INFORMATION NOTE

Developments in the Regulation of Internet Protocol (IP) Telephony in Selected Overseas Places

1. Background

1.1 On 4 October 2004, the Office of the Telecommunications Authority (OFTA) issued a consultation paper entitled "Regulation of Internet Protocol (IP) Telephony". In the consultation paper, the Telecommunications Authority sets out his preliminary views on various regulatory issues of IP Telephony, a new telecommunications service which is also commonly referred to as "Voice over Internet Protocol" or "VoIP" in some places[1]. The purpose of this information note is to provide Members of the Panel on Information Technology and Broadcasting of the Legislative Council with information on recent developments in the regulation of IP Telephony in selected overseas places.

1.2 Same as OFTA, the telecommunications regulators in the United Kingdom (UK), the United States (US), Canada and Singapore have also issued consultation papers recently on the regulation of IP Telephony. These overseas places as well as Hong Kong are all more developed telecommunications markets. However, this information note only studies the regulatory frameworks proposed by the UK, Canada and Singapore for IP Telephony, as the US telecommunications regulator, the Federal Communications Commission, has posed various regulatory issues in its consultation paper for public comment without proposing any concrete framework or setting out any preliminary views on the regulatory issues. This information note also gives a brief discussion on the regulatory regime in Finland where the telecommunications regulator has made a decision on how to regulate IP Telephony services.

2. The United Kingdom

2.1 As a member state of the European Union (EU), the UK is subject to the EU regulatory framework which came into effect in July 2003 to regulate all types of electronic communications service (ECS), including IP Telephony[2]. The framework has put an end to the distinction between voice telephony and other telecommunications services, thereby putting various categories of ECS, irrespective of their underlying technologies, under the same regulatory regime.

---

1 See Legislative Council Secretariat (2004) for background information on IP Telephony with respect to its underlying technology, means of transmission, possible benefits and drawbacks, and regulatory implications.

2 IP Telephony in the EU countries was exempted from regulation under the former regulatory regime. Prior to July 2003, the service was not considered as a telephony service due to its low quality and reliability when compared with traditional circuit-switched voice services.

Application of the European Union regulatory framework

2.2 In the UK, IP Telephony services are referred to as new voice services, which cover the voice communications delivered over IP-based networks rather than via traditional telephone networks. The UK telecommunications regulator — the Office of Communications (Ofcom) — has applied the EU regulatory framework to new voice services with respect to the licensing system, regulatory status, interconnection and numbering arrangements, and number portability.

Licensing system

2.3 The UK has followed the EU regulatory framework to establish a general authorization regime, under which companies operating ECS (including IP Telephony) are not required to seek prior authorization or licences from Ofcom. Nevertheless, they have to abide by a combination of general conditions applicable to all ECS providers and specific conditions imposed on specific ECS providers. General conditions comprise the requirements to establish codes of practice and procedures for handling consumer complaints, whereas specific conditions include the universal service obligation (USO) to provide reliable telecommunications services to the public at affordable prices.

Regulatory status of Internet Protocol Telephony services

2.4 In line with the EU regulatory framework, Ofcom divides ECS into three different categories, namely private ECS, public ECS and publicly available telephone service (PATS). A private ECS can be an IP Telephony service providing voice communications within a company using a private network. If IP Telephony is used to provide a service to the public, it will be considered as a public ECS. A public ECS would fall within the scope of PATS if it provides, among other features, access to the emergency services[3].

2.5 Different categories of ECS are subject to different levels of regulation. Private ECS providers are normally subject to minimal regulation, whilst public ECS providers are required to comply with a set of obligations mainly relating to consumer protection. For PATS providers, they are subject to additional rights and obligations over and above those of public ECS providers, which include reliable access to the emergency services, number portability and provision of directory enquiries.

[3] As defined by the EU, PATS *"is a service available to the public for originating and receiving national and international phone calls and access to emergency services through a number or numbers in a national or international telephone numbering plan"*.

Interconnection arrangement

2.6 Under the EU regulatory framework, Ofcom accords to operators of public communications networks both a right and a duty to negotiate interconnection with each other. In the event of a dispute, Ofcom may intervene to issue guidelines and decisions governing the interconnection arrangements between network operators, which include interconnection charges and technical terms and conditions.

Numbering arrangement

2.7 The allocation of telephone numbers is essential for users to have any-to-any connectivity for IP Telephony services. In the EU, all IP Telephony service providers are entitled to number allocation to facilitate the any-to-any connectivity. As such, Ofcom issued a statement on the numbering arrangement for new voice services on 6 September 2004. In the statement, Ofcom makes both geographical number ranges and a new "056" number range available for new voice services. According to Ofcom, geographical numbers would make it easier for customers to switch from a traditional telephony service to an IP Telephony service, as they do not have to change their telephone numbers. For the new "056" number range, it is not related to any specific local area and can be used anywhere with an Internet connection.

Number portability

2.8 Number portability allows users to retain existing telephone numbers when switching network operators. Such an arrangement enables consumers to switch between IP-based and circuit-switched networks as well as among IP-based networks, without incurring the costs and inconvenience of changing telephone numbers.

