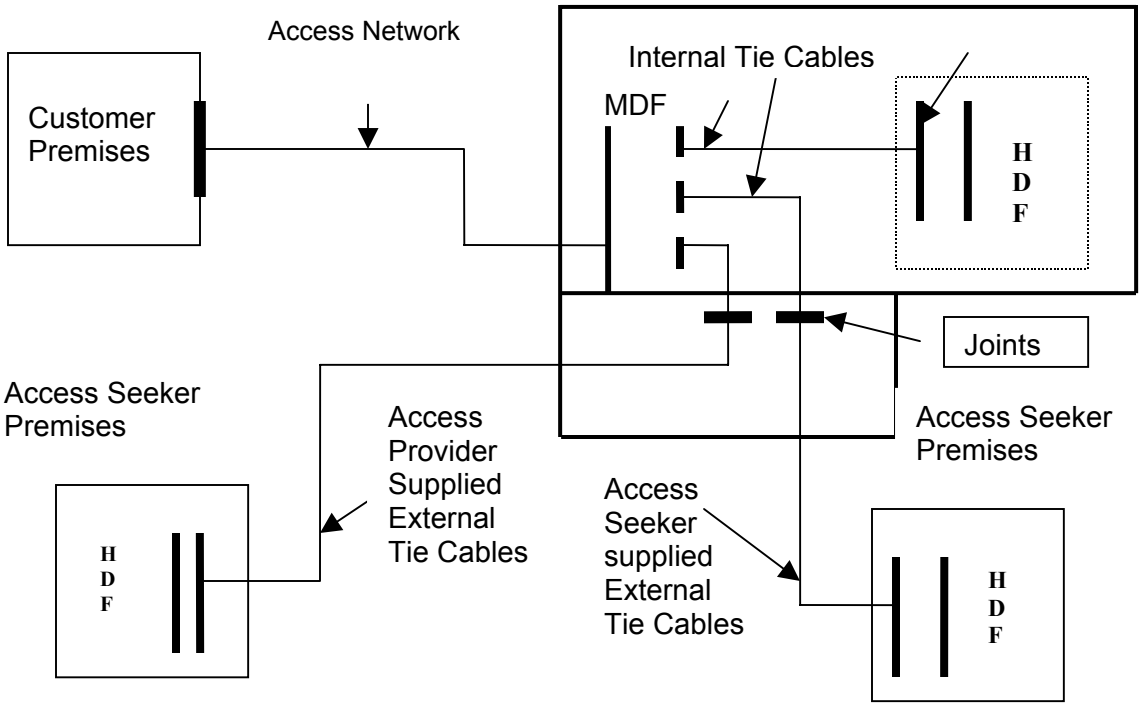


Figure 10: Schematic Diagram of some of the services

v. Shared access (Splitters):

a. The additional services required to provide shared access vary depending on how this is implemented;

b. There are two basic possible technical configurations:

1. the Access Provider separates the frequencies for voice telephony and those for higher-bandwidth services, and then leases to an Access Seeker the higher frequency portion of the loop (Option 1); or

2. the Access Seeker separates the frequencies and hands back to the Access Provider the frequencies for voice telephony (Option 2);

c. Under Option 1, the Access Provider need to provide splitter - provision and maintenance of a splitter at the customer's premises, matching the one the Access Provider uses to separate the frequencies at the exchange site;

d. Under Option 2, the Access Provider need to provide:

1. internal tie-cable; and

2. provision, including testing, termination and maintenance of a metallic twisted pair between the Access Seeker's HDF and the MDF, necessary to represent the streamed-off PSTN calls.

e. There may be a concern that, under Option 2, an Access Seeker might install splitters that interfere with the voice telephony supplied by the Access Provider on the shared line, and thereby degrade the quality of the Access Provider's voice telephony services. This problem should be overcome through the specification of a set of the criteria that all splitters would need to meet. The Access Seeker would have to prove that their equipment is compliant with these criteria before deploying it.

vi. Interface to Operational Support System (OSS):

a. This includes provisioning, ordering, fault resolution, maintenance etc. The Access Provider should make available access to its OSS for ordering, maintenance and repair and billing purposes as these represent ancillary services necessary for the use of the services listed from (i) to (v) above.

b. Ordering and provisioning procedures should follow the general principles of transparency and non-discrimination. An electronic interface should be installed for submitting the processing the ANE orders as far as this serves to increase the efficiency. This interface could also be used for fault reports. The development of electronic interface may be undertaken jointly by the Access Provider and the Access Seeker.

