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Conference Paper

Network neutrality: Hong Kong's perspectives

8th Asia-Pacific Regional Conference of the International Telecommunications Society (ITS):
"Convergence in the Digital Age", Taipei, Taiwan, 26th-28th June, 2011

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Au, Man Ho (2011) : Network neutrality: Hong Kong's perspectives, 8th Asia-Pacific Regional Conference of the International Telecommunications Society (ITS): "Convergence in the Digital Age", Taipei, Taiwan, 26th-28th June, 2011, International Telecommunications Society (ITS), Calgary

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Network Neutrality – Hong Kong’s Perspectives

Man Ho AU*

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Abstract

The next generation broadband infrastructure will provide access to two categories of content, applications and services – those delivered over the Internet and those provided on the managed networks of the infrastructure. This paper addresses the question of whether operators of broadband infrastructures have the incentives to engage in discriminatory practices in the provision of access to content, applications and services on the Internet and the managed networks and what should be the appropriate regulatory response to address such practices. In particular, the paper will examine the issues from the perspectives of the Hong Kong environment where facilities-based competition has materialised and the end-users have wider choice of broadband access services than in countries where monopoly or significant market power still exists in the supply of access services.

On the basis of theoretical considerations and empirical evidence from the market, this paper examines four questions. First, in the highly competitive market in Hong Kong, would there still be incentives for access providers to engage in discriminatory practices against content, applications and services on the Internet and on the managed networks? Second, would such discriminatory practices lead to “market failures”? Third, are the existing laws able to cope with the discriminatory practices if they should lead to “market failures” that justify regulatory intervention? Fourth, should new regulation be introduced to tackle the discriminatory practices?

This paper argues that in the competitive environment of Hong Kong, incentives for access providers to engage in discriminatory practices may still exist, particularly in the provision of carriage services over the managed networks. So long as the Internet remains open as a communications infrastructure, discriminatory practices over the managed networks should not cause concerns from the public interest perspectives. However, in the future, the best-effort Internet may become inadequate as a communications infrastructure for all types of content, applications and services. Discriminatory practices over the managed networks would obstruct the achievement of the public interest goal of having an open communications infrastructure to serve the society. The existing telecommunications and competition laws are not entirely effective to tackle discriminatory practices against content, applications and services on both the Internet and the managed networks that are found to be contrary to public interests. However, as the future developments of the Internet and the managed networks are far from clear, it is premature to introduce new regulation to tackle the discriminatory practices. At this stage, the recommendable approach for the regulator is to adopt proportionate measures to keep the best-effort Internet open and maintain competition between the content, applications and services provided on the Internet and those on the managed networks.

1. Introduction

Development of the next generation broadband infrastructure, with much increased speeds and capacity to meet future demands, has become a key element of the information communications technology (ICT) policies of developed countries.¹ End-users connected to the broadband infrastructure are capable of accessing two categories of content, applications and services – first, those delivered over the Internet and second, those provided on the managed networks of the infrastructure², sometimes referred to as “managed” or “specialized” services.³

The Internet is a globally interconnected network of networks. The characteristics of the Internet are its “openness” and “end-to-end” design. “Openness” means that any provider of content, applications and services may launch its products on the Internet and be able to reach the global mass of Internet users without seeking permission from, or entering into agreements with, the operators of the access networks which connect the users to the Internet. “End-to-end” design is an attribute to achieve “openness”, because the intelligence for the operation of content, applications and services resides at the edge of the Internet within the control of the providers of those products while the Internet has minimal intelligence and functions only to transmit packets from end to end⁴ on a “best-effort” basis without providing guaranteed quality of service (QoS) for the delivery.

In contrast, managed services are operating in a more controlled environment. Managed services are operated over the managed Internet Protocol (IP) networks of the network operators. The QoS of the service delivery is guaranteed by the network operators. Intelligence may reside inside the networks and support innovations and

¹ For example, Department for Culture Media and Sport (United Kingdom) & Department for Business Innovation and Skills (United Kingdom), "Digital Britain Final Report" (2009), Report published in June 2009, pp. 58 - 64; Federal Communications Commission, "Connecting America: The National Broadband Plan" (2010), Report published on 16 March 2010; Communications and the Digital Economy (Australia) Department of Broadband, "New National Broadband Network" (2009), Media Release, 7 April 2009.

² The managed networks of the infrastructure correspond to the “Next Generation Network (NGN)” defined by the International Telecommunication Union as “a packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS [Quality of Service]-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.” See International Telecommunication Union Telecommunication Standardization Sector (ITU-T) Recommendation Y.2001 (12/2004).

³ The term “managed or specialized services” was used by the US Regulator in the October 2009 Notice of Proposed Rulemaking on the introduction of network neutrality regulation. See Federal Communications Commission, "Notice of Proposed Rulemaking in the matter of Preserving the Open Internet, and Broadband Industrial Practices" (2009), FCC 09-93 adopted on 22 October 2009, p. 53.

⁴ Lemley and Lessig (2001) describe “end-to-end” design as follows: “[The end-to-end argument] counsels that the ‘intelligence’ in a network should be located at the top of a layered system – at its ‘ends’, where users put information and applications onto the network. The communications protocol themselves (the ‘pipes’ through which information flows) should be as simple and as general as possible.” See Mark A. Lemley & Lawrence Lessig, "The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era" (2001) 48 *UCLA Law Review* 925, pp. 930 – 931.

security of the managed services. The managed services are operated by the network operators or third-parties with whom the network operators have entered into agreements. Hong Kong operators providing broadband access services to end-users (“access providers”) are already providing QoS assured channels over the access networks for their own Internet Protocol television (IPTV) and IP-based telephone services. Examples of other managed services often mentioned are high-quality video conference services, virtual private network services, cloud computing services, smart grid services, tele-educational services and tele-medical services.⁵

Content, applications and services provided over the Internet and the managed networks will co-exist and compete with each other in the foreseeable future.⁶ Some applications such as Voice over Internet Protocol (VoIP) and IPTV are available both on the Internet and the managed networks. So far the concerns about discriminatory treatment of content, applications and services by access providers, in the so-called “network neutrality” (or “net neutrality”) debates, have focused on those provided over the Internet, but not on the managed networks.

“Network neutrality” in essence means the non-discriminatory treatment of data packets transmitted over the Internet by network operators, including the access providers, involved in the routing and transmission, irrespective of their origins, destinations, applications or content.⁷ A common concern about discriminatory practices is that the access providers may themselves provide content, applications or services, or be affiliated with providers of such products (referred to as “content providers” in the remainder of this paper⁸) in the market. In order to improve the market position of their own products or those of affiliated providers, the access providers may degrade the quality of transmission of, or in the extreme block, the traffic of competing content providers.

Another concern is about the establishment of different tiers of services for the transmission of traffic over the Internet. The access providers may provide the

⁵ See, for example, AT&T Inc., “Comments of AT&T Inc. in the Matter of Preserving the Open Internet (GN Docket No. 09-191) and Broadband Industry Practices (WC Docket No. 07-52)” (2010), Submission to the FCC 14 January 2010, p. 7; Federal Communications Commission, “Notice of Proposed Rulemaking in the matter of Preserving the Open Internet, and Broadband Industrial Practices”, para. 150.

⁶ For a view on the competition between the Internet and NGN services, see Electronic Communications Committee (ECC) within the European Conference of Postal and Telecommunications Administrations (CEPT), “Next Generation Network Developments and Their Implications for the New Regulatory Regime” (2003), ECC Report 27, pp. 10 – 13.

⁷ There is no unified definition for “network neutrality”. Issues raised by “network neutrality” proponents include “blockage and degradation of non-favoured content and applications”, “charging content and applications providers for prioritized data delivery”, “vertical integration” of access providers, preserving “innovation at ‘edge’ of the Internet”, freedom of “political and other expression on the Internet”, “exclusive content and balkanization of Internet”, etc. See Federal Trade Commission, “Broadband Connectivity Competition Policy” (2007), FTC Staff Report, June 2007, pp. 52 – 60 and 79 – 80. Others refer to “mandating interconnection, non-discrimination, rate regulation and the adoption of standardized interfaces such as TCP/IP”. See Barbara Van Schewick, “Towards An Economic Framework for Network Neutrality Regulation” (2007) 5 *Journal on Telecommunications & High Technology Law* 329, pp. 333 - 334. Non-discriminatory treatment of data packets in their transmission is by far the commonest theme in network neutrality propositions.

⁸ In this context, “content providers” may also include operators of platforms, such as aggregators of video content, and operators of application stores and application clouds, that host the content, applications and services.

prioritised channels for the traffic of their own content, applications or services, or those of the affiliated content providers, or the content providers who are willing to pay the higher level of charges, leaving the “slow lanes” (the non-prioritised channels) to non-affiliated content providers or those who are not willing to pay. Some consider that the provision of different grades of service at different charges is not, in itself, discrimination, but if the access providers should refuse to supply the prioritised channels to non-affiliated content providers, such practices may be discriminatory.⁹

“Network neutrality” issues have been hotly debated in the United States (US) for many years¹⁰ and the debates have spread outside the US in recent years, but so far there has been little public attention to this issue in Hong Kong, probably due to the intense market competition in the supply of broadband Internet access services.

On the basis of theoretical considerations and empirical evidence from the market, this paper examines four questions. First, in the highly competitive market in Hong Kong, would there still be incentives for access providers to engage in discriminatory practices¹¹ against content, applications and services on the Internet and on the managed networks (Section 3)? Second, would such discriminatory practices lead to “market failures” (Section 4)? Third, are the existing laws able to cope with the discriminatory practices if they should lead to “market failures” that justify regulatory intervention (Section 5)? Fourth, should new regulation be introduced to tackle the discriminatory practices (Section 6)?

This paper argues that in the competitive environment of Hong Kong, incentives for access providers to engage in discriminatory practices may still exist, particularly in the provision of carriage services over the managed networks. So long as the Internet remains open as a communications infrastructure, discriminatory practices over the managed networks should not cause concerns from the public interest perspectives. However, in the future, the best-effort Internet may become inadequate as a communications infrastructure for all types of content, applications and services. The bandwidth-intensive and delay-sensitive content, applications and services may need to be delivered over the managed networks in order to achieve quality of service that meets users’ expectation. In this case, discriminatory practices over the managed networks would obstruct the achievement of the public interest goal of having an open communications infrastructure to serve the society. This paper finds that the existing

⁹ C. Scott Hemphill, "Network Neutrality and the False Promise of Zero-Price Regulation" (2008) 25 *Yale Journal on Regulation* 135, p. 143; J. Gregory Sidak, "What is the Network Neutrality Debate Really About" (2007) 1 *International Journal of Communication* 377, p. 384; Jonathan E. Nuechterlein, "Antitrust Oversight of an Antitrust Dispute: An Institutional Perspective on the Net Neutrality Debate" (2009) 7 *Journal on Telecommunications and High Technology Law* 19, p. 33.

¹⁰ There is a large body of literature on network neutrality in the US. The earliest article widely cited is Tim Wu, "Network Neutrality, Broadband Discrimination" (2003) 2 *Journal on Telecommunications and High Technology Law* 141, pp. 141 – 175. For an overview of the issues on “network neutrality”, see Paul Ganley & Ben Allgrove, "Net Neutrality: A User's Guide" (2006) 22 *Computer Law & Security Report* 454, pp. 454 - 463; Rob Frieden, "A Primer on Network Neutrality" (2008) *Intereconomics*, January/February 2008, pp. 4 – 15.

¹¹ In this context, the term “discriminatory practices” does not necessarily carry a negative connotation. Discrimination is part of normal business practices when the operator is not obliged by law to deal with customers on a non-discriminatory basis. Thus in the absence of regulation, access providers may decide whether, and on what terms, carriage services are to be provided to third-party content providers. The access providers are also expected to provide more than one grade of QoS over the managed networks.

laws are not entirely effective to tackle discriminatory practices against content, applications and services on both the Internet and the managed networks that are found to be contrary to public interests. However, as the future developments of the Internet and the managed networks are far from clear, it is premature to introduce new regulation to tackle the discriminatory practices. At this stage, the recommendable approach for the regulator is to adopt proportionate measures to keep the best-effort Internet open and maintain competition between the content, applications and services provided on the Internet and those on the managed networks.

The remainder of this paper is structured as follows. Section 2 introduces the Hong Kong environment. Sections 3 to 6 deal with the four questions examined in this paper. Section 7 draws some conclusions.

2. The Hong Kong Environment

In Hong Kong, the government has adopted market-driven policies in the telecommunications sector. As self-built customer access networks of competitors to the fixed network incumbent have extensive coverage of the households, mandatory access to the incumbent's local loops for competitors has been withdrawn in phases from July 2004 and fully terminated by 30 June 2008.¹² The regulator has declared that mandatory access to the incumbent's unbundled local loops after June 2008 will be considered in situations where it can be established that the local loops constitute "essential facilities".¹³ The regulator has stated its intention to scale back *ex ante* regulation as the market becomes more competitive and its strategy will be to rely on facilities-based competition to promote investment in the next generation broadband infrastructure. There is no government policy to invest, or subsidise the investment, in the next generation infrastructure.¹⁴

The high population and building densities in Hong Kong have enabled the parallel rollout of fibre-based networks to serve the consumer market. Four fixed broadband networks connected to domestic premises are in operation.¹⁵ They are based on Digital Subscriber Line (DSL), fibre-to-the-building, fibre-to-the-home and cable modem technologies, providing domestic customers with a wide choice of downloading and uploading speeds, up to 1 Gigabits per second, symmetrical or unsymmetrical, although the more widely available connection speeds are up to 100 Megabits per second.¹⁶ According to information from the Office of the Telecommunications Authority (OFTA) in Hong Kong, at the end of 2010, 86% of

¹² Mandated access to the local loops from the telephone exchanges has been withdrawn, but mandated access to the in-building wiring systems is still available should commercial negotiations for access fail. Office of the Telecommunications Authority (Hong Kong), "Review of Type II Interconnection Policy" (2004), Statement of the Telecommunications Authority, 6 July 2004, para. 16, available at <http://www.ofta.gov.hk/en/tas/interconnect/ta20040706.pdf> (last visited 9 April 2010)

¹³ *Id.*, paras. 1 and 5.

¹⁴ Office of the Telecommunications Authority (Hong Kong), "Development of Broadband Infrastructure in Hong Kong" (2009), Regulatory Affairs Advisory Committee Paper No. 4/2009, available at <http://www.ofta.gov.hk/en/ad-comm/raac/raacpaper.html> (last visited 9 April 2010).