c. Access to the Access Provider's OSS should be granted to all the Access Seeker on fair and non discriminatory terms. In order to allow access, the Access Provider will provide technical specifications concerning an interface between its own and the Access Seeker's systems.

vii. Provision of information:

This includes network information in respect of the following:

a. The basic information on the cabling system may include but not limited to:

i. list and/or map of MDFs including total number of usable loops and number of loops in use;

ii. data on known disturbers per MDF and per cable;

iii. line distribution per MDF (weighted average distribution;

iv. general information concerning cable characteristics including typical type and quality of cable (e.g. diameter, results from

quality tests that have been conducted, number of lines, technical interference control and spectral management plan);

v. statistical information about the network, e.g. loop characteristics;

vi. standard spectrum masks and/or list of approved systems;

vii. availability of co-location space and type;

viii. power availability;

ix. MDF space availability;

x. co-location features available (air conditioning, uninterruptible power supply, security).

b. the detailed information on the cabling system;

i. latest update of information in addition per MDF where the Access Seeker wants to have access;

ii. location (physical address information) associated with the MDFs and the name of the associated local switch and/or number ranges associated with MDFs;

iii. exact customer coverage of each MDF;

iv. detailed information concerning loop characteristics, any known limitations or incompatibilities;

v. results of any DSL tests;

vi. any foreseeable limitations on space for MDF – extensions;

vii. detailed description of procedures and conditions relating to ANE

c. the detailed information on MDF – access

i. type of access proposed by Access Provider, either

1. directly on the MDF; or

2. in-house on HDF (distance, cable type and size (number of pairs)); or

3. outside (remote) on HDF (distance, cable type and size (number of pairs)); or

4. cable entry points and capacity available.

d. co-location information;

i. availability of co-location space and type, detailed drawings if space has to be set-up by the Access Seeker;

ii. co-location features available (air conditioning, uninterruptible power supply, security), technical constraints, terms and conditions of use; and

iii. access conditions to the facilities.

e. Access Reference Document

A site specific costs, terms and conditions

10.3.2 From the regulatory viewpoint, it is important to consider various possibilities or options in which the Access Seeker may get access to the network elements of the Access Provider's Access Network. The following options could be possible:

i. An existing pair from the LE to the customer;

In this case, does the requirement only to use the existing cable capacity or is there a requirement to add new loops if requested? If so, does this apply only to buildings that are already served or to buildings not yet served?

ii. An additional line, a pair made available in the conveyance and distribution, or cables;

Does the requirement include cable replacement if more capacity is requested than is available, or if existing cable pair becomes faulty and unusable?

iii. An entirely or partly new pair and new ducts?

Does the requirement extend to the provision of additional ducts if increases in the capacity cannot be accommodated in existing ducts?

10.4 Mandatory Standard on Access

10.4.1 As of 31 May 2003, the MCMC has initiated work on determining a Mandatory Standard on Access. In the event that after the conclusion of this PC process the MCMC is moving forward with implementing ANE, it would appear that it may be likely that the Mandatory Standard on Access[15] would have to be amended (or added) to accommodate the new requirements with respect to ANE, as the current draft Mandatory Standard on Access only deals with the network facilities and/or network services on the current Access List.

10.4.2 For successful deployment of ANE, the MCMC will also endeavor to encourage the participation of the industry / Access Forum to develop the manuals / codes including, but not limited to the followings:

i. ANE: Service ordering, provisioning and customer transfer;

ii. ANE: Network deployment rules;

iv. ANE: Cable management procedures;

v. ANE: Performance requirements;

vi. ANE: Spectral compatibility determination process;

vii. ANE: Codes of practice for co-location

viii. ANE: Fault management

[15] notwithstanding the fact the current draft Mandatory Standard on Access has been drafted as generically as possible so as to accommodate future changes to the Access List

10.5 Access Reference Document (ARD)

10.5.1 One of the obligations of the Access Provider contained in the Mandatory Standard on Access is to prepare and publish an Access Reference Document. Each Access Provider shall prepare and maintain an Access Reference Document in relation to Network Facilities or Network Services on the Access List which that Access Provider provides to itself or third parties and which:

i. contains terms and conditions which are consistent with the rights and obligations set out in the Mandatory Standard on Access; and

ii. does not include terms and conditions which are inconsistent with the rights and obligations set out in this Standard.

10.5.2 Indicative list of items to be included an ARD to be published by the Access Provider shall include, but not limited to:

i. Conditions for Access to Network Elements

a. Network elements to which access is offered:

May include, but not limited to, the following:

access to raw copper local loops (copper terminating at the local switch) and sub loops (copper terminating at the remote concentrator or equivalent facility), in the case of full access;

access to non-voice frequencies of the Access Network, in the case of shared access;

access to space within an MDF site of the Access Provider for attachment of access multiplexers (such as DSL access multiplexers (DSLAM)) and/or similar types of equipment to the Access Network of the Access Provider.

b. Availability:

All relevant detail regarding local network architecture, information concerning the locations of physical access sites, availability of copper cables in specific parts of the Access Network;

c. Technical conditions:

Technical characteristics of copper cables in the Access Network; lengths, wire diameters, loading coils and bridged taps; line testing and conditioning procedures

Specifications for DSL equipment, splitters etc with reference to relevant international standards or recommendations; spectrum limitations and electromagnetic compatibility requirements designed to prevent interference with other systems;

d. provisioning procedures:

Line investigations for specific DSL technologies, ordering and provisioning procedures, usage restrictions.

ii. Co-location services

a. information on co-location sites:

In particular the precise locations of the Access Provider's relevant sites; including switches, MDF, concentrators, and remote distribution points such as street cabinets, pedestals and vaults. Specification of the website(s) where the updated list of locations is published. Availability of alternatives when physical co-location is not available.

b. co-location: Options at the sites identified above:

The types of co-location available (*e.g.*, shared, caged/cage less, physical or virtual); availability of power and air-conditioning facilities at these sites; rules for subleasing of co-location space.

c. equipment characteristics:

Restrictions, if any, on equipment that can be co-located.

d. security Issues:

Measures put in place by Access Provider to ensure the security of their locations; conditions for access by the staff of competitive service providers in order to identify and repair service problems

e. safety standards:

In principle safety standards used by the Access Provider and its affiliates should be deemed adequate for competitive service providers' equipment.

f. inspections:

Conditions for competitive service providers and the MCMC to inspect the locations at which physical co-location is available, or sites where co-location has been refused on grounds of lack of capacity.

iii. Operational support systems (OSS)

a. conditions for access to the Access Provider's OSS, information systems or databases for pre-ordering, provisioning, ordering, maintenance and repair requests and billing.

b. in principle the OSS elements listed should cover access to all loop qualification information, including information on whether a particular loop is capable of supporting advanced services.

iv. Supply conditions

a. timeframes: lead time for responding to requests for supply of services and facilities, as well as contractual compensation provided in case of failure to meet those time frames, service level agreements, fault resolution and escalation procedures.

b. prices for each feature, function and facility listed above, shown separately, including one-time payments and recurring rental payments.

c. Provision of individual wholesale ANE services in conjunction with the full range of ANE products and services

d. a site-specific costs, terms or conditions

Information to be provided after conclusion of the agreement for access to a specific MDF could cover:

e. any foreseeable changes to the above mentioned items should be announced at the latest six months before the change will occur.

Changes involving civil work should be announced even earlier, with respect of locally relevant authorisation procedures and delays for undertaking such civil work.

f. unforeseeable changes should be notified immediately as the need for the change occurs.

g. on request: line-quality test results of a specified local loop serving an identified subscriber. If no test has been done so far on that line, the Access Provider should make the test and provide the result. Costs may be charged to the Access Seeker.

10.6 Questions from Section 10

1. Which service providers to be regulated?

2. Should the requirement to provide ANE be reciprocal or apply to dominant or to all service providers having control of Access Network?

3. Should there be a standard ARD? If yes, what should be the information content of the ARD in addition to the information mentioned in Chapter 10?

4. What is the list of services that should be included in the Access List as a part of ANE, in addition to the services contained in Chapter 10?

5. What information need to be contained in ARD to enable the Access Seeker to develop their plans for using ANE and why?

6. Are any other initiatives needed to ensure adequate provision of information?

7. How far reaching must regulations be and how much room should be left to commercial negotiations? This question can include several aspects of relations between service providers:

    a. Pricing
    b. Service quality
    c. Implementation lead times
    d. Technical information on line qualification
    e. Specifications of the transmission equipment used by either of the service providers

8. What is the additional information required for the purpose of ANE before the Access Seeker develop their plans for utilising the Access Network of the Access Provider? (with reference to the information need as contained in Chapter 10).

9. In order to fulfill the obligations by the Access Provider to maintain a database of information as contained in 10.3 (vi) and (vii) with regards to the interface with OSS and provision of information, the Access Provider will incur a cost. What mechanism should be established for payment of such costs incurred by the Access Provider? Should the cost be shared amongst the Access Seeker?