¹⁵ Operated by PCCW, Hutchison, Hong Kong Broadband Network and i-Cable.

¹⁶ Data from the websites of PCCW Netvigator at <http://www.netvigator.com/> (last visited 8 April 2011), Hutchison Broadband at <http://www.hgcbroadband.com/home.html> (last visited 8 April 2011), Hong Kong Broadband Network at <http://www.hkbn.net/bb1000/> (last visited 8 April 2011) and i-Cable at <http://www.i-cable.com/> (last visited 8 April 2011).

households have choice of at least two broadband fixed access networks while 70% of households have choice of at least three such networks.¹⁷ In addition, four third-generation (3G) wireless networks, incorporated with the High-Speed Packet Access (HSPA) or Evolved HSPA (HSPA+) technologies, are in operation¹⁸, providing wireless access to fixed, mobile or nomadic customers although they are not yet viable substitutes for the wireline networks as far as next generation access is concerned, at least not until the wireless networks have been upgraded to the fourth-generation (4G) technologies. In recent years, OFTA has auctioned off additional spectrum usable for the capacity expansion and upgrading of the wireless networks to 4G technologies.¹⁹

Facilities-based competition based on independent infrastructures is regarded by many scholars as the ideal form of competition.²⁰ It is sustainable without regulatory intervention. It also enables product differentiation as different competitors operate independent infrastructures to serve their customers. This form of competition has been achieved in Hong Kong and is apparently sustainable. The natural monopolistic characteristics of the access networks have been diluted by the high population and building densities. Compared with the situations in other regions such as US and Europe, the incentives and ability of the access providers to engage in discriminatory practices are much diminished.

However, in an environment which relies on facilities-based competition, the number of independent infrastructures that can be sustained is bound to be limited due to economy of scale and the limitation of space on and underneath the pavements of public streets to accommodate cable ducts and manholes. This is so even in the more densely populated areas in Hong Kong. Furthermore, even though there are now four independent infrastructures for fixed broadband access services in operation, the actual choice available to the end-users at a given location will be less due to non-overlapping coverage of the networks. The data from OFTA on choice of broadband fixed networks have combined the coverage of the current generation and next generation broadband fixed access. Current generation access can be provided over local loops from telephone exchanges using DSL technologies. Next generation

¹⁷ Presentation by the Director-General of Telecommunications, OFTA to the media on 24 January 2011, obtainable at <http://www.ofta.gov.hk/en/speech-presentation/2011/20110124.pdf> (last visited 26 January 2011).

¹⁸ Operated by CSL, Hutchison, Vodafone-Smartone and PCCW.

¹⁹ OFTA has auctioned spectrum in the 2.5/2.6 GHz bands and 850/900 MHz bands in 2009 and 2011 respectively. See OFTA press releases of 22 January 2009 available at http://www.ofta.gov.hk/en/press_rel/2009/Jan_2009_r1.html and 3 March 2011 available at http://www.ofta.gov.hk/en/press_rel/2011/Mar_2011_r1.html (last visited 28 March 2011).

²⁰ For example, Cave (2004) and Friederiszick, et al. (2008) consider that facilities-based competition can deliver product differentiation, innovation and lower regulatory costs (less need for regulatory intervention). In comparison, service-based competition often only offers price competition enabled by regulation. To Hausman and Sidak (2007), “the end-point of competitive local markets should be facilities-based competition” and should not be “regulation forever”. See Martin Cave, “Making the Ladder of Investment Operational” (2004), Downloadable from <http://www.ictregulationtoolkit.org/en/Publication.2916.html>, p. 1; Hans Friederiszick, et al., “Analyzing the Relationship between Regulation and Investment in the Telecom Sector” (2008) *ESMT White Paper* No. WP-108-01, p. 11; Jerry Hausman & J. Gregory Sidak, “Telecommunications Regulation: Current Approaches with End in Sight” (2007), NBER Conference on Economic Regulation and Its Reform: What Have We Learned, Conference held in 2005 (Paper revised in October 2007), p. 1.

access requires fibre rollout to locations much closer to the consumers' premises. The coverage of the next generation broadband fixed access networks will be smaller and the number of choices of next generation fixed access networks available to households is expected to be lower than the data published by OFTA.

It can also be expected that a considerable percentage of households in the less densely populated areas cannot be reached by next generation fixed access networks in the medium term if reliance is made entirely on market forces for network rollout. Even if some of these households will ultimately be connected by fibre-based networks, it is unlikely that the households will be connected by more than one such network based on commercial considerations. These households have to wait for the upgrading of the wireless networks to 4G technologies before meaningful choice of next generation access networks is available to them.

The choices to the end-users can be expanded if the infrastructure operators would open their networks to access-based or service-based competitors. However, although price competition at the retail level among the facilities-based network operators is intense, the operators adopt similar policies towards network openness to service-based providers. No wholesale products are offered to service-based competitors for the higher-bandwidth broadband access services for the mass market. Service-based competitors for residential customers are practically non-existent in the market.

For the above reasons, despite the existence of facilities-based competition, the barriers for end-users at certain locations to switch suppliers of broadband access services, particularly next generation access services, may be substantial. How this would impact on the ability and incentives of the access providers to engage in discriminatory practices will be examined below.

3. Are There Incentives to Engage in Discriminatory Practices in the Hong Kong Environment?

3.1 Theoretical Considerations

When scholars discuss discriminatory practices by suppliers in a primary market against goods or services in a secondary market, they are normally concerned with suppliers that are in a monopoly position in the primary market. Chicago School theorists argue that even a supplier in a monopoly position in the primary market does not have incentive to discriminate against goods or services in the secondary market. The monopoly supplier can capture the rent in the secondary market simply by raising the prices in the primary market. This is the so-called "one-monopoly-rent theory".²¹

The supplier of the primary goods or services will also benefit from a wide variety of goods and services competing in the secondary market. According to the "internalizing complementary efficiencies (ICE)" theory²² put forward by Farrell and Weiser (2003), a wide variety of goods and services in the secondary market will

²¹ Daniel F. Spulber & Christopher S. Yoo, *Networks in Telecommunications: Economics and Law* (New York: Cambridge University Press, 2009), p. 144.

²² Joseph Farrell & Philip J. Weiser, "Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age" (2003) 17 *Harvard Journal of Law & Technology* 85, pp. 100 - 103.

enhance the value of the primary goods or services to their users. According to Speta (2000)²³, a new broadband user increases the value of the broadband access service to existing users through the “indirect” network effect, by attracting more content to be hosted in the access network thereby making the access service more valuable to all users. Based on the ICE and indirect network effect arguments, the access provider would have the incentive to promote more content to be accessible from its network.

Many Post-Chicago School studies have identified the circumstances in which a monopoly or dominant supplier in the primary market may have the incentive to discriminate in the secondary market in order to increase its profit in the secondary market or reinforce its position in the primary market.²⁴ The “one-monopoly-rent theory” assumes that a number of market conditions are satisfied. For example, the primary market is unregulated and the complementary product in the secondary market is used in fixed proportion to the primary product. These conditions may not be satisfied.²⁵ Even the proposers of the ICE theory, Farrell and Weiser, have identified eight situations in which the monopoly supplier in the primary market may have the incentive to discriminate in the secondary market in order to increase its profit²⁶ – for example, when the monopoly supplier faces price regulation in the primary market so that it cannot raise prices there.²⁷ According to Van Schewick (2007), access providers that face “limited competition” in the access service market may have the incentive to discriminate against non-affiliated content, applications and services on the Internet.²⁸ Whether an access provider will actually engage in such discriminatory practices depends on whether the benefits from the blockage or discrimination exceed the costs.²⁹ For example, one of the potential benefits of discriminatory practices to the access provider is to safeguard the sales of the access provider’s or affiliated providers’ products in the complementary market. Another potential benefit is the maintenance of product differentiation that would reinforce the market position of the access provider in the primary market.³⁰ The principal cost of the discriminatory practices to the access provider is potential loss of customers due to customer dissatisfaction with the discriminatory practices.

²³ James B. Speta, "Handicapping the Race for the Last Mile?: A Critique of Open Access Rules for Broadband Platforms" (2000) 17 *Yale Journal on Regulation* 39, p. 80.

²⁴ For example, Pietro Crocioni, "Leveraging of Market Power in Emerging Markets: A Review of Cases, Literature, and a Suggested Framework" (2007) 4 *Journal of Competition Law and Economics* 449, pp. 458 – 467; Janusz A. Ordovery, et al., "Equilibrium Vertical Foreclosure" (1990) 80 *The American Economic Review* 127, pp. 127 – 128; Michael D. Whinston, "Tying, Foreclosure, and Exclusion" (1990) 80 *The American Economic Review* 837, p. 839; Dennis W. Carlton, "A General Analysis of Exclusionary Conduct and Refusal to Deal - Why *Aspen* and *Kodak* are Misguided" (2001) 68 *Antitrust Law Journal* 659, p. 669.

²⁵ See, for example, Crocioni, "Leveraging of Market Power in Emerging Markets: A Review of Cases, Literature, and a Suggested Framework", p. 458; Steven C. Salop, "Economic Analysis of Exclusionary Vertical Conduct: Where Chicago Has Overshot the Mark" in Robert Pitofsky (ed.) *How the Chicago School Overshot the Mark: The Effect of Conservative Economic Analysis on U.S. Antitrust* (Oxford: Oxford University Press, 2008), p. 145.

²⁶ Farrell & Weiser, "Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age", p. 105.

²⁷ *Id.*, p. 105 - 107.

²⁸ Van Schewick, "Towards An Economic Framework for Network Neutrality Regulation", p. 370.

²⁹ *Id.*, pp. 375 – 378.

³⁰ *Id.*, p. 374.

3.2 Considerations for the Hong Kong Environment

The foregoing theories and exceptions are concerning the incentives to discriminate of a monopoly operator in the primary market. In a competitive environment like Hong Kong, the access providers may lack the market power in the access service market that can be leveraged to affect competition in the market for content, applications and services. The access providers therefore lack the ability and incentives to engage in discriminatory behaviours towards the content providers. However, despite the relatively weak market power vis-à-vis the customers in the retail access service market, each access provider may still have a certain degree of market power vis-à-vis the content providers who need to use the access provider's service for the delivery of content, applications and services to the end-users connected by the access service, in a manner similar to the "terminating access monopoly" held by any network operator in relation to the end-users connected to its network for the termination of telephone calls.³¹ Such market power may, however, be constrained by the countervailing buyer power of the content providers and the ability of the end-users to switch to alternative suppliers in the market if they are dissatisfied with any degradation of the quality of transmission, or blockage, of the content, applications and services that they wish to access.³²

Even if the monopoly power of an access provider exists, according to the "one-monopoly-rent theory" there may be some level of access prices at which the access provider would be indifferent as to whether the content is provided by itself or by unaffiliated third parties. Thus the access provider may have no incentive to deny access to the non-affiliated content if the access price received is high enough. However, the ability of the access provider to charge this level of access price may be constrained by countervailing buyer power of the content providers and competition in the market³³ and if the revenue from providing access cannot offset the loss as perceived by the access provider, for example, due to diversion of revenue from its own content and applications, the access provider may still have the incentives to discriminate against the third-party content providers.

According to the theories on ICE and indirect network effect, a wider range of content accessible from access services would enhance the value of those services and should also be welcomed by the access providers even in a competitive environment. However, this may not necessarily be valid for all content and applications. Some less significant content or applications may be considered by the access providers as bringing marginal value to the access services only. Access providers may wish to exercise control over which content or applications are accessible in order to, for example, establish certain specialization, style or reputation of the access services. The access providers are expected to balance the various benefit and cost factors in the decision-making process of whether to engage in discriminatory practices. The

³¹ See Federal Trade Commission, "Broadband Connectivity Competition Policy", p. 77.

³² For example, see Nuechterlein, "Antitrust Oversight of an Antitrust Dispute: An Institutional Perspective on the Net Neutrality Debate", footnote 34 at pp. 34 – 35.

³³ The countervailing buyer power of the content provider would constrain the ability of an access provider to set access prices. The access provider is competing with other access providers in the same local market, or in the international market, in providing carriage services to end-users. The content providers may not be targeting a particular group of end-users (so if the access price of a particular access provider is too high, the content providers may seek to deliver the content, applications and services to other groups of end-users connected by other access providers).

benefits and costs of discriminatory practices to the access providers in the Hong Kong environment will now be examined.

Benefits

The benefits to the access providers will be discussed under four headings, protecting revenue from affiliated services, maintaining network differentiation, maintaining QoS and raising additional revenue through prioritised services.

(1) Protecting revenue from affiliated services

According to Van Schewick (2007), one of the benefits to the access providers for discriminatory behaviours is to protect revenue from the content, applications and services operated by the access providers themselves or affiliated providers.³⁴ Such benefits need not depend on complete monopolization of the content market.³⁵ All that is necessary is increased sales, because the price is typically above marginal costs in the production of the content, applications and services.

The four broadband access providers in Hong Kong are all vertically integrated operators in the sense that they all provide, or are affiliated with providers of, voice services and television services. The voice services are local and international telephone services provided using conventional or VoIP technologies. The television services are IPTV services provided over the broadband connections or conventional cable television services.³⁶

In Hong Kong, the intense competition in the primary market for the provision of broadband access means that profit margin is low. It is natural that the operators will attempt to increase, or at least to preserve, sale of services in the secondary market to enhance or safeguard profit. Revenue from local telephone services includes not only rental charges from the customers, but also payment of local access charges by other operators when the customers originate or receive international telephone calls.³⁷ Revenue from local and international telephone services still constitutes a significant proportion of the turnover of fixed network operators.³⁸ VoIP services provided over a broadband connection can provide alternatives for making local and international calls. The international calls can be much cheaper than the international telephone

³⁴ Van Schewick, "Towards An Economic Framework for Network Neutrality Regulation", p. 372 – 374.

³⁵ Id., p. 364 – 368.

³⁶ PCCW provides local and international telephone services and IPTV services under the brandname "NOW TV". PCCW has also entered into an agreement with TVB Pay services to deliver the latter's services over the former's IPTV platform. HGC provides local and international telephone services and is affiliated with TVB Pay services in delivering IPTV services. HKBN provides IP-based local and international telephone services as well as IPTV services. i-CABLE provides cable television services and is affiliated with another provider in the same corporate group providing local and international telephone services.

³⁷ Office of the Telecommunications Authority, "Local Access Charges of Fixed Telecommunications Network Services Operators Other than Hong Kong Telecom", at <http://www.ofta.gov.hk/en/tas/interconnect/ta990422.html> (last visited 28 March 2011).

³⁸ According to the financial report of PCCW for the year 2010, the revenue from local and international telephone services constituted about 34% of the core revenue of the company. The report is accessible at http://www.pccw.com/About+PCCW/Investor+Relations/Financial+Results?language=en_US&date=20100101&date=20101231&year=2010 (last visited 28 March 2011).

services provided using conventional means. Calls between users of IP-based services can be free of charge.³⁹ Some VoIP services are accessible using an instrument similar to the familiar telephone set thus enhancing the substitutability to non-technology savvy users.⁴⁰

As conventional telephone services face substitution by VoIP services and mobile services, revenue from content like television services will be increasingly important to integrated operators. Increased sale of television services will increase profit (or reduce loss) as many of the cost elements of content production are fixed. New technologies for delivering high-resolution television services over the Internet might threaten revenue from the television services provided by the access providers.⁴¹

One incident in Hong Kong in 2004 illustrates the possibility of access providers engaging in discriminatory practices in order to protect revenue from their own services. In 2004, one of the access providers, Hong Kong Broadband Network (HKBN) started to offer a VoIP service over the broadband connections of the incumbent operator, PCCW. HKBN complained that PCCW initially blocked the VoIP service for a few hours upon its launch and the blockage was not terminated until a complaint was made to the regulator.⁴² PCCW subsequently applied to court for an injunction to stop HKBN from offering the service. The justification was that HKBN offered the service in breach of the conditions of its licence and that HKBN had “free-ridden” on PCCW’s broadband connections.⁴³ Network operators may consider that content providers should pay a charge for the usage of their networks to carry the content.⁴⁴ The justification of PCCW in the 2004 incident, that the VoIP service of HKBN had “free-ridden” on PCCW’s network, had reflected this viewpoint. The real reason may well be that the VoIP service had the potential of threatening the core business of PCCW in its local fixed telephone line services and international telephone services. The VoIP services provided by overseas providers which impose time-based charges to calls within Hong Kong would be of less threat to a local fixed network operator, as there are no call charges for local telephone calls over the

³⁹ For example, calls between two Skype users on-line are free of call charges. Such free calls between personal computers are also available for other instant messaging services, such as Windows Messenger, Yahoo! Messenger, etc.

⁴⁰ For example, Hong Kong Broadband Network offers an adaptor box which connects a traditional telephone set to the broadband access line. The information is accessible at <http://www.hkbn.net/BBphone/demo.htm> (last visited 28 March 2011). Vonage also offers a similar adaptor box: http://www.vonage.com/how_vonage_works/?refer_id=WEBHO0706010001W (last visited 28 March 2011).

⁴¹ FCC referred to such threat to Comcast’s cable services in *Comcast* decision, Memorandum Opinion and Order, FCC 08-183, released 20 August 2008, paragraph 5. Another example is the BBC iPlayer service which offers high definition television over the Internet for viewers within the UK – information available at <http://en.wikipedia.org/wiki/IPlayer> (last visited 28 March 2011).

⁴² See news report on *Hong Kong Economic Times* (《香港經濟日報》), 3 August 2004. OFTA has not issued any statement confirming this blockage.

⁴³ See news report on *South China Morning Post*, 7 October 2004.

⁴⁴ The often quoted response from the US former AT&T CEO Ed Whitacre to a media interview question in 2005 reflected this attitude:

Now what [Google, MSN, Vonage and other Internet content providers] would like to do is use my pipes free, but I ain’t going to let them do that because we have spent this capital and we have to have a return on it. So there’s going to have to be some mechanism for these people who use these pipes to pay for the portion they’re using. Why should they be allowed to use my pipes?

“At SBC, It’s All About ‘Scale and Scope’”, *Business Week Online*, 7 November 2005, obtainable at: http://www.businessweek.com/magazine/content/05_45/b3958092.htm (last visited 29 April 2011).

conventional telephone lines, but a service with all the characteristics of a conventional telephone line service would pose a more serious threat. PCCW later decided to settle the case by withdrawing the application for injunction.⁴⁵ HKBN's service continued to be offered in the market. However, the general terms and conditions of the broadband services provided by PCCW contain the following condition (which continues to exist as of March 2011):

Without limitation to the above disclaimer or any other provision in this Agreement, you acknowledge and agree that unless we have entered into an agreement with a Voice over Internet Protocol (VoIP) service provider allowing it to use NETVIGATOR BROADBAND to deliver VoIP services then such service provider will continue to have no entitlement to use NETVIGATOR BROADBAND to deliver VoIP services and accordingly, it may not be possible to access VoIP services supplied by such service provider using NETVIGATOR BROADBAND or, if accessible, the standard or quality of such VoIP services may be adversely affected. A list of VoIP service providers who have entered into an agreement with us to utilize NETVIGATOR BROADBAND to deliver VoIP services is available on www.netvigator.com.⁴⁶

No such list of VoIP service provider has been found on the website of PCCW and there has been no report since 2004 about PCCW blocking or degrading the quality of transmission for any VoIP service, but the fact that PCCW sees the need to retain this condition in the standard terms and conditions is an indication of its preparedness to deviate from network neutrality to protect its commercial interests.

(2) Maintaining network differentiation

Van Schewick (2007) has pointed out that one of the reasons for discriminatory behaviours of access providers is to preserve product differentiation.⁴⁷ As part of the competition strategies in the market, the four access providers in Hong Kong have differentiated their products in terms of television programme content, speed of connections, quality of customer service, etc. Television programme content forms an important part of these differentiation strategies. Each access service is tied to a specific set of television programme services. Customers of that access service cannot access the television platforms of the competing access providers. Content available from the Internet will dilute such differentiation of network operators. If the content that customers need or are accustomed to is available from the Internet, they would find it less inconvenient or disruptive to switch to the access service of another operator as all broadband connections are functionally similar. Access providers therefore may view the availability of certain content on the Internet as a threat, not only to their own revenue, but also to the product differentiation that they try to maintain.

(3) Maintaining QoS

Every access provider has a need to safeguard quality of services. The need to

⁴⁵ See news report on *Hong Kong Economic Journal* (《信報財經新聞》), 1 December 2004.

⁴⁶ PCCW, *Netvigator Broadband Terms and Conditions*, part of Condition No. 7.

⁴⁷ Van Schewick, "Towards An Economic Framework for Network Neutrality Regulation", p. 374.

maintain quality of service is even more critical in a competitive environment like Hong Kong. An access provider stands to lose out to its competitors if it cannot maintain quality of service to the satisfaction of its customers. Although the capacity of the “last-mile” links between the end-users and the facilities of the access providers has increased substantially and there is less likelihood of congestion over these links, the resources beyond these links, including the aggregation networks and the connections to the Internet exchange or backbone operators are still shared among the customers of the access provider. The access provider would have the need to control and manage traffic over these limited resources to maintain quality of service to the majority of users and to avoid the need of making uneconomical investment in capacity expansion. One apparently legitimate approach is to give higher priority to packets of delay-sensitive applications without degrading the quality of transmission of the less delay-sensitive applications to an unacceptable level. The more controversial approach would be to impose restrictions against certain heavy users who use the service “excessively”, or to discriminate against or even block certain types of bandwidth-intensive applications.

(4) Raising additional revenue from prioritised services

It is also entirely possible that the access providers will wish to sell prioritised services to content, application or service providers in order to raise additional revenue. There seems to be no obvious reason why the access providers would not exploit all technically and economically feasible means to increase their revenue unless the law forbids this practice. As a matter of fact, the four access providers in Hong Kong are already providing prioritised transport channels to their own services like IPTV over managed IP networks or cable TV over dedicated channels. OFTA takes the position that VoIP services may be offered in a mode which entails an interconnection agreement between the access provider and the VoIP service provider for guaranteed quality of delivery.⁴⁸ Whether the services over the non-prioritised channels are still handled with an acceptable quality of service depends on the policy of the operators. The non-prioritised services may not suffer deliberate degradation, but the allocation of resources between the prioritised services and non-prioritised services would affect the quality of the non-prioritised services perceived by the customers. The operators stand the risk of losing customers at the retail level if the quality of the non-prioritised services is unacceptable.

Costs

The foregoing paragraphs have discussed the potential benefits to access providers in engaging in discriminatory practices against content, applications and services on the Internet. There are costs associated with these benefits. The principal cost to the access providers in engaging in blockage or discrimination is that the broadband access service becomes less attractive to customers. The result is less sales to new customers or switching of existing customers to other operators. The more intense the competition, the higher will be such costs. One would therefore expect such costs to be relatively high in the Hong Kong environment. However, the magnitude of the costs is also affected by the ability and willingness of customers to switch to

⁴⁸ Office of the Telecommunications Authority (Hong Kong), "Network Neutrality" (2009), Regulatory Affairs Advisory Committee Paper No. 2/2009, p. 19.

alternative access providers in the market. In Hong Kong, the ability of the customers to switch may be restricted in some areas where certain access networks do not have coverage, but the behaviours of the access providers should be constrained by the intense competition in areas where the customers do have the ability to switch.⁴⁹ Therefore the behaviours of access providers would be mainly affected by the willingness of the end-users to switch suppliers in areas where the end-users have choice.

The first factor affecting the willingness of customers to switch is the impact of the discrimination to the customers. Whether a customer will actually decide to switch depends on the value to that particular customer of the content or application which has been blocked or discriminated against. The customer is less inclined to switch if the content or application is not considered by the customer as significant (for example, the content or application is provided by a start-up or relatively unknown operator whose products have not been proven or gained wide market acceptance) or if he/she does not use that content or application anyway. Thus the costs to the access provider of engaging in discriminatory practices may well depend on the market power of the content providers that the access provider is dealing with.

The second factor affecting the willingness of customers to switch is product differentiation in the market. The appeal of the access provider's products in terms of content, speed, reliability or customer service may induce new customers to join or existing customers to stay despite the discrimination against or blockage of some products from third-parties. This also explains why access providers may be concerned about the dilution of product differentiation from the accessibility of all content and applications on the Internet from all broadband access networks.

The existing evidence from the market shows that the access providers are competing vigorously for customers. They compete on the basis of ever higher speeds in the access networks, larger bandwidth in external links and smoother Internet experience. Apart from engaging in what the access providers claim to be reasonable and necessary network management practices, there is no evidence that they are engaging in discriminatory degradation of transmission quality or blockage of content, applications and services on the Internet. At least there have been no reports in the media about blatant discriminatory behaviours of the access providers. The reason for this is that there is a general expectation among the end-users that the Internet should be open. The regulator is also expected to maintain vigilance on discriminatory practices against content, applications and services on the Internet. Any unreasonable discriminatory practice against content, applications and services on the Internet is likely to arouse public attention, bring bad reputation against the access provider concerned, with the consequence of substantial loss of market share.

Another reason is related to how the service providers and network operators of the best-effort Internet are paid for the carriage services they provide. The access

⁴⁹ Even though the actual number of choice available to the users is less in some areas where certain competing networks do not have coverage, as explained in Section 2, the access providers are expected to adopt the same policy throughout the entire territory of Hong Kong in providing access to third-party content and applications. The behaviours of the access providers will be constrained by the competition in areas where all competing networks have coverage and the users do have the ability to switch suppliers.

providers are paid by the end-users and content providers for the connections to the Internet. The access providers in turn pay the higher-tier service providers and backbone operators through transit arrangements. Operators that consider themselves to be at the same tier of the Internet hierarchy may have among them peering arrangements for traffic exchange. In this way, there is no need for the content providers to negotiate a contract with the access providers for the delivery of the content and there is no way for the access providers to collect a toll from the distant content providers. There is therefore no reason for an access provider to block, or degrade the transmission quality of, a particular content provider based on the justification of failure to reach a commercial agreement with the content provider. Any such discriminatory act would be unilateral and is likely to be regarded as unreasonable. For a Hong Kong access provider, any attempt to raise additional revenue by threatening to block or degrade the quality of service of content providers who do not agree to pay the carriage charge is unlikely to be successful. As Hong Kong is just a small market, content providers that target the worldwide or regional markets are unlikely to accede to a Hong Kong operator's demand for payment of carriage charge. A Hong Kong access provider who puts the threat into practice would likely face the high costs due to loss of customers at the retail level.

The situation would be different with respect to the managed networks. Differentiation in the content, applications and services accessible from the managed networks is the market norm and accordingly there is no user expectation that they can reach any content and applications by entering the relevant Uniform Resource Locators (URL) as for the Internet. For example, the IPTV platform available on a particular access network is generally not accessible from the other access services. The end-users of the access services are able to access the content, applications and services of only those content providers that can reach agreements with the access providers. Whether an agreement would be concluded depends on the cost-benefit considerations of both parties in reaching an agreement.

The cost-benefit considerations of the access providers for providing access to the managed networks are similar to those for the Internet. Allowing access to its network would bring the benefits of additional revenue from content carriage and higher value of the access service to the end-users as a result of more content being accessible from the service. However, the costs to the access provider are potential diversion of revenue from the access provider's own or affiliated content, reduced product differentiation as the content may also be accessible from other access networks and possibly more congestion or additional investment necessary to cope with the increased demand on the network resources.

The QoS assured carriage services over the managed networks are sources of additional revenue to enable the access providers to recoup their investment in rolling out the access networks. The investment in next generation access networks will involve substantial capital and risks. The access providers are likely to have incentive to maximize the revenue from the managed networks. The access providers would not be content with operating their networks only as "pipes" supplying "commoditized" transmission products. Non-discriminatory access to the managed networks may lead to commoditization of the carriage services. The access providers may therefore wish to engage in discriminatory practices such as price discrimination so as to extract the maximum revenue from the content providers.

It is of course also possible for the content providers to engage in discriminatory practices against the access providers. Even on the Internet, it has been reported that content providers with market power have sought to levy charges on access providers for making the content available to the end-users connected to the access networks.⁵⁰ Likewise on the managed networks, the content providers will also have their own set of cost-benefit considerations in deciding whether, and on what terms, the content should be made available to the access networks and their end-users.⁵¹ If the content providers and the access providers cannot reach agreement, access to the content will be withheld.