10. Do you think that the Mandatory Standard or Access Code should be in place before the ANE services are opened to competition?

11. How much time should the Access Forum take to develop these Codes?

12. Should the Access Forum be assigned the responsibility to develop the Access Code in a time-bound manner?

13. Should the price for ANE and co-location be determined by the Access Provider in the ARD or should it be determined by the MCMC?

14. Are any other initiatives needed to ensure adequate provision of information?

15. Should the Access Provider be obliged to upgrade an existing line or to provide the required line even if it means building all or part of it?

Annexure 1: DSL technologies

1.1 Description of DSL Technologies

1.1.1 With the advent of Internet, more and more people want to connect their computers up to other computers. Also, the volumes of data they want to send between these computers are growing, beyond the capabilities of traditional analogue modems.

1.1.2 To address this problem, a new method has been evolved known as xDSL, where “x” is replaced with a different letter to denotes a different version of product (e.g. HDSL, SDSL ADSL, VDSL etc.) The original research into xDSL modems actually began quite awhile back and these modems are in use for many years as a part of core switching networks of many of the major world telcos.

1.1.3 DSL stands for digital subscriber line. It's the technology that allows high-speed bandwidth to be harvested from the existing copper lines that deliver our phone service. The cost-savings derived from using the same copper infrastructure allow DSL service providers to offer DSL services at a very affordable price.

1.1.4 DSL delivers high-speed, always-on Internet access, enabling small businesses to leverage the Internet for greater efficiency, productivity, and better customer service. Within the close vicinity of the local area it is possible to get the expected data transfer rates up to 6.1mbps, enabling continuous transmission of motion video, audio, and even 3-D effects.

1.1.5 However, individual connections will provide from 1.544 Mbps to 512 Kbps downstream and about 128 Kbps upstream.

1.2 Advantages of DSL

i. Internet connection still uses the phone line for voice calls. The speed is much higher than a regular modem (1.5mbps vs. 56kbps). DSL doesn't require new wiring; it can use the existing phone line;

ii. Always-on connection, no need to dial and connect; and

iii. Can be introduced on a per-user basis.

1.3 Limitations of DSL

i. ADSL connection works better when the user is closer to the LE;

ii. The connection is faster for receiving data than it is for sending data over the Internet; and

iii. The heavier 24-gauge wire carries the same data rate farther than 26-gauge wire.

1.4 Working of DSL

1.4.1 To understand DSL, a brief insight of the working of a normal telephone line - the kind that telecommunications professionals call plain old telephone service (POTS) - is important.

1.4.2 One of the ways that POTS makes the most of the telephone company's wires and equipment is by limiting the frequencies that the switches, telephones and other equipments carry. Human voices, speaking in normal conversational tones, can be carried in a frequency range of 0 to 3,400 Hertz. This range of frequencies is tiny. For example, compare this to the range of most stereo speakers, which cover from roughly 20 Hertz to 20,000 Hertz.

1.4.3 The wires themselves have the potential to handle frequencies up to several million Hertz in most cases. The use of such a small portion of the wire's total bandwidth is historical - as the telephone system has been in place, using a pair of copper cables to each home, for about a century. By limiting the frequencies carried over the lines, the telephone system can pack lots of wires into a very small space without worrying about interference between lines. Modern equipment that sends digital rather than analog data can safely use much more of the telephone line's capacity. DSL does just that.

1.4.4 Most popular form of connecting homes and small business customers are using an asymmetric DSL (ADSL) line. ADSL divides up the available frequencies in a line on the assumption that most Internet users look at, or download, much more information than they send, or upload. Under this assumption, if the connection speed from the Internet to the user is three to four times faster than the connection from the user back to the Internet, then the user will see the most benefit (most of the time).

1.5 Voice and Data

1.5.1 ADSL is a distance-sensitive technology. As the connection's length increases, the signal quality decreases and the connection speed goes down. The limit for ADSL service is typically 18,000 feet (5,460 meters), though for speed and QoS reasons many ADSL providers place a lower limit on the distances for the service.

1.5.2 At the extremes of the distance limits, ADSL customers may see speeds far below the promised maximums, while customers nearer the central office have faster connections and may see extremely high speeds in the future. ADSL technology can provide maximum downstream (Internet to customer) speeds of up to 8mbps at a distance of about 6,000 feet (1,820 meters), and upstream speeds of up to 640kbps. In practice, the best speeds widely offered today are 1.5mbps downstream, with upstream speeds varying between 64 and 640kbps.