In conclusion, whether the access providers and the content providers will engage in discriminatory practices depends on their cost-benefit considerations of engaging in such practices. In a competitive environment for the access services, the costs to the access providers of engaging in such practices are expected to be high. Based on current evidence from the market, access providers in Hong Kong are likely to remain open with regard to content, applications and services on the Internet but discriminatory practices in providing access to the managed networks appear to be the market norm. The next question to consider is whether the discriminatory practices of the access providers and the content providers would lead to “market failures”.

4. Would the Discriminatory Practices Lead to “Market Failures”?

4.1 Theoretical Considerations

Under the market system of economic organisation, it is believed that individuals and groups should basically be left free to pursue their own private welfare goals. The individual pursuits of private interests will, collectively, achieve public welfare goals. The state stays in the periphery of the market and its role is restricted to maintaining the institutions essential for the functioning of the free market. The state should intervene, through “regulation” or “regulatory law”, only when the market fails to achieve goals in the public interest.⁵²

In economic terms, a “market failure” is a situation where the market acting alone fails to deliver some measure of efficiency or maximize social welfare. Economic regulation is a form of state intervention to address such market failures. The common forms of market failures – existence of natural monopolies, externalities,

⁵⁰ AT&T Global Network Services (UK) B.V., “Comments of AT&T Global Network Services (UK) B.V.: Ofcom Consultation Paper on Traffic Management and ‘Net Neutrality’” (2010), Submission to Office of Communications (UK), 9 September 2010, Engineering Background, p. 5. AT&T refers to the practice of the content providers as “reverse-blocking”.

⁵¹ From the point of view of the content provider, making the content available to the access networks would bring more revenue from the advertisers or subscribers. However, the content provider may withhold access to its content for various reasons. For example, the content provider may wish to charge the access provider a fee that the access provider is not willing to pay. The content provider may wish to reserve the content for its own or affiliated access providers so as to reinforce their market position in the supply of access services. The content provider may be constrained by intellectual property right restrictions in the choice of distribution channels for its content.

⁵² Anthony Ogus, *Regulation: Legal Form and Economic Theory* (Oxford: Clarendon Press, 1994), pp. 1 – 2; Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions* (Cambridge, Massachusetts: The MIT Press, 1988), p. 2/I.

public goods and information deficiencies – that justify regulation have been extensively discussed in neo-classical economics literature.⁵³

Frischmann (2005) develops an economic theory for regulating “infrastructure” based on the considerations of externalities and public goods. He defines an “infrastructure” as a resource satisfying three criteria, namely, that the resource is “nonrival or partially (non)rival goods”⁵⁴, that “social demand for the resource is driven primarily by downstream productive activity that requires the resource as an input” and that “[t]he resource may be used as an input into a wide range of goods and services, including private goods, public goods and non-market goods”.⁵⁵ If a resource is an “infrastructure”, it is socially desirable that it is managed as “commons”, which means that it is openly accessible, because of the substantial positive externalities generated in using the resource to produce the public goods and non-market goods⁵⁶. The willingness of the producers to pay for access is unlikely to be able to capture the social value of the public goods and non-market goods due to measurement problems.⁵⁷

In a similar vein, Lessig (2001) argues for preserving certain resources, such as the Internet, as “free” resources or “commons” in order to preserve the Internet as a platform for innovations.⁵⁸ In his view, a “free” resource does not mean that the resource can be used without charge, but rather the resource is open for use by anyone without seeking the permission of anyone else or if such permission is required, it is granted in a neutral manner.⁵⁹ Van Schewick (2007) and Frischmann and Van Schewick (2007) describe the Internet as an infrastructure employing “general

⁵³ When natural monopolies exist in the market, the number of suppliers in the market may need to be restricted. Regulation is applied to control market entry. Without effective competition, products may be overpriced and under-produced. Regulation is applied to protect public interest. When externalities exist in the market, unintended third parties gain or lose as a result of the transaction between two parties. In the presence of externalities, the market cannot capture such unintended gain or loss and cannot achieve efficiency in the use of resources. Regulation is also necessary in the supply of “public goods” as a special class of externalities. The benefits of “public goods” are not diminished when more people consume it and cannot be withheld from anyone. As a result, no one is likely to be interested in paying for the “public goods” and state intervention is required to secure its production. Finally, where information available in the market is deficient, e.g. information asymmetry between the suppliers and the consumers, the market cannot function efficiently. Regulation seeks to overcome this information deficiency. See Robert Baldwin & Martin Cave, *Understanding Regulation: Theory, Strategy, and Practice* (Oxford: Oxford University Press, 1999), pp. 9 - 12; Ogus, *Regulation: Legal Form and Economic Theory*, pp. 30 - 41; Anthony Ogus & C.G. Veljanovski (eds.), *Readings in the Economics of Law and Regulation* (Oxford: Clarendon Press, 1984), pp. 235 - 236.

⁵⁴ By “nonrival” goods, Frischmann refers to “pure public goods”. By “partially (non)rival goods”, Frischmann refers to resources that are subject to congestion at times, depending on the capacity and number of users. During off-peak hours when the number of users is low, the consumption may be nonrival. During peak-hours, the consumption may be rival. “Partially (non)rival goods” may be referred to as “club goods”.

⁵⁵ Brett M. Frischmann, “An Economic Theory of Infrastructure and Commons Management” (2005) 89 *Minnesota Law Review* 917, p. 956.

⁵⁶ Frischmann describes a “public good” as non-rival. Innovation is often referred to as “public good”. “Non-market goods” are “those goods that are neither provided nor demanded through the market mechanism”. Examples given are “active participation in democratic dialogue; voting; free speech”, etc. See *Id.*, pp. 964 – 965.

⁵⁷ *Id.*, pp. 974 - 977.

⁵⁸ Lawrence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World* (New York: Vintage Books, 2001), pp. 19 – 23.

⁵⁹ *Id.*, p. 12.

purpose technology” which according to Lipsey et al. (1998) has four characteristics - scope for evolutionary improvement, wide variety of uses, wide range of use and strong technological complementarities with existing or potential new technologies.⁶⁰ Innovations and the usage of “general purpose technology” generate benefits for the entire society that are external to the innovators, users and the infrastructure operators. The infrastructure operators are not capable of internalising such benefits and would not take the positive externalities into account in their decision making. The level of innovations and use of the “general purpose technology” will then be lower than the social optimum. This calls for regulation to address the externalities and restore the economic efficiency.⁶¹

The theories of Frischmann (2005), Lessig (2001), Van Schewick (2007) and Frischmann and Van Schewick (2007) express the public interest goals in economic terms, being maximizing economic welfare through non-discriminatory access to certain types of resources. There are, however, some public interest goals that cannot be defined in terms of economic efficiency. Social regulation may be applied to achieve these non-economical goals not delivered by the market.⁶²

In a series of articles, Benkler (1998, 2000, 2001 and 2003) made a case for setting up a “core common infrastructure” to achieve the non-economic goals of enabling robust democratic discourse and securing freedom of expression.⁶³ To achieve these goals, the infrastructure should not be subject to the exclusive control of any person in the use and disposition of its resources and should be “equally open to all” to disseminate and exchange information.⁶⁴ He argued that the existing mass media model enables only a limited number of commercial producers to “serve a menu of prepackaged information goods to consumers whose role is limited to selecting from this menu”.⁶⁵ Instead, the passive “consumers” should turn into “users” originating as well as receiving information without restrictions from the common infrastructure. Benkler

⁶⁰ Richard G. Lipsey, et al., “What Requires Explanation?” in Elhanan Helpman (ed.) *General Purpose Technologies and Economic Growth* (Cambridge, Massachusetts: MIT Press, 1998), pp. 38 – 43. “Scope for evolutionary improvement” means that the technologies “enter as fairly crude technologies with a limited number of uses, but they evolve into much more complex technologies with dramatic increase in the range of their use across the economy and the number of economic outputs that they produce”. “Variety of use” refers to the different types of usage. “Range of use” refers to “the proportion of the productive activities in the economy using that technology”. “Technological complementarities” is defined “as occurring whenever a technological change in one item of capital requires a redesign or reorganization of some of the other items that cooperate with it”.

⁶¹ Van Schewick, “Towards An Economic Framework for Network Neutrality Regulation”, pp. 385 – 386; Brett M. Frischmann & Barbara Van Schewick, “Network Neutrality and the Economics of an Information Superhighway: A Reply to Professor Yoo” (2007) 47 *Jurimetrics* 383, pp. 427 - 428.

⁶² Ogus, *Regulation: Legal Form and Economic Theory*, pp. 46 - 54.

⁶³ Yochai Benkler, “From Consumers to Users: Shifting the Deeper Structures of Regulation Towards Sustainable Commons and User Access” (2000) 52 *Federal Communications Law Journal* 561, p. 579; Yochai Benkler, “The Political Economy of Commons” (2003) Vol. IV *Upgrade: The European Journal for the Informatics Professional* 6, p. 9.

⁶⁴ Yochai Benkler, “The Commons as a Neglected Factor of Information Policy” (1998), TPRC 1998, 3 - 5 October 1998, pp. 27 – 28; Yochai Benkler, “Property, Commons, and the First Amendment: Towards a Core Common Infrastructure” (2001), White Paper for the First Amendment Program, Brennan Center for Justice at New York University School of Law, March 2001, pp. 2 – 5; Benkler, “The Political Economy of Commons”, pp. 6 and 8; Yochai Benkler, “Freedom in the Commons: Towards a Political Economy of Information” (2003) 52 *Duke Law Journal* 1245, pp. 1273 – 1274.

⁶⁵ Benkler, “From Consumers to Users: Shifting the Deeper Structures of Regulation Towards Sustainable Commons and User Access”, p. 562.

was not arguing that all communications facilities need to be operated as commons, but in every society a core common infrastructure should be operated alongside the proprietary ones.⁶⁶

Another public interest goal that has traditionally been achieved through common law is that for certain types of businesses, no one making a reasonable request for service and willing to pay the established price would be denied lawful access to the service. Nachbar (2008) has conducted a review of the circumstances in which obligations of providing non-discriminatory access (common carriage) are imposed on businesses “affected with public interest” under common law. He finds that the obligations of common carriage are imposed on businesses connected with transportation and communications⁶⁷ and that market power has little connection with the imposition of the obligations.⁶⁸ He considers that every telecommunications network that offers services to the public is a “public network” whether or not it is operated in a monopolistic or competitive environment, and should be subject to the obligation to provide “non-discriminatory access”.⁶⁹

Some scholars dispute that non-discriminatory access to the network infrastructure is necessarily a public interest goal. For example, Becker, Carlton, et al. (2010) consider that “preserving a free and open Internet”, a goal advocated by the US regulator, is not “[b]y itself” “an economically appropriate goal of public policy, which instead should focus on maximizing consumer welfare”.⁷⁰ Spulber and Yoo (2009) do not consider that discriminatory behaviours of infrastructure operators necessarily constitute market failures. The discriminatory behaviours would lead to “network diversity”. Spulber and Yoo consider that users’ preferences are heterogeneous and their differentiated needs can best be satisfied by “network diversity”. The differentiation allows higher level of revenue and enables multiple customer access networks to co-exist even though the economy of scale for each has not been exhausted. “Network diversity” therefore promotes investment and competition in the access networks. On the other hand, the provision of access on a non-discriminatory basis would lead to “network uniformity”. In an environment of “network uniformity”, the access providers compete on the basis of price only and this gives decisive advantages to the larger infrastructure operators with lower costs and could reinforce one source of market failure that regulation is meant to address – the existence of monopoly in the operation of access networks.⁷¹

Some scholars consider that innovations inside the networks are as important as innovations at the edge of the networks and therefore dispute the promotion of edge-based innovations at the expense of network-based innovations. For example, Sidak and Teece (2010) consider that innovations in the network infrastructure would also generate positive “spillover” benefits and such spillovers have been overlooked by

⁶⁶ Benkler, "Freedom in the Commons: Towards a Political Economy of Information", pp. 1273 – 1274; Benkler, "The Political Economy of Commons", p. 8.

⁶⁷ Thomas B. Nachbar, "The Public Network" (2008) 17 *CommLaw Conspectus* 67, pp. 103 – 104.

⁶⁸ Nachbar also finds that under common law, “necessity” or “holding out [as offering a service to the public]” is not a sufficient basis for classifying a business as “affected with the public interest”. See *Id.*, pp. 96 – 102, pp. 85 – 86 and 93.

⁶⁹ *Id.*, p. 139.

⁷⁰ Gary S. Becker, et al., "Net Neutrality and Consumer Welfare" (2010) 6(3) *Journal of Competition Law and Economics* 497, p. 499.

⁷¹ Spulber & Yoo, *Networks in Telecommunications: Economics and Law*, pp. 387 – 388.

network neutrality proponents.⁷² Some scholars however consider that if the potential for innovation lies predominately in the layer of content, applications and services, it would be more desirable to promote open access to the networks rather than facilities-based competition among the access networks. For example, De Bijl and Peitz (2008) consider that if users seek only reliability and capacity of connections from the access networks, the users' need for innovation is best satisfied by competition at separate network and application layers without the networks acting as "gatekeepers".⁷³ Bauer (2010) considers that "[i]f the content and application layer has a significantly greater innovation potential than the network platform layer and complementarities are weak, then vertical policies that foster players on that layer (e.g., strict non-discrimination rules) may be more desirable."⁷⁴

In sum, there is little disagreement that regulation is justified only in situations of "market failures". However, there is divergence of opinion in the literature as to whether discriminatory practices of access providers would lead to "market failures". Economists tend to confine "market failures" to situation whereby economic efficiency or social welfare is not maximized. However, some scholars extend the concept of "market failures" to failure to achieve public interest goals and these goals need not be defined on economic terms. Whether discriminatory behaviours of infrastructure operators would lead to "market failures" would therefore depend on the public interest goals that the society wishes to achieve. This is a public policy issue best resolved by political means in a democratic society. If the public interest goal is to have an open communications infrastructure for the society, then impediments to the proper functioning of the infrastructure due to discriminatory practices would constitute market failures to attain this public interest goal.

4.2 Considerations for the Hong Kong Environment

The governments of major developed countries acknowledge the importance of a communications infrastructure to the countries. For example, the US regulator, Federal Communications Commission (FCC), compares a broadband infrastructure to the railroads, highways and electricity infrastructure of the past and regards broadband as "*the* great infrastructure challenge of the early 21st century" (emphasis in original).⁷⁵ The United Kingdom (UK) government considers that "UK's communications infrastructure is a vital enabler for the country's society, economy, safety, security and well being."⁷⁶

To these governments, the Internet is the core of this communications infrastructure. The FCC refers to the "high-speed Internet" as "transforming the landscape of America more rapidly and more pervasively than earlier infrastructure networks".⁷⁷

⁷² J. Gregory Sidak & David J. Teece, "Innovation Spillovers and the "Dirt Road" Fallacy: The Intellectual Bankruptcy of Banning Optional Transactions for Enhanced Delivery over the Internet" (2010) 6 *Journal of Competition Law and Economics* 521, p. 555.