1.5.3 The distance limitation on the ADSL is due to small amplifiers called loading coils that the telephone company uses to boost voice signals. As these loading coils are incompatible with ADSL signals, a voice coil in the loop between the telephone and the LE will disqualify the customer from receiving ADSL.

1.6 DSL Transceiver (ATU-R)

1.6.1 Most residential customers call their DSL transceiver a "DSL modem." The engineers at the telephone company or ISP call it an ATU-R. Regardless of what it's called, it's the point where data from the user's computer or network is connected to the DSL line.

1.6.2 The transceiver can connect to a customer's equipment in several ways, though most residential installation uses USB or 10 base-T Ethernet connections. While most of the ADSL transceivers sold by ISPs and telephone companies are simply transceivers, the devices used by businesses may combine network routers, network switches or other networking equipment in the same platform.

1.7 Digital Subscriber Line Access Multiplexer (DSLAM)

1.7.1 A DSLAM at the Access Provider’s site is the equipment that really allows DSL to happen. The DSLAM takes connections from many customers and aggregates them onto a single, high-capacity connection to the Internet. DSLAMs are generally flexible and able to support multiple types of DSL in a single central office, and different varieties of protocol and modulation - both CAP and DMT, for example -- in the same type of DSL.

1.7.2 In addition, the DSLAM may provide additional functions including routing or dynamic IP address assignment for the customers. The DSLAM provides one of the main differences between user service through ADSL and through cable modems. Because cable-modem customers generally share a network loop that runs through a neighborhood, adding customers means lowering performance in many instances.

1.7.3 ADSL provides a dedicated connection from each user back to the DSLAM, meaning that customers won't see a performance decrease as new customers are added -- until the total number of customers begins to saturate the single, high-speed connection to the Internet. At that point, an upgrade by the service provider can provide additional performance for all the customers connected to the DSLAM.

1.8 High Bit-rate Digital Subscriber Line (HDSL)

1.8.1 HDSL, one of the earliest forms of DSL, is used for wideband digital transmission within a corporate site and between the telephone company and a customer. The main characteristic of HDSL is that it is symmetrical: an equal amount of bandwidth is available in both directions.

1.8.2 HDSL can carry as much on a single wire of twisted-pair cable as can be carried on a T1 line (up to 1.544 Mbps) in North America or an E1 line (up to 2.048 Mbps) in Europe over a somewhat longer range and is considered an alternative to a T1 or E1 connection.

1.9 Symmetric Digital Subscriber Line (SDSL)

1.9.1 SDSL is similar to HDSL with a single twisted-pair line, carrying 1.544mbps (the US. and Canada) or 2.048mbps (Europe) each direction on a duplex line. It's symmetric because the data rate is the same in both directions.

1.10 Very High Data Rate Digital Subscriber Line (VDSL)

1.8.3 VDSL is a developing technology that promises much higher data rates over relatively short distances (between 51 and 55mbps over lines up to 1,000 feet or 300 meters in length). It is envisioned that VDSL may emerge somewhat after ADSL is widely deployed and co-exist with it. The transmission technology (CAP, DMT, or other) and its effectiveness in some environments are not yet determined. A number of standards organizations are working on it.

1.11 G.Lite

1.11.1 ITU has come out with a variant ADSL solution in its Recommendation G.992.2, also known as G.Lite, that is very easy to deploy in the customer premises because it is ‘splitter-less’. It needs a very simple serial filter that separates voice and data and does not call for any rewiring at the customer premises.

1.11.2 Speeds are up to 1.5mbps downstream and 285kbps upstream. Some PC suppliers are already marketing PC equipment with integrated G.Lite-ADSL modems so that standard universal solutions can be rolled out in a large scale in the residential market.

1.12 Summary of DSL Technologies

Table 2: DSL Summary table

DSL Type	Description	Data Rate Downstream; Upstream	Distance Limit	Application
HDSL	High bit-rate Digital Subscriber Line	1.544 Mbps duplex on two twisted-pair lines; 2.048 Mbps duplex on three twisted-pair lines	12,000 feet on 24 gauge wire	T1/E1 service between server and phone company or within a company; WAN, LAN, server access
ADSL	Asymmetric Digital Subscriber Line	1.544 to 6.1 Mbps downstream; 16 to 640 Kbps upstream	1.544 Mbps at 18,000 feet; 2.048 Mbps at 16,000 feet; 6.312 Mbps at 12,000 feet; 8.448 Mbps at 9,000 feet	Used for Internet and Web access, motion video, video on demand, remote LAN access
SDSL	Symmetric DSL	1.544 Mbps duplex (U.S. and Canada); 2.048 Mbps (Europe) on a single duplex line downstream and upstream	12,000 feet on 24 gauge wire	Same as for HDSL but requiring only one line of twisted-pair
VDSL	Very high Digital Subscriber Line	12.9 to 52.8 Mbps downstream; 1.5 to 2.3 Mbps upstream; 1.6 Mbps to 2.3 Mbps downstream	4,500 feet at 12.96 Mbps; 3,000 feet at 25.82 Mbps; 1,000 feet at 51.84 Mbps	ATM networks; Fiber to the Neighborhood
G.Lite	"Splitter less" DSL without the "truck roll"	From 1.544 Mbps to 6 Mbps, depending on the subscribed service	18,000 feet on 24 gauge wire	The standard ADSL; sacrifices speed for not having to install a splitter at the user's home or business

Annexure 2: International Scenario with Respect to ANE

1.1 Approaches to Unbundling of Network Elements

1.1.1 Unbundling of network elements has already taken place in various parts of the world but the approach appears to be limited to the elements of the network within the local loop.

1.1.2 In contrast, CMA provides for a wider and flexible framework beyond the conventional limits of network elements within the local loop. It will, however, be useful to take a look at various international scenarios in which the access to network elements has been introduced.

1.2 Local Loop Unbundling (LLU)

1.2.1 Different countries have different view on LLU and also the extent to which it has been implemented.

1.2.2 By the end of April 2002, 23 OECD countries have introduced or at least legislated LLU. This is a significant increase since 1999 when only 12 countries implemented and adopted policies on LLU.

1.2.3 There are currently 7 OECD countries that have not yet implemented LLU: the Czech Republic, Mexico, New Zealand, Poland, the Slovak Republic, Switzerland and Turkey.

1.2.4 Among these countries, the Czech Republic, and the Slovak Republic are currently planning to introduce LLU following the establishment of EC unbundling Regulations.

1.2.5 In New Zealand, the Telecommunications Act 2001 requires the Commerce Commission to report to the Government within 24 months on whether the unbundled elements of NZ Telecom's local network should be regulated service under the Act.

1.2.6 Mexico has no plans for full unbundling although the Regulator has indicated that they may require line sharing for Internet access.

1.2.7 Turkey still has a monopolistic telecommunications market but is considering introducing LLU after the termination of monopoly in 2004.

1.2.8 Although the Swiss' regulator has been trying to introduce the LLU, a court case initiated by the incumbent has resulted in a ruling by the Swiss Federal Court in March 2001 that Swisscom's local loop s should not be opened to effective competition immediately, because there was already effective competition in the local loop by virtue of new technologies.

1.2.9 In April 2002 the Government indicated that they would try to introduce LLU by 2002 by revising the Telecommunication Service Ordinance. In August 2002, the Federal Council decided in favour of a PC procedure on a partial revision of the

telecommunications law and a decree on telecommunications services to introduce LLU.

1.2.10 Countries such as the Netherlands and Canada considered LLU as an interim measure to build up service-based effective competition. Canada adopted a sunset clause while introducing the LLU wherein LLU would be available in urban areas only for a limited period of five years whereas for higher areas (rural and remote) LLU would be available for indefinite period.

1.2.11 In the Netherlands, the early framework for the implementation of LLU in 1998 foresaw that the price for LLU would increase in increments over a period of 5 years after which the price could be set by the incumbent on a commercial basis. The regulator in its guidance for MDF access also made provisions for the incumbent to refuse in a specific exchange to provide access to the MDF if it could show that no capacity was available at that exchange.

1.2.12 There is a great deal of difference in the state of deployment of LLU in different countries. The US has so far unbundled 5.5% of their total line of the local loop whereas Canada has done with 4% of their lines. The US with the longest history of LLU, increased the ratio of unbundled loops to total lines from 21% in December 1997 to 7.2% in December 2001.

1.2.13 The detailed requirements in implementing LLU has meant that in many countries, despite the fact that legislation and regulatory requirements mandates LLU, the actual arrangements for implementation have slowed progress in actual unbundling. For example, in Ireland incumbent's Access Reference Offer, the line sharing manual and the co-location process were agreed to by industry in early 2002 after nearly two years of discussion.