⁷³ Paul De Bijl & Martin Peitz, "Innovation, Convergence and the Role of Regulation in the Netherlands and Beyond" (2008) 32 *Telecommunications Policy* 744, p. 750.

⁷⁴ Johannes M. Bauer, "Regulation, Public Policy, and Investment in Communications Infrastructure" (2010) 34 *Telecommunications Policy* 65, p. 76.

⁷⁵ Federal Communications Commission, "Connecting America: The National Broadband Plan", p. 3.

⁷⁶ Department for Culture Media and Sport (United Kingdom) & Department for Business Innovation and Skills (United Kingdom), "Digital Britain Final Report", p. 47.

⁷⁷ Federal Communications Commission, "Connecting America: The National Broadband Plan", p. 3.

The Digital Agenda for Europe issued by the European Commission (EC) setting out the actions required to attain the policy objectives in Europe 2020 states that “[t]he future economy will be a network-based knowledge economy with the internet at its centre”⁷⁸ and the objective of the Agenda is “to chart a course to maximise the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity”.⁷⁹ The Australian Labor Party states that “high-speed broadband internet access throughout Australia will help enable significant productivity gains, the growth of new businesses and the development of new markets”.⁸⁰

Furthermore, governments stress the importance of keeping the Internet open. In US, the FCC stated that the purpose of its network neutrality regulation is to keep the Internet as “an open platform for innovation, investment, job creation, economic growth, competition, and free expression”.⁸¹ In Europe, the EC declared that it “attaches high importance to preserving the open and neutral character of the Internet”.⁸² The European Parliament and the Council recognised that “the Internet is essential for the practical exercise of freedom of expression and access to information”, and “any restriction on the exercise of these fundamental rights should be in accordance with the European Convention for the Protection of Human Rights and Fundamental Freedoms”.⁸³ The EC stated that one of the objectives of the 2009 regulatory reform was “to promote a high quality of service and unobstructed access to digital and online content” in the European information society.⁸⁴ National regulatory authorities are to promote the citizens’ interests by “promoting the ability of end-users to access and distribute information or run applications and services of their choice”.⁸⁵ In addition, the EC has attached a declaration on “net neutrality” to the end of the “Better Regulation Directive”⁸⁶ to the effect that the EC attaches high

⁷⁸ European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda for Europe” (2010), COM(2010)245 final/2, issued on 26 August 2010, p. 19.

⁷⁹ Id., p. 3.

⁸⁰ Australian Labor Party, “National Platform” (2009), available at <http://www.alp.org.au/australian-labor/our-platform/> (last visited 20 January 2011), Chapter 3, para. 37.

⁸¹ Federal Communications Commission, “Report and Order in the Matter of Preserving the Open Internet and Broadband Industry Practices” (2010), FCC 10-201 adopted on 21 December 2010 and issued on 23 December 2010, p. 2.

⁸² Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services (OJ L337/37 - L337/69, 18 December 2009), Commission Declaration on Net Neutrality, p. L337/69.

⁸³ Id., Recital (4).

⁸⁴ European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Report on the Outcome of the Review of the EU Regulatory Framework for Electronic Communications Networks and Services in accordance with Directive 2002/21/EC and Summary of the 2007 Reform Proposals” (2007), COM (2007) 696 final issued on 13 November 2007, p. 4.

⁸⁵ Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive) as amended by Directive 2009/140/EC and Regulation 544/2009, Article 8(4)(g).

⁸⁶ Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services (OJ L337/37 - L337/69, 18 December 2009), p. L337/69.

importance to preserving the open and neutral character of the Internet and will monitor the implementation of the new provisions in the regulatory package and make a report to the Parliament and the Council by the end of 2010.

The ICT policy document in Hong Kong has not explicitly referred to the availability of an open communications infrastructure to serve the Hong Kong society.⁸⁷ However it acknowledges that “a robust information infrastructure, just as essential physical infrastructure, is crucial to supporting and propelling the growth of economies”.⁸⁸ Given the almost universal acceptance amongst developed economies of the link between an open communications infrastructure and innovations, investment, job creation and social well-beings, and Hong Kong’s aspirations to be an international city and a regional communications hub, it would be surprising if the availability of open communications infrastructure is not a public interest goal in Hong Kong.

At present, the Internet is performing the functions of the global information infrastructure. Although some scholars consider that an open Internet is not necessarily an appropriate public interest goal and that consumers’ welfare may well be better served by “network diversity”, such views apparently are not shared by the politicians and policymakers in developed countries. In an environment of “network diversity”, users’ choice of content, applications and services would not be compromised if end-users could readily switch between a large number of access connections.⁸⁹ However, as end-users typically subscribe to only one fixed broadband connection per household and possibly one mobile connection per user at any one time, it is difficult to see how the end-users’ access to content, applications or services of their choice would not be restricted when each connection does not offer non-discriminatory access to all content, applications and services that end-users may wish to have access to.

In contrast with the Internet, the managed networks as a communications infrastructure are not explicitly mentioned in the government policy documents. The reason for this is possibly that the relationship between the Internet and the managed networks is not well understood at this stage. However, there is no reason why the public policy objective of having an open communications infrastructure for a society should be confined to the provision of best-effort delivery services only and exclude the delivery services with QoS assurances. When referring to the functions of the Internet, the policy documents include practically all societal activities embracing doing business, working, playing, communicating, expressing freely, health care, education, transport, clean environment, media, public services, entertainment, cultural services and so on. In this context, the Internet should be an Internet that is adequate in performance to meet the evolving demands of the society.

One possible scenario in the future is that the managed networks would take over the

⁸⁷ See Government of the Hong Kong Special Administrative Region, 2008 Digital 21 Strategy, available at <http://www.info.gov.hk/digital21/eng/strategy/2008/Foreword.htm> (last visited 24 April 2011).

⁸⁸ Foreword of 2008 Digital 21 Strategy.

⁸⁹ A possible analogy is the diversity of content in the printed media. Readers can readily switch to different newspapers, magazines, books, etc. and therefore readers’ access to content is not restricted even when each individual publication is not offering non-discriminatory access to content.

functions of the Internet for critical or delay-sensitive applications as some content providers make arrangements to secure the QoS for the delivery of their content. It is already a current practice that some content of the Internet are delivered, by international or regional managed networks (such as “content delivery networks” (CDNs) or self-provided “caching networks”), to cache storage located as close as possible to the end-users although the final links to the end-users may still be provided over the best-effort Internet.⁹⁰ It is also possible that the content are delivered by the international or regional managed networks directly to the managed networks of the access providers. In this case, the best-effort Internet will be bypassed for the entire delivery path.

Another possible scenario is for the managed networks of the access providers to become part of the global Internet of the future. The managed network operation is based on the Internet Protocol (IP) and is therefore well suited for integration with the Internet. The Internet Protocol has already incorporated mechanisms for implementing different grades of QoS, but widespread deployment has been obstructed by pricing and billing problems across network boundaries.⁹¹ When these commercial issues are resolved, the Internet might be incorporated with QoS functionalities. It will then be necessary for Internet to be connected to the managed networks of the access providers in order to provide end-to-end QoS functionalities across the Internet.

If the managed networks should supplant the functions of the Internet, or become part of the Internet, there would be a need to consider whether the public interest objectives applicable to the Internet should be equally applicable to the managed networks. The FCC has indicated that it will monitor the operation of the “specialized” services which are currently excluded from the network neutrality regulation.⁹² If the services provide a function equivalent to broadband Internet access services or are used to evade the network neutrality regulation, they will be caught by the regulation.⁹³

The potential for discriminatory practices does not exist only at the access network level of the communications infrastructure. As noted in Section 3, it is possible for content providers to engage in discriminatory practices in allowing access providers to have access to their content, applications and services. Market power may also shift to the upper levels of the communications infrastructure, such as platforms hosting the content, applications and services, and search engines acting as

⁹⁰ AT&T Global Network Services (UK) B.V., "Comments of AT&T Global Network Services (UK) B.V.: Ofcom Consultation Paper on Traffic Management and 'Net Neutrality'", Engineering Background, pp. 4 – 6.

⁹¹ Weibin Zhao, et al., "Internet Quality of Service: An Overview" (2000), Columbia University Research Report CUCS-003-00, February 2000, obtainable at www.research.ibm.com/people/o/olshef/publications/cucs-003-00.pdf (last visited 26 January 2011), pp. 1 – 9; Xipeng Xiao & Lionel M. Ni, "Internet QoS: A Big Picture" (1999) 13 *IEEE Network* 8, pp. 8 – 15; Geoff Huston, "Quality of Service - Fact or Fiction?" (2000) 3(1) *The Internet Protocol Journal*, obtainable at http://www.cisco.com/web/about/ac123/ac147/ac174/ac197/about_cisco_ipj_archive_article09186a00800c8314.html (last visited 26 January 2011).

⁹² Federal Communications Commission, "Report and Order in the Matter of Preserving the Open Internet and Broadband Industry Practices", paras. 113 – 114.

⁹³ Id., Appendix A – Substantial Rules, §8.11(a).

intermediaries between the providers of those products and the end-users. There have been calls for “openness” or “neutrality” of the providers operating at any level of the communications infrastructure that may act as “gatekeepers” to content, applications and services.⁹⁴ Whether discrimination problems at the levels other than the access services would lead to “market failures”, whether competition law alone is adequate to address these problems, and whether regulation at these levels is warranted are issues that need much more research, but are beyond the scope of this paper.

In conclusion, a public interest goal widely adopted in developed countries is to have an open communications infrastructure for the society. The functions of an open communications infrastructure should include best-effort services and services with guaranteed QoS. Discriminatory practices of the access providers against content, applications and services on the Internet may constitute a “market failure” as they impede the attainment of the goal of having an open communications infrastructure based on the Internet. So long as the Internet performs adequately as an open communications infrastructure, discriminatory practices for content, applications and services on the managed networks should not for the time being cause concerns from the public interest perspectives. If in the future the best-effort Internet becomes inadequate to perform fully the functions of an open communications infrastructure, discriminatory practices on the managed networks would need close scrutiny. The next question is whether the existing laws are adequate to tackle discriminatory practices if found to lead to “market failures”.

5. Are the Existing Laws Adequate to Deal with Discriminatory Practices?

5.1 Telecommunications Regulation

In Hong Kong, telecommunications networks and services are regulated under the Telecommunications Ordinance (TO).⁹⁵ Networks and services need to be licensed under the TO, unless exemption has been given by the Chief-Executive-in-Council.⁹⁶ Licences may be issued by the Chief-Executive-in-Council, or the regulator, the Telecommunications Authority (TA).⁹⁷ In practice, all telecommunications networks and services operated in Hong Kong are licensed under licences issued by the TA.⁹⁸ In issuing the licences, the TA is empowered to prescribe a wide range of conditions, including general conditions and special conditions.⁹⁹ The operation of the networks and services has to comply with the provisions in the TO as well as conditions under the licences.¹⁰⁰ In this way, the operation of telecommunications networks and

⁹⁴ For example, see AT&T Inc., “Comments of AT&T Inc. in the Matter of Preserving the Open Internet (GN Docket No. 09-191) and Broadband Industry Practices (WC Docket No. 07-52)”, p. 196; Frank Pasquale, “Internet Non-Discrimination Principles: Commercial Ethics for Carriers and Search Engines” (2008) 2008 *University of Chicago Legal Forum* 263, pp. 276 – 286.

⁹⁵ Chapter 106, Laws of Hong Kong accessible from <http://www.legislation.gov.hk/eng/home.htm> (last visited 28 April 2011).

⁹⁶ Sections 8(1), 20 and 39, Telecommunications Ordinance.

⁹⁷ Section 7, Telecommunications Ordinance.

⁹⁸ The Chief-Executive-in-Council issues only exclusive licences (section 7(1), Telecommunications Ordinance). From the list of licences published by OFTA, there are no exclusive licences in Hong Kong: <http://www.ofta.gov.hk/en/tele-lic/main.html> (visited 2 December 2009).

⁹⁹ Sections 7 and 7A, Telecommunications Ordinance.

¹⁰⁰ If the licensee fails to comply with the provisions in the TO or conditions under the licence, the TA may issue directions requiring the licensee to comply with the provisions or conditions (section 36B, Telecommunications Ordinance), impose financial penalty on the licensee (section 36C,

services, including broadband access services, is brought under regulation.

Access providers are licensees under a type of licences called “carrier licence”.¹⁰¹ The provisions in the TO and licence conditions that may potentially be relevant to discriminatory practices of the access providers are those related to “common carriage”, “non-discrimination” and “access and interconnection”. The equivalent to the “common carriage” obligation is a licence condition requiring the licensee to provide the service, on the terms and conditions published in a tariff, upon request from a customer at a location reasonably covered by the licensee’s network.¹⁰² Thus an access provider is obliged to provide its access service to a customer located within its network coverage, but the licence condition does not govern the carriage of content by the access service provided. The “non-discrimination” obligation is part of the industry-specific competition law under the TO and will be discussed in Section 5.2 below. Regarding “access and interconnection”, a special condition in the carrier licence¹⁰³ prescribes the following requirements:

- (1) The licensee shall interconnect its service and network with the services and networks of other unified carriers, mobile carriers, fixed carriers, or fixed telecommunications network services licensed under the Ordinance and, where directed by the Authority, interconnect its service and network with telecommunications networks and services of a type mentioned in section 36A(3D) of the Ordinance. The licensee shall interconnect its service and network with the services and networks of other interconnecting parties under this Special Condition to ensure any-to-any connectivity, i.e. any customer in any one network can have access to any other customer in any interconnecting network and, where directed by the Authority, to any service offered in any interconnecting network.
- (2) The licensee shall use all reasonable endeavours to ensure that interconnection is effected promptly, efficiently and on terms, conditions and at charges which are based on the licensee’s reasonable relevant costs attributable to interconnection.