1.2.14 The following table depicts the implementation status of LLU in OECD countries.

Table 3: Status on Implementation of LLU in OECD Countries (1.4.2002)

Australia	LLU was mandated by the decision of the regulator Australian Effective competition and Consumer Commission (ACCC) in July 1999 with different pricing structures in different geographical areas After publishing a draft report on LLU pricing in August 2000, the ACCC issued a final Report in April 2002
Austria	The use of LLU was made possible with the Austrian Telecommunications Act coming into force in January 1998. The incumbent Telekom Austria, having significant market power, is subject to LLU The current version of the reference unbundling offer (RUO) is of January 2002
Belgium	LLU was introduced in October 2000 by the Belgian Council of Ministers. The incumbent first issued an RUO in December 2000, which has been examined several times by the national regulatory authority
Canada	LLU was introduced by a decision of the regulator CRTC in 1997 with different unbundling requirements in rural and metropolitan areas. The requirement of LLU in lower cost areas was put in place for a period of five years starting from 1997 A decision was made in 2001 subjecting local loops in urban areas to unbundling requirements on indefinite basis
Czech Rep.	LLU has not been introduced yet, however, the government is currently planning to introduce LLU
Denmark	LLU was mandated as a matter of law in July 1998. The incumbent Tele Denmark published a revised standard RUO for full unbundling and new standard offer for line sharing in January 2001 With the alteration of the Danish Executive Order on Reference Offers in October 2001, it was mandated that Tele Denmark should publish a RUO on bitstream access. In a further revised RUO published in March 2002, access to sub-loops has been provided
Finland	LLU was mandated in June 1997 following a ruling by the Finish government. Since then, incumbents have published RUOs in line with EC unbundling regulation Amendments to the Telecommunications Market Act in January 2001 provided regulations on line sharing. Bitstream access is not mandatory, but is currently available
France	LLU was mandated in January 2001 under Decree 2000-881 of September 2000. France Télécom has published its standard offer for

	local loop access and since June 2002, has complied with the functional and tariff requirements of the ART Decision of April 2002
Germany	LLU was mandated in the Ordinance on Special Network Access on the basis of German Telecommunications Act in 1996. The incumbent DT renewed its LLU Standard Offer in November 2001. Line sharing was mandated by the regulator RegTP in March 2001 As of January 2002, nearly 100 contracts have been concluded between DT and other service providers for fully unbundled subscriber lines. Regarding line sharing, DT is currently carrying out contract negotiations with potential customers
Greece	LLU was mandated by the regulator EETT in January 2001, although LLU was provided by the incumbent OTE on a case-by-case basis prior to this decision In May 2001, the EETT approved the RUO of the incumbent
Hungary	LLU was legally mandated by the new Communications Act in December 2001. However, LLU has not yet been introduced in practice
Iceland	LLU was mandated in October 2001. However, the EC unbundling regulation has not been implemented. Even though the incumbent Iceland Telecom (Siminn) is not legally obliged to publish a RUO, it published a Standard Offer for LLU in October 2000
Ireland	Full LLU came into force in December 2000, although only 7 fully unbundled loops have been taken up. The incumbent eircom published an initial RUO in December 2000. This RUO has been modified a number of times by the regulator ODTR In September 2001, eircom announced a wholesale offer with the intention of launching wholesale and retail bitstream offers in October 2001. ODTR reviewed pricing and was forced to delay the launch as eircom had not complied with their obligations to ensure cost orientation, and there were concerns over a possible margin squeeze In April 2002, eircom published a revised Wholesale Bitstream Offer, which was approved by the ODTR. Retail service was launched in May 2002. As of May 2002, eircom had 619 customers. Other developments during 2001–2002 include: January–May 2001: 5 documents including a direction to eircom to reduce pricing (resulting in legal challenge), a decision on information to be provided, and a direction on service level agreements have been published September 2001-January 2002: The Industry operational forum commenced to facilitate Esat requests for physical co-location in 40