Under the TO, the TA may determine the terms and conditions of interconnection¹⁰⁴ and issue direction to a licensee requiring it to take such action as the TA considers necessary in order for the licensee to secure the connection of the licensed service to “any other telecommunications service being the subject of a licence granted under the Ordinance or of an [exemption order]”.¹⁰⁵

The types of services mentioned in the section 36A(3D) referred to in the licence condition are telecommunications services licensed or exempt from licensing under

Telecommunications Ordinance), or even suspend or revoke the licence (section 34, Telecommunications Ordinance).

¹⁰¹ Carrier licences are used to license facilities-based network operators. Nearly all access providers in the consumer market in Hong Kong are facilities-based.

¹⁰² Special Condition 2, Fixed Carrier Licence and Special Condition 10.1, Unified Carrier Licence, Telecommunications Ordinance.

¹⁰³ Special Condition 3, Unified Carrier Licence, Telecommunications Ordinance. Special Condition 3 of a Fixed Carrier Licence contains similar requirements, except that the clause on “any-to-any connectivity” is absent.

¹⁰⁴ Section 36A, Telecommunications Ordinance.

¹⁰⁵ Section 36B, Telecommunications Ordinance.

the TO.¹⁰⁶ “Telecommunications” means “any transmission, emission or reception of communication by means of guided or unguided electromagnetic energy or both, other than any transmission or emission intended to be received or perceived directly by the human eye”.¹⁰⁷ “Communication” refers to the intelligence being carried by telecommunications.¹⁰⁸ “Telecommunications service” means “a service for the carrying of communication by means of guided or unguided electromagnetic energy or both”.¹⁰⁹ The effect of these rather long-winded definitions is to confine the meaning of “telecommunications” to the *carriage* (by wireline or wireless technologies), rather than the *provision*, of content. It is quite apparent that the obligation to “interconnect” under the above licence condition and the powers of the TA to intervene in “interconnection” are concerning interconnection between telecommunications networks or services licensed under the TO for the carriage of communication, including content.

The analysis in the preceding paragraph has implications on the use of the interconnection powers to address the problems related to discriminatory practices of access providers. In the special case of blockage or degradation of the quality of service of a telecommunications service licensed under the TO, such as a VoIP service operated by another access provider licensed in Hong Kong, the blockage may mean refusal to interconnect, while degradation may mean refusal to interconnect at a satisfactory level of quality of service, with the telecommunications service in question. As the network and the service of the other access provider are both licensed under the TO, the TA’s power on directing interconnection will be applicable. However, outside this special category, such as the blockage or degradation of content, applications and services that are not subject to the licensing requirement under the TO, and a telecommunications service provided by an operator *outside* Hong Kong and therefore not licensed under the TO (such as a VoIP service operated by an operator without presence in Hong Kong), the interconnection power of the TA will not be applicable because the content, applications or services subject to blockage or degradation are not telecommunications services licensed in Hong Kong.

The licence condition in the carrier licence has referred to the obligation of the licensee to achieve “any-to-any connectivity” through the interconnection. According to the licence condition, “any-to-any connectivity” enables any customer connected to any one network to have access to any other customer connected to any interconnecting network. A content provider leases a broadband connection from an access provider and may therefore be regarded as a “customer” of the access provider.

¹⁰⁶ Section 36A(3D) provides that the type of interconnection includes an arrangement among 2 or more parties for

- (a) interconnection between telecommunications systems or services including
 - (i) those licensed under section 7, expressed as being licensed under section 7 or 34 or deemed to be licensed by the Chief Executive in Council under this Ordinance under section 8(3) of the Television Ordinance (Cap. 32);
 - (ii) those of a description mentioned in section 8(4)(e) and (f) [which are telecommunications systems not related to the Internet];
 - (iii) telecommunications services that are the subject of an order made under section 39.....

¹⁰⁷ Section 2, Telecommunications Ordinance.

¹⁰⁸ Section 2 of the Telecommunications Ordinance provides that “communication” includes any communication (a) whether between persons and persons, things and things or persons and things; and (b) whether in the form of speech, music or other sounds, or text, or visual images whether or not animated, or signals in any other form or combination of forms”.

¹⁰⁹ Section 2, Telecommunications Ordinance.

It would appear that the “any-to-any connectivity” obligation would enable an end-user connected to one access provider to have access to any content provider connected to another access provider licensed in Hong Kong. This would ensure access of the end-user to at least any content hosted in Hong Kong.

Such an expansion of the regulation on access and interconnection to secure access to content on the Internet or the managed networks would be problematic. The policy intention of the “any-to-any connectivity” obligation can be ascertained from the public consultation paper concerning the creation of the “unified carrier licence” incorporated with this obligation.¹¹⁰ The paper indicated that “[any-to-any] connectivity is an important public policy objective that is based on the long-standing expectation of the public that any telecommunications user can communicate with any other user”.¹¹¹ The paper referred further to an interconnection principle that “[a]ny customer in any one network can have access to any other customer or any service offered in any interconnecting network”.¹¹² The “any-to-any connectivity” obligation is therefore a legacy of the regulation on public telephone networks to ensure that any end-user connected to a network can communicate with any other end-user, or have access to any telecommunications service (such as international telephone service), connected to an interconnecting network. To extend the meaning of “any-to-any connectivity” to include the access by any end-user connected to an access network to any content provider connected to an interconnecting network would be untenable. In practice, this “any-to-any connectivity” is not achieved for content on the broadband access networks in Hong Kong. As pointed out in Section 3.2 (under the heading of “maintaining network differentiation”), the customers of each access service are unable to gain access to the television platforms connected to the competing access services.

Access and interconnection regulation is also not applicable to the connections between telecommunications networks and content providers. Regulation on access and interconnection is enacted to address the particular problems in a telecommunications market, such as to achieve the public interest objective of “any-to-any connectivity” as discussed above, to deal with network effect which places larger networks at a competitive advantage, and to address bottleneck problems hindering the development of competition in the telecommunications market.¹¹³ Extending the regulation on access and interconnection to include non-discriminatory access to networks for content providers would stretch it beyond its intended functions. It is therefore unlikely that the power for the telecommunications regulator to compel the carriage of content is included in the provisions regulating access and interconnection. It is relevant to note that not even the broadcasting regulator is empowered to compel a broadcasting licensee to carry particular content. Any requirement to carry a specific type of programmes (“must-carry” requirement) is separately spelt out in the law.¹¹⁴

¹¹⁰ Office of the Telecommunications Authority (Hong Kong), “Licensing Framework for Unified Carrier Licence” (2007), Consultation Paper, 21 December 2007.

¹¹¹ *Id.* at para. 24.

¹¹² *Id.* at para. 26.

¹¹³ Spulber & Yoo, *Networks in Telecommunications: Economics and Law*, pp. 323 - 324; Eli M. Noam, “Interconnection Practices” in Martin Cave, et al. (eds.), *Handbook of Telecommunications Economics* (Amsterdam: Elsevier Science B.V., 2002), p. 389.

¹¹⁴ For example, the obligation of a licensee to carry, as required by the Broadcasting Authority, educational television programmes for schools is spelt out in section 19 of the Broadcasting Ordinance

Regulation on access and interconnection is also not used to secure content carriage in the US and Europe. In the US, the interconnection obligations applicable to “telecommunications carriers” are for the benefits of other “telecommunications carriers” only.¹¹⁵ In any case, the FCC has reclassified broadband access services as “information services”, thus removing the interconnection obligations applicable to “telecommunications carriers” from the obligations of the access providers.¹¹⁶ In Europe, even though the EC has stated that one of the objectives of the 2009 regulatory reform is “to promote a high quality of service and unobstructed access to digital and online content” in the European information society¹¹⁷ and the national regulatory authorities are to promote the citizens’ interests by “promoting the ability of end-users to access and distribute information or run applications and services of their choice”¹¹⁸, the ability of the authorities to intervene on content matters will be constrained by their actual powers to regulate, and resolve disputes on, access and interconnection.¹¹⁹ The definition for “access” is “the making available of facilities and/or services to another undertaking for the purpose of providing electronic communications services, including when they are used for the delivery of information society services or broadcast content services”.¹²⁰ “Electronic communications services” are services for the *conveyance* of signals on electronics communications networks, including telecommunications services and transmission services in networks used for broadcasting, but specifically exclude services providing, or exercising editorial control over, content.¹²¹ The powers of the national

(Cap. 562).

¹¹⁵ US legislation Telecommunications Act 1996, section 251, 47 U.S.C. §251.

¹¹⁶ For example, wireline broadband access services have been reclassified as “information services” in 2005. See Federal Communications Commission, “Report and Order and Notice of Proposed Rulemaking in the matters of Appropriate Framework for Access to the Internet over Wireline Facilities, Universal Service Obligations of Broadband Providers, Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services, Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review- Review of Computer III and ONA Safeguards and Requirements, Conditional Petition of the Verizon Telephone Companies for Forbearance Under 47 U.S.C. 160(c) with Regard to Broadband Services Provided Via Fiber to the Premises; Petition of the Verizon Telephone Companies for Declaratory Ruling or, Alternatively, for Interim Waiver with Regard to Broadband Services Provided Via Fiber to the Premises, Consumer Protection in the Broadband Era” (2005), FCC 05-150, 20 FCC Rcd 14853 adopted on 5 August 2005 and released on 23 September 2005.

¹¹⁷ European Commission, “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Report on the Outcome of the Review of the EU Regulatory Framework for Electronic Communications Networks and Services in accordance with Directive 2002/21/EC and Summary of the 2007 Reform Proposals”, p. 4.

¹¹⁸ Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive) as amended by Directive 2009/140/EC and Regulation 544/2009, Article 8(4)(g).

¹¹⁹ Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive) as amended by Directive 2009/140/EC, Article 5.

¹²⁰ Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services (OJ L337/37 - L337/69, 18 December 2009), Article 2(1)(a), p. L337/59.

¹²¹ Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive) as amended by Directive 2009/140/EC and Regulation 544/2009, Article 2(c).

regulatory authorities related to access and interconnection are therefore confined to access arrangements between providers of conveyance services and cannot be used to intervene in the arrangements between a provider of conveyance services and a content provider. Indeed, “must carry” obligations for specified radio and television broadcast channels are explicitly provided for in a separate article of the Universal Service Directive.¹²²

In conclusion, the non-discriminatory carriage of content on the Internet or the managed networks by the access providers is not a subject-matter that should be addressed by regulation on access and interconnection.

5.2 Competition Law

In Hong Kong there is not yet a general competition law. The bill for a general competition law is now going through the legislative procedure and the government plans for its enactment by summer 2012. Before the bill becomes law, reliance has to be made on the industry-specific competition provisions in the laws regulating telecommunications and broadcasting.¹²³ For the telecommunications industry, there are provisions under the TO prohibiting anti-competitive agreements or arrangements (section 7K) and abuse of dominant position (section 7L) similar to Articles 101 and 102 of the Treaty of the Functioning of the European Union (TFEU).¹²⁴ In addition, there is a prohibition on discrimination which has anti-competitive purpose or effect (section 7N).¹²⁵

The TO is a law regulating the telecommunications industry and the jurisdiction of the telecommunications regulator extends only to telecommunications licensees in the industry. The competition provisions in the TO therefore regulate the conduct of telecommunications licensees only. There is no doubt that the access providers are telecommunications licensees. However, the competition provisions prohibit conduct that has the purpose or effect of preventing or substantially restricting competition in a *telecommunications* market. The word “telecommunications” should have the same meaning as that in the TO. The content, applications and services affected by discriminatory practices of the access providers may not be telecommunications services. Therefore it may not be competition in a telecommunications market that is

¹²² Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) as amended by Directive 2009/136/EC, Article 31.

¹²³ Paragraph 61, Policy Address 2008/09, Chief Executive of the Hong Kong SAR.

¹²⁴ Section 7K of the Telecommunications Ordinance prohibits conduct, which, in the opinion of the TA, has the purpose or effect of preventing or substantially restricting competition in a telecommunications market. Section 7L prohibits a licensee in a dominant position in a telecommunications market from abusing its position. Such a licensee has abused its position if, in the opinion of the TA, the licensee has engaged in conduct which has the purpose or effect of preventing or substantially restricting competition in a telecommunications market.

¹²⁵ Section 7N of the Telecommunications Ordinance prohibits (1) a licensee in a dominant position in a telecommunications market from discrimination between persons who acquire services in the market on charges or the conditions of supply, and (2) an exclusive licensee or a carrier licensee from discrimination between a person who lawfully acquires and uses telecommunications networks, systems installations, customer equipment or services to provide services to the public and any other person who is not providing a service to the public. Both prohibitions are subject to the condition that the discrimination is unlawful only if it has the purpose or effect of preventing or substantially restricting competition in a telecommunications market.

being compromised. This would limit the application of the competition provisions in the TO to tackle the discriminatory practices.

The prohibitions of discrimination under section 7N do not extend the effectiveness of the industry-specific competition provisions under the TO to tackle the discriminatory practices of access providers. There are two prohibitions under section 7N. The first prohibition is against discrimination by a telecommunications licensee in a dominant position that has anti-competitive purpose or effect in a telecommunications market.¹²⁶ This prohibition is in fact already covered by the prohibition of abuse of dominance under section 7L and is largely redundant. The second prohibition is against the discrimination by a carrier licensee (irrespective of market position) between end-users and persons who acquire the services from the carrier licensee for the provision of public telecommunications services.¹²⁷ This prohibition is intended to prevent discrimination between end-users and service providers and is not relevant to the discriminatory practices of access providers against content providers.

Even when a general competition law along the line of Articles 101 and 102 of the TFEU is enacted in Hong Kong, the law may not be entirely effective to tackle the discriminatory practices if they arise in Hong Kong. Chirico, Van Der Haar, et al. (2007) and Valcke, et al. (2008) have analysed the use of European competition law to tackle the conduct of access providers deviating from network neutrality principles.¹²⁸ They found that the Article 82 of the Treaty Establishing the European Community (EC) (previous version of Article 102, TFEU) is not effective in addressing the problems in some circumstances. Where an access provider in a dominant position degrades the quality of transmission of third-party content providers compared with the quality provided to its own or affiliated content providers, thereby placing the former providers at a competitive disadvantage, the access provider may be in breach of Article 82.¹²⁹ However, dealing with blockage and refusal to provide prioritised services is less straightforward. Where this access provider blocks the content from third-party providers without objective justifications, the conduct may be regarded as a refusal to deal with the third-party providers.¹³⁰ The access provider may be in breach of Article 82 only if it can be established that the transmission facilities of the access provider are “essential facilities”.¹³¹ However, Chirico, Van Der Haar, et al. (2007) consider that proving that a particular access network is “essential facilities” is more difficult after *Oscar Bronner* when other access services are available in the market.¹³² Likewise, discriminatory practices in the supply of prioritised services may also be analysed as a refusal to supply the prioritised channels to the non-affiliated providers. It would be difficult to prove that the prioritised channels are

¹²⁶ Section 7N(1).