	exchanges. A first site is offered to Esat in December 2001. Currently 40 site offers have been made to Esat, and 12 sites are operational April 2002: LRIC Industry Advisory Group was set up to advise on LRIC for Access Network April 2002: Copper Loop Frequency Management Plan was published. June 2002: Access Reference Offer (ARO) was updated to include sub loop unbundling
Italy	LLU was mandated by an Italian Ministerial Decree in April 1998. In November 1998, an AGCOM decision started the implementation process (decision 1/98/CIR). In March 2000 (decision 2/00/CIR), AGCOM issued guidelines for the implementation of LLU and broadband DSL services In December 2000, AGCOM defined the procedures for the selection and allocation of co-location spaces (decision 13/00/CIR). In May 2000, Telecom Italia published a Reference Offer for LLU. In December 2000, AGCOM verified Telecom Italia's 2000 Offer and imposed some modifications (decision 14/00/CIR) In July 2001, AGCOM introduced new detailed guidelines and issued procedural rules to implement LLU (decision 15/01/CIR). In November 2001, AGCOM issued a decision on technical, economic and procedural aspects for line sharing and for sub-loop unbundling (decision 24/01/CIR). In February 2002, AGCOM imposed modifications on Telecom Italia's 2001 Reference Offer (decision 4/02/CIR)
Japan	LLU was mandated by the amendments of Telecommunications Business Law in June 1997. The amendments of Ministerial Decree for Telecommunications Business Law in September 2000 specified the details of LLU Unbundling of fibre-optic facilities was also mandated by the Ministerial Decree in April 2001
Korea	LLU was introduced by the amendment of Telecommunication Business Act in January 2001 The government (MIC) issued Public notification of LLU requirements and standards and full implementation of LLU, which lead to the opening and sharing of KT's copper line and network
Luxembourg	LLU was mandated in December 2000 The incumbent EPT issued a RUO in October 2001 and got an approval from the regulator ILR

Mexico	Basis for local service provision was established in 1999, but effective competition is stalled due to disputes on interconnection rules. LLU is not under active consideration
Netherlands	LLU (MDF access) was mandated by the regulator OPTA at the end of 1997 The incumbent KPN issued a revised RUO in September 2001, which is currently under examination by the OPTA.
New Zealand	LLU has not been mandated
Norway	LLU was implemented by the incumbent Telenor in the absence of regulations in April 2000 The EC Unbundling Regulation came into force in October 2001. ARUO has been available since December 2000, which is currently under examination by the regulator NPTA
Poland	Provisions on LLU will be introduced to the Telecommunications Law (Act of July 21 2000) by the amendments which will enter into force in March 2003. The secondary legislation (legislation on LLU) is being drafted and will enter into force in the beginning of 2003
Portugal	LLU was mandated by the regulator ANACOM in December 2000. Following a PC on effective competition in local access, launched in July 2000, ANACOM published in November 2000 a Deliberation on LLU which defined the following objectives i. the notified operator should present a draft Reference Offer until 30 November 2000, which should encompass, at least, the elements determined by ANACOM that generally reflect the Annex to the LLU Regulation; and ii. efforts should be made to start LLU offering from 31 December 2000. A revised RUO was published in October 2002
Slovak Republic	LLU has not been introduced but is under consideration
Spain	LLU was mandated by Royal Decree in December 2000. Telefonica's first RUO was approved with a set of modifications by the Ministry of Science and Technology in December 2000 Since January 2001, the regulator CMT has implemented administrative proceedings for the revision of the RUO. Several interim measures were taken in 2001 to respond to market needs (e.g. co-location) All these have been consolidated in the new RUO adopted in May 2002. New prices were also approved by CMT with an average reduction of 25%

Sweden	LLU was implemented by the incumbent Telia in March 2000. The prices for LLU are published in Telia's RUO, but have not been approved by the regulator PTS
Switzerland	LLU has not been introduced yet. The Swiss Federal Court ruled in October 2001 that the incumbent Swisscom's local loops should not be opened to effective competition immediately. However, the government is planning to introduce LLU In July 2002, the Federal Council decided to open a PC procedure for revision of the telecommunications law to introduce LLU In February 2003, the Federal Council decided to introduce LLU as rapidly as possible at the decree level. It will introduce LLU obligations within the framework of the current revision of the Telecommunications Law
Turkey	LLU has not been introduced
UK	LLU was mandated through a licence condition of the incumbent BT in April 2000, which came into effect in August 2000. The regulator Oftel published guidelines on the application of the licence condition in September 2000 It has also published numerous documents including 14 formal actions concerning the prices that BT must charge and services that BT must offer
US	LLU and transport were mandated by the Telecommunications Act in 1996. In November 1999, the regulator FCC issued rules on unbundling of network elements including sub-loops and dark fibre However on 21st February 2003, FCC adopted and Order revising the rules under which incumbent local exchange carriers (ILECs) must make unbundled network elements available to new entrants. According to this order the following elements are no longer subject to unbundling requirements i. broadband fiber to the home; iii. broadband fiber to the neighborhood (HFC) using packet switching capabilities; iv. line sharing; and v. local circuit switching for business customers served by high capacity loops

Source: OECD