¹²⁷ Section 7N(2). This prohibition applies only if it has the purpose or effect of preventing or substantially restricting competition in a telecommunications market.

¹²⁸ Filomena Chirico, et al., "Network Neutrality in the EU" (2007) *TILEC Discussion Paper* No. DP 2007-30, pp. 1 - 67, at pp. 37 – 39 and pp. 58 – 65; Peggy Valcke, et al., "Network Neutrality: Legal Answers from an EU Perspective" (2008), The International Telecommunications Society 17th Biennial Conference, 24 - 27 June 2008, pp. 14 - 20.

¹²⁹ Valcke, et al., "Network Neutrality: Legal Answers from an EU Perspective", p. 16.

¹³⁰ Chirico, et al. consider that if the access provider has provided access to some content providers in the market, but refuses to provide access to other content providers, this form of blockage may be dealt with as anti-competitive discrimination. See Chirico, et al., "Network Neutrality in the EU", p. 36.

¹³¹ Valcke, et al., "Network Neutrality: Legal Answers from an EU Perspective", p. 14.

¹³² Chirico, et al., "Network Neutrality in the EU", p. 38.

“essential facilities” in the presence of the non-prioritised channels even though using the non-prioritised channels would put the third-party providers at a less advantageous position.¹³³

The general competition law when enacted in Hong Kong will prohibit anti-competitive conduct of an operator with a “substantial degree of market power”. If the access provider discriminating against certain Internet content providers does not possess this level of market power, its conduct would not be caught by the law. As explained in Section 3.2, some scholars consider that the access providers possess market power vis-à-vis the content providers in the delivery of the content, applications and services to the end-users connected by the access services. However, such market power may be counteracted by countervailing buyer power of the content providers and potential switching of end-users to alternative suppliers in the market. Thus whether sufficient level of market power can be established for the competition law to apply would depend on the circumstances of individual cases. Furthermore, with multiple broadband fixed access networks connected to 86% of the households, it may be difficult to establish that any of the networks are “essential facilities”. Refusal to deal with a third-party content provider may not constitute a breach under the “essential facilities” doctrine.

In conclusion, even if a general competition law in Hong Kong is enacted in the future, it may not be entirely effective to deal with discriminatory practices against third-party content, applications and services on the Internet or the managed networks.

5.3 Consumer Protection Law

More recent works of scholars have suggested that problems arising from discriminatory practices of access providers should best be tackled through enhanced consumer protection measures. Access providers should be required to disclose their network management practices and the performance of their services so that the end-users can make informed choice in the market and the regulators can judge whether the practices are reasonable. Unreasonable practices can be dealt with on a case-by-case basis.¹³⁴

Requirements for access providers to disclose information relevant to consumer interest are dealt with by consumer protection laws. In Hong Kong, section 7M in the TO prohibits conduct of licensees which, in the opinion of the TA, is misleading or deceptive in providing telecommunications networks, services and equipment, including (but not limited to) promoting, marketing or advertising the networks. Thus when the access providers disclose information to consumers, the information must not be misleading or deceptive. However, section 7M does not compel the access providers to disclose specific types of information to the consumers, such as network management practices or usage restriction policy, unless the omission of the

¹³³ Valcke, et al., "Network Neutrality: Legal Answers from an EU Perspective", pp. 18 – 19.

¹³⁴ See, for example, Philip J. Weiser, "The Next Frontier for Network Neutrality" (2008) 60 *Administrative Law Review* 273, p. 322; Douglas A. Hass, "The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates" (2007) 22 *Berkeley Technology Law Journal* 1565, pp. 1628 - 1635; Rob Frieden, "Network Neutrality and its Potential Impact on Next Generation Networks" (2007) *SSRN Paper* obtainable at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1026635, pp.17 - 19.

information amounts to misleading or deceptive conduct. It could be argued that if a certain type of information is critical or material to the consumers in their decisions to use or not to use a particular broadband access service, failure to disclose such information may be a breach of section 7M.¹³⁵ However, the current level of consumer awareness in Hong Kong may not have reached such level as to make the non-disclosure of highly technical information about network management practices and usage restriction policy a breach of section 7M. When it comes to achieving sufficient transparency on such practices and policy, a positive obligation on the access providers to disclose information would be much more preferable to a negative obligation of not to mislead or deceive because the standards of the information to be disclosed would be much more certain and known beforehand.

There are also no explicit provisions empowering the regulator to specify minimum quality of service, as the underlying philosophy is that the quality of service, like prices, in a competitive market should be determined by the market. Under the conditions of a licence regulating access providers, a licensee is required to provide “a good, efficient and continuous service in a manner satisfactory to the [TA]”¹³⁶, but this condition is probably too vague to form the legal basis for imposing specific standards on the access providers for minimum quality of service.

In comparison to the legal requirements under the current Hong Kong law, the legal standards in the US and Europe for access providers to disclose information to consumers are much more specific. In the US, the FCC has introduced network neutrality regulation in December 2010 with the aim of preserving Internet openness and freedom. One of the rules concerning “transparency” requires the Internet access providers to “publicly disclose accurate information regarding the network management practices, performance, and commercial terms of its broadband Internet access service sufficient for consumers to make informed choices regarding use of such services and for content, application, service, and device providers to develop, market, and maintain Internet offerings”.¹³⁷

In Europe, the 2009 communications reform package has not included any regulation on “network neutrality”, but has incorporated a number of provisions empowering the national regulatory authorities to ensure transparency and safeguard the minimum service quality of the connections provided to end-users. Regarding transparency, access providers must disclose in the contracts with consumers “conditions limiting access to and/or use of services and applications”, “the minimum service quality levels offered”, “procedures to measure and shape traffic so as to avoid filling or overfilling a network link”, “how those procedures could impact on service quality” and “any restrictions on the use of terminal equipment supplied”.¹³⁸ Access providers

¹³⁵ Failure to disclose the upload speed of broadband access service was ruled to be misleading. See *Hong Kong Broadband Network Ltd. v the Telecommunications Authority*, Telecommunications (Competition Provisions) Appeal Board, Case No. 23 of 2006, 24 April 2007, accessible at <http://www.cedb.gov.hk/ctb/eng/telecom/case23.htm> (last visited 2 December 2009).

¹³⁶ General Condition 5.1, Unified Carrier Licence, Telecommunications Ordinance.

¹³⁷ §8.3 – Transparency, Part 8 of Title 47 of the Code of Federal Regulations. See Federal Communications Commission, “Report and Order in the Matter of Preserving the Open Internet and Broadband Industry Practices”, Appendix A, p. 88.

¹³⁸ Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) as amended by Directive 2009/136/EC, Articles 20(1)(b), 21(3)(c) and (d).

must “publish comparable, adequate and up-to-date information for end-users on the quality of their services”.¹³⁹ Regarding quality of service, national regulatory authorities are empowered to specify and enforce minimum quality of service of public communications services.¹⁴⁰

In conclusion, the existing laws in Hong Kong including telecommunications regulation, competition law and consumer protection law, are not sufficiently capable of addressing problems arising from discriminatory practices if found to be market failures that justify regulatory intervention. The next question is whether new regulation should be introduced.

6. Should New Regulation be Introduced?

6.1 Theoretical Considerations

Since the 1980’s, developed countries have implemented some form of “regulatory impact assessment” to improve their regulatory environment.¹⁴¹ The common philosophy behind such assessment is that regulation should be applied only to deal with “market failures” or other systemic problems where certain desirable outcomes in the public interest cannot be delivered without regulation, but even when such failures or problems exist, regulation should be applied only when the benefits of regulation outweigh its costs.¹⁴²

So far, scholarly discussions on the costs and benefits of regulation are focused on the network neutrality regulation dealing with discriminatory practices targeting content, applications and services delivered over the Internet. To the network neutrality proponents, the principal benefit of network neutrality regulation is to safeguard innovation on the Internet. Without network neutrality regulation, the proponents argue, the innovation on the Internet will no longer be able to flourish as in the past.¹⁴³ To them, the Internet should act as “dumb pipes” leaving the intelligence to the edges. They consider the “end-to-end” principle to be fundamental in supporting innovation on the Internet.¹⁴⁴ The “end-to-end” principle first expounded by Saltzer, Reed and Clark (1984) suggests that the intelligence of a communications systems should reside at the end-points, or at the uppermost application layer of the layered network model, and the functions of the transmission “pipes” or at the lower layers should be kept as simple as possible without discrimination.¹⁴⁵ Without adherence to the “end-to-end” principle, the proponents argue, the innovation on the Internet will no longer be able to flourish as in the past.¹⁴⁶

¹³⁹ Id., Article 22(1).

¹⁴⁰ Id., Article 22(3).

¹⁴¹ OECD, "Regulatory Impact Analysis: A Tool for Policy Coherence" (2009), Report published on 11 September 2009, p. 15.

¹⁴² Id., pp. 66 – 68, 74.

¹⁴³ See for example Lawrence Lessig, "Testimony of Lawrence Lessig on 'Network Neutrality'" (2006), Publication of AEI-Brookings Joint Center for Regulatory Studies, March 2006, pp. 3 - 4; Wu, "Network Neutrality, Broadband Discrimination", p. 146.

¹⁴⁴ Lessig, "Testimony of Lawrence Lessig on 'Network Neutrality'", pp. 3 - 4.

¹⁴⁵ Jerome H. Saltzer, et al., "End-to-End Arguments in System Design" (1984) 2(4) *ACM Transactions on Computer Systems* 277, p. 278; David P. Reed, et al., "Commentaries on "Active Networking and End-to-End Arguments"" (1998) 12(3) *IEEE Network* 69, p. 70.

¹⁴⁶ See for example Lemley & Lessig, "The End of End-to-End: Preserving the Architecture of the

Network neutrality opponents argued that strict adherence to the “end-to-end” principles may potentially restrict legitimate design of the Internet. The Internet has not been neutral in its original design and subsequent operation, pointing to the differential treatment in the Transmission Control Protocol/Internet Protocol (TCP/IP) specifications¹⁴⁷ and the long-time existence of service differentiation and QoS technology in the market¹⁴⁸. They cite the examples of service level agreements¹⁴⁹, virtual private network services, non-neutral search engines¹⁵⁰, content delivery networks¹⁵¹, and the general acceptance of access providers’ practices in filtering harmful content such as virus, worms and spams.¹⁵² Yoo (2010) argues that these developing network topology and business relationships are mostly for the purposes of reducing costs, managing congestion and maintaining QoS rather than harming competitors.¹⁵³

To the network neutrality opponents, network neutrality regulation may also restrict legitimate network management practices. Internet resources are “club goods” subject to congestion during periods of heavy usage.¹⁵⁴ It is necessary for access providers to manage traffic on their networks in order to maintain quality of service for all classes of traffic. The Internet is now used for a wide variety of traffic, some of which are delay-sensitive (e.g. real-time voice, streaming video, interactive multi-party electronic games) and some can accept a certain degree of delay (e.g. e-mail, file exchanges). Giving priority to delay-sensitive traffic will improve the quality of service to end-users without degrading the quality of the delay-insensitive traffic to a noticeable or unacceptable extent. Yoo (2006) has argued that certain bandwidth-intensive applications might be a legitimate proxy for usage measurements as it may be too costly to meter usage over the broadband access. Discrimination against or blockage of such applications might form part of network management practices to protect quality of service to other customers.¹⁵⁵

The potential restrictions on legitimate Internet design and legitimate network management practices would probably be addressed by qualifying the discrimination prohibited by “unreasonable” and explicitly permitting any “reasonable network management” practices as in the network neutrality regulation enacted by the FCC in

Internet in the Broadband Era”, pp. 930 – 934, 945 – 946; Lessig, “Testimony of Lawrence Lessig on ‘Network Neutrality’”, pp. 3 - 4; Wu, “Network Neutrality, Broadband Discrimination”, p. 146.

¹⁴⁷ Hass, “The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates”, pp. 1576 - 1577.

¹⁴⁸ Id., pp. 1586 - 1587.

¹⁴⁹ Weiser, “The Next Frontier for Network Neutrality”, p. 9.

¹⁵⁰ Hass, “The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates”, p. 1590.

¹⁵¹ Robert Hahn & Robert E. Litan, “The Myth of Network Neutrality and What We Should Do About It” (2007) 1 *International Journal of Communication* 595, pp. 599 - 602; Hass, “The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates”, pp. 1590 - 1591.

¹⁵² Hass, “The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates”, p. 1589.

¹⁵³ Christopher S. Yoo, “Innovations in the Internet’s Architecture that Challenge that Status Quo” (2010) 8 *Journal on Telecommunications and High Technology Law* 79, p. 99.

¹⁵⁴ Christopher S. Yoo, “Network Neutrality and the Economics of Congestion” (2006) 94 *Georgetown Law Journal* 1847, p. 1863 – 1864.

¹⁵⁵ Id., pp. 1873 - 1876.

2010.¹⁵⁶ Ultimately it is the impact on revenue that is the true concern of network neutrality opponents. To the network neutrality opponents, another cost of network neutrality regulation is the potential negative impact on investment incentives for network infrastructure. They consider that allowing the access providers to charge the content providers for delivery will enable the access providers to raise additional revenue to recover the investment in the networks to cope with the ever-increasing demand for speed and capacity.¹⁵⁷

Network neutrality opponents regard network neutrality regulation prohibiting access providers from charging content providers for transmission to end-users to be a form of price regulation that mandates zero price for content providers to use network resources.¹⁵⁸ They argue that in the absence of clear evidence that certain forms of pricing are detrimental to consumers, the access providers should have the freedom to experiment with different forms of pricing for their network resources.¹⁵⁹ Faulhaber (2007) points out that the supply of access services is, in economic terms, a “two-sided market” in which both the end-users and the content providers may pay to cover the costs of the access services. The pricing structure will evolve with market. In his view, any attempt to freeze it at a particular arrangement is not justified.¹⁶⁰ Hemphill (2008) recognises that making available content to end-users requires joint innovation by both the access providers and the content providers. The pricing issue is ultimately one of appropriation of the rent available between the access providers and content providers. It is not clear what form of appropriation would have a better outcome for innovation.¹⁶¹ It is therefore an area that regulators do not possess sufficient information to intervene.

Another cost arises from potential enforcement errors. Scholars have noted that network neutrality regulations are particularly difficult to enforce. Blockage or degradation that was deliberately introduced to harm competitors could be disguised as legitimate network management procedures or attributed to software problems. On the other hand, legitimate practices could be mistaken for harmful discrimination.¹⁶² In the case of inadequate resources being allocated to the non-prioritised channels, it is difficult to tell if such resource shortage is due to genuine capacity limitations or an artificial restriction of resources in order to promote the other interests of the access provider. FCC’s network neutrality regulation now prohibits only “unreasonable discrimination”.¹⁶³ This type of law however needs detailed guidelines to be developed by the regulatory authorities and many years of litigations to build up the case law that clarifies the exact boundary of the prohibition. In the meantime, there

¹⁵⁶ Federal Communications Commission, "Report and Order in the Matter of Preserving the Open Internet and Broadband Industry Practices" , §8.7, Appendix A – Substantive Rules.

¹⁵⁷ Christopher E. Fulmer, "When Discrimination is Good: Encouraging Broadband Internet Investment without Content Neutrality" (2006) *Duke Law and Technology Review* No. 6, paras. 29 – 31.

¹⁵⁸ Robert Hahn & Scott Wallsten, "The Economics of Net Neutrality" (2006) 3 *Economists' Voice* Art. 8, p. 1; Hemphill, "Network Neutrality and the False Promise of Zero-Price Regulation", p. 137.

¹⁵⁹ Hahn & Wallsten, "The Economics of Net Neutrality", pp. 3 - 5; Yoo, "Network Neutrality and the Economics of Congestion", p. 1852.

¹⁶⁰ Gerald R. Faulhaber, "Network Neutrality: The Debate Evolves" (2007) 1 *International Journal of Communication* 680, p. 699.

¹⁶¹ Hemphill, "Network Neutrality and the False Promise of Zero-Price Regulation", p. 149.

¹⁶² See for example Hass, "The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates", pp. 1625 -1627.

¹⁶³ Federal Communications Commission, "Report and Order in the Matter of Preserving the Open Internet and Broadband Industry Practices" , paragraph 77.

would be uncertainties in the market. Such uncertainties may lead to significant regulatory costs in the form of delayed market entry or investment until the law is clarified.

In sum, the network neutrality debates over some eight years have built up a voluminous body of literature arguing for and against the introduction of network neutrality regulation. Unless there is evidence in the market that discriminatory practice has occurred or is likely to occur that would harm consumers' interests, it would be quite difficult to prove that the benefits of any network neutrality regulation would outweigh its costs.

6.2 Considerations for the Hong Kong Environment

The Hong Kong regulator at this stage does not consider network neutrality regulation to be necessary. OFTA takes the view that the “competitive nature of the telecommunications market in Hong Kong has the ability to dilute any negative impact” of violation of the principles of network neutrality, and “[i]n the unlikely event that the market cannot solve a problem associated with Network Neutrality, existing regulations at hand should be capable of addressing the problem.”¹⁶⁴

The author agrees with OFTA that the market in Hong Kong is working and there appears to be no significant problem in the market. There were only a couple of incidents connected with network neutrality in the past and these incidents have been resolved for the time being. The reported incident on blockage of VoIP on the Internet occurred some seven years ago.¹⁶⁵ A more recent incident about the “fair use” restrictions of mobile operators has apparently been settled by the regulator pushing the operators to improve their transparency measures.¹⁶⁶ As far as content, applications and services delivered over the Internet are concerned, the problems of deviations from network neutrality are largely prospective. Although the potential for discriminatory practices may be greater in the provision of carriage services over the managed networks, this would not be a concern if an open infrastructure is maintained on the Internet. Given the uncertainties as to whether the benefits of additional regulation would outweigh the costs, the justification does not exist for any new regulation on network neutrality at this stage. It is prudent to monitor the market behaviours for the time being and, in the meantime, other more proportionate measures may be considered. In particular, measures to improve the transparency of market practices should be considered.

Some observations on market practices show that there is much room for improvements of operators' transparency in the provision of access services to the

¹⁶⁴ Office of the Telecommunications Authority (Hong Kong), "Network Neutrality", p. 19. OFTA has identified the provisions in the TO and licence conditions concerning interconnection as the tools that can potentially be used to address problems of deviations from network neutrality, but has apparently not considered the application of these provisions or licence conditions to the access to non-telecommunications content and applications and to telecommunications services not licensed within Hong Kong.

¹⁶⁵ See news report on *Hong Kong Economic Times* (《香港經濟日報》), 3 August 2004.

¹⁶⁶ Consumer Council, Hong Kong, *Choice*, Issue 401, March 2010, pp. 38 – 39; South China Morning Post, *Surge in Complaints over Mobile Broadband*, 16 March 2010.

Internet. At present, the access providers in Hong Kong are not entirely transparent with regard to the network management practices or their policy towards the end-users for “excessive usage”. The contract is either silent on the practices and policy, or has included conditions restricting the excessive use of the broadband access services that are quite vague or one-sided. One of the standard terms and conditions of i-Cable, the cable modem operator, reads as follows:

.....If we, in our sole judgement, consider that your use of our Cable Broadband Service has consumed a bandwidth which is not typically associated with residential use and is otherwise excessive, which may inhibit, restrict or degrade other subscribers’ use or enjoyment of our Services, upon the first detection of such usage behaviour, we will alert and warn you and allow you to rectify the problem. If the usage behaviour persists, as part of our resource management outlined in [the above clause], we mayrestrict or limit the bandwidth available to you to such rate for such period as we may in our absolute discretion consider fit and proper.¹⁶⁷

This condition is effectively advising the customer that he/she may be punished for “excessive usage”, but the access provider is not telling the customer what “excessive usage” is at the time of contract and the meaning of “excessive usage” may well change over time at the sole discretion of the access provider. This type of contract terms is likely to be falling short of the standards of disclosure required in the US and Europe. For example, Comcast Corporation in US, after the FCC’s ruling in August 2008, has published much more detailed and specific information on what constitutes “excessive use” and on its network management practices.¹⁶⁸ In the published information, it has made some specific commitments that the network management technique is “protocol-agnostic” and “content neutral”, applied in “a certain area of the network near a state of congestion” and applied temporarily “until the period congestion passes”.¹⁶⁹

Another example relates to the transparency of the “fair use” restrictions of mobile operators. The Consumer Council in Hong Kong reported in March 2010 that the so-called “unlimited use” plans of mobile operators are actually subject to “fair use” restrictions. Such “fair use” clauses had always existed in the contracts between the operators and their customers, and were aimed to maintain quality of service for the majority of the customers, but the Consumer Council’s report revealed that the operators had not been drawing customers’ attention to the existence of such clauses in the marketing of the services.¹⁷⁰

All mobile operators have restrictions against “excessive” usage that would adversely

¹⁶⁷ i-Cable, *Cable General Terms and Conditions for the Supply of Internet Access Service*, Condition No. 29.

¹⁶⁸ “Frequently Asked Questions about Excessive Use” available at <http://customer.comcast.com/Pages/FAQViewer.aspx?seoid=Frequently-Asked-Questions-about-Excessive-Use> (last visited 11 March 2011) and “Frequently Asked Questions about Network Management” available at <http://customer.comcast.com/Pages/FAQViewer.aspx?Guid=24f9d063-b8ca-4c93-a528-cb62e1fd664b> (last visited 23 March 2011).

¹⁶⁹ Information given under “How does the current congestion management technique work?” in “Frequently Asked Questions about Network Management” published by Comcast.

¹⁷⁰ Consumer Council, Hong Kong, *Choice*, Issue 401, March 2010, pp. 38 – 39; South China Morning Post, *Surge in Complaints over Mobile Broadband*, 16 March 2010.

affect the quality of service provided to other subscribers. However, the “Fair Use Policy” of CSL, one of the mobile operators characterizes the top 5% heavy users as “abusers”.¹⁷¹ CSL stated, “According to our statistics only a small number of individuals are abusing the network. At the moment these serious abusers are approximately 5% of our customers.”¹⁷² It seems that a user would become an “abuser” if he or she happens to be falling within the top 5% in terms of volume of usage.

Self-regulation by industry players may be considered as a measure to improve the transparency on network management practices and quality of service. OFTA has engaged the industry to discuss the network neutrality problems. As part of the discussions, OFTA and the industry should jointly establish the criteria of what constitutes reasonable network management. The industry should be encouraged to develop a voluntary code of practice on network management practices and disclosure of such practices to consumers, with threat of introducing regulation to mandate disclosure if a satisfactory code is not adopted.

This threat would not be credible without legal backing. This paper has earlier referred to the codification by the FCC and the EC of the requirements for disclosure of information by access providers to achieve network neutrality goals.¹⁷³ Hong Kong should also consider mandated disclosure of information, as a positive obligation under either a consumer protection law or the TO in addition to the existing negative obligation of not to mislead or deceive under section 7M of the TO. Cross-sector consumer protection law suffers from the disadvantage of being too general to cover specific requirements for individual sectors. Therefore mandated disclosure of information such as food labelling is normally specified in sector-specific legislation.¹⁷⁴ The TO or licence conditions should be amended to empower the regulator to specify the information that must be disclosed to customers by telecommunications licensees. In relation to broadband access services, such information should include the usage restrictions of broadband access services, network management practices adopted by the operators and comparable data of actual quality of service achieved. This power needs not be invoked unless the industry has failed to adopt and follow the voluntary code for disclosure as discussed in the preceding paragraph.

The information to be disclosed by access providers is necessarily technical and detailed. Although the information is likely to be analysed by the regulator, other industry players and technology savvy end-users to identify any unreasonable practices, such disclosure is supposed to be read by the ordinary consumers as well. The information would not be meaningful to ordinary consumers without enhanced

¹⁷¹ CSL’s “Fair Use Policy” states as follows: “We may monitor usage of your service. If in our reasonable opinion, the use of your Mobile Service is excessive or unreasonable the relevant Mobile Services subscribed to may be restricted by us (ie we may restrict the throughput or amount of data transferred) forthwith without notice.” “Your mobile service will be reset at the beginning of the next billing period.” See CSL Limited, Hong Kong, “You Spoke. We Listened. We have Changed Our Fair Usage Policy”, pp. 5 – 6, downloaded 30 January 2011.

¹⁷² CSL Limited, Hong Kong, “You Spoke. We Listened. We have Changed Our Fair Usage Policy”, p. 1, downloaded 30 January 2011.

¹⁷³ See Section 5.3.

¹⁷⁴ For example, food labelling requirements are specified under the Public Health and Municipal Services Ordinance in Hong Kong.

consumer education. The industry and OFTA should work towards enhancing consumer education on what to expect from broadband access services.

7. Conclusions

Competitive conditions in Hong Kong should deter access providers from engaging in discriminatory practices against content, applications and services on the Internet. If access providers should engage in such practices, they would likely face substantial costs due to customer switching to other suppliers. There is a general expectation among the end-users that they should be able to reach all lawful content, applications and services on the Internet and the access services should provide adequate performance to support this user requirement. Discriminatory practices on the Internet therefore appear to pose less serious a threat to public interests compared with other markets with less intense competition.

The considerations related to the managed networks would be different. In the first place, there is no expectation among the end-users that they can reach all content, applications and services provided over the managed networks and the accepted market norm is differentiation of the accessible products among the networks. The incentives of the end-users to switch suppliers of access services in response to discriminatory practices on the managed networks may be different from the best-effort Internet. The potential for discriminatory practices is therefore greater on the managed networks than on the best-effort Internet. However, as long as the best-effort Internet performs adequately as an open communications infrastructure, discriminatory practices on the managed networks should not raise public interest concerns. When the best-effort Internet is no longer adequate to support the future needs of the society, the issues of discriminatory practices on the managed networks would become more relevant.

The issues related to the managed networks may not be so much about “network neutrality” as the managed networks are designed to be non-neutral, there being different grades of QoS provided and intelligence incorporated into the networks to support network-based innovations. Nevertheless, the concerns about market failures on the managed networks remain similar to those expressed in the network neutrality debates – market failures caused by discriminatory practices within the communications infrastructure that may impede content providers’ access to their intended end-users, and end-users’ access to content, applications and services of their choice.

Investment in the managed networks represents an attempt by the access providers to capture a larger proportion of the overall value of content provision and delivery, instead of just supplying a commoditized transmission product. The business models for the best-effort Internet and the managed networks are fundamentally different. For the best-effort Internet, no contract is necessary between the content provider and the access provider. For the managed networks, a commercial relationship needs to be established between the content provider and the access provider before the QoS enhancements and other resources on the managed networks can be provided to the content provider. The access providers would be reluctant to apply the business model of the best-effort Internet to the managed networks. So doing would lead to commoditization of the carriage services over the managed networks, defeating the

purpose of investing in the managed networks. In the absence of legal obligations to offer non-discriminatory access, the access providers are likely to have the incentives to discriminate in order to maximize their revenue from providing carriage services to the content providers.

The actual behaviours of the access providers in offering access to the managed networks would need to be further studied as the coverage of competing networks is expanded and additional access networks, particularly those based on the 4G wireless technologies, are brought into operation. In addition, apart from discriminatory practices at the access service level, such practices may also exist at the top or upper levels of the communications infrastructure. To ensure policy coherence, the disparity of regulatory treatment between different levels of the communications infrastructure cannot be disregarded. Whether discriminatory problems at the levels other than the access services would lead to market failures, whether competition law alone is adequate to address these problems, and whether regulation at these levels is warranted are issues that need much more research and market observations.

At this stage, the future relationship between the best-effort Internet and the managed networks is far from clear. The two networks could co-exist for some time in the foreseeable future, with the best-effort Internet fulfilling adequately the functions of the global communications infrastructure. Alternatively, the managed networks may replace, or become integrated with, the Internet to satisfy the different demands for bandwidth, QoS assurances and security. When this materialises, discriminatory practices on the managed networks may potentially obstruct the attainment of the public interest goal of having an open communications infrastructure to serve the society.

Before further research is conducted on these issues, it is premature to consider the introduction of regulation to address potential market failures on the managed networks. The recommendable approach at this stage for the regulator is to introduce proportionate measures that preserve the openness of the best-effort Internet and safeguard the competition between the content, applications and services on the Internet and those on the managed networks. This approach would postpone the need to consider regulatory intervention of the managed networks.

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