2.9 Under the EU regulatory framework, number portability is a right only for subscribers to PATS. It is believed that the right to number portability might provide an incentive to IP Telephony service providers to offer services with features required of a PATS operator, particularly the access to the emergency services[4]. Therefore, in the UK, only new voice service providers providing PATS can offer their customers the benefits of number portability.

2.10 On 6 September 2004, Ofcom issued a consultation paper to solicit views on how to further apply the EU regulatory framework to new voice services. In the consultation paper, Ofcom sets out its preliminary views on several regulatory issues, comprising regulatory approach, access to the emergency services, consumer protection, USO and backup power supply.

[4] See Wilhelm (2004c).

Regulatory approach

2.11 In the consultation paper, Ofcom sets out its proposal for "light touch" regulation of new voice services. The proposal aims to balance the promotion of new and innovative services against the need to inform and protect consumers. In addition, it is believed that the "light touch" approach should limit the extent of distortion that regulation creates in the market.

2.12 Reflecting the above considerations, Ofcom is of the preliminary view that it is not desirable to require all new voice services to offer the same features as traditional telephony services. This is to help new companies create a range of differentiated services and offer consumers more choice. However, consumers must be able to make informed decisions about the services they subscribe to.

Access to emergency services

2.13 According to the definition of PATS, a service provider is considered offering PATS if he/she chooses to offer, among other things, access to the emergency services. The definition further requires PATS providers to provide a *reliable* access to the emergency services. This particular requirement might render new voice service providers to avoid offering any access to the emergency services, if they could not do so with the same level of reliability as other PATS providers such as traditional telephony service providers. This is particularly the case as IP Telephony can be used in a "nomadic" way, i.e. from any location with an Internet connection[5].

2.14 While seeking guidance from the EU on the PATS definition, Ofcom adopts an interim solution which allows new voice services to offer access to the emergency services without having to meet the other obligations of PATS. The objective of this interim solution is to ensure that new voice services entering the market are not prevented or dissuaded from offering access to the emergency services. At the same time, providers of nomadic IP Telephony services should alert their customers to the fact that the emergency agencies may not automatically know their locations when they make the emergency calls.

[5] For example, a user may use a broadband access network over which his/her IP Telephony service provider cannot have any, not even indirect, control over the service quality and/or reliability of broadband connection. In addition, as "nomadic" services can be used anywhere with an Internet connection, it may be difficult to identify the location of the caller who uses IP Telephony services to access the emergency services.

Consumer protection

2.15 In the consultation paper, Ofcom proposes a "two-stage approach" to provide consumers with necessary protection. The objectives are to ensure that purchasers are aware of the nature of IP Telephony services at the point of purchase, and potential users are adequately informed of the technical and operational limitations of the services at the point of use. These two objectives could be achieved through several possible measures suggested by Ofcom, which include publicity materials, a warning label to alert users to the reliability level of the access to the emergency services, and a checklist showing which facilities are included or excluded in the contracts signed by purchasers.

Universal service obligation

2.16 The introduction of IP Telephony may increase competition in the telecommunications market, and hence, may affect the revenue of existing contributing parties to USO. As such, the advent of IP Telephony may render the need to review the funding mechanism of USO, including whether IP Telephony service providers should be obliged to contribute to USO.[6]

2.17 In the consultation paper, Ofcom has not specifically addressed the future arrangement of USO, which is currently taken up by two designated telecommunications service providers. Unlike many telecommunications regulators, Ofcom has not put in place a universal service funding scheme to compensate the telecommunications operators for the costs they incur in fulfilling USO. Nevertheless, the issue of USO will be separately considered in the Universal Service Review as stated in the 2004-05 Annual Plan of Ofcom.

Backup power supply

2.18 Backup power supply outside the customer premises has traditionally been provided by the Public Switched Telephone Network (PSTN). It provides the safeguard that a telephone will continue to function in the event of electricity power failure on the customer premises. However, IP Telephony services require the use of a personal computer, a phone adapter or an IP Phone, which needs local power supply from the customer premises. In the consultation paper, Ofcom's preliminary view is that providers of new voice services would not be expected to provide backup power supply when it is not practical for them to make such an arrangement.

6 See Legislative Council Secretariat (2004) for details.

3. Canada

3.1 In Canada, the increasing availability of VoIP services has presented new challenges to the telecommunications regulator, the Canadian Radio-television and Telecommunications Commission (CRTC). There were two applications requesting CRTC to address the regulatory requirement for the provision of voice communications services using IP technology[7]. In response, CRTC released a Public Notice on 7 April 2004 setting out its preliminary views on a number of regulatory issues relating to VoIP services, including the regulatory status, interconnection arrangement, number portability, access to the emergency services, consumer protection and USO.

Regulatory status of Voice over Internet Protocol services

3.2 In the Public Notice, CRTC considers that as VoIP services require number allocations and allow subscribers to make calls to or receive calls from PSTN, they have the same functional characteristics as circuit-switched voice services. As such, VoIP services should generally fall under the existing regulatory framework that governs circuit-switched voice services.

3.3 CRTC adopts the principle of "technological neutrality", which states that like services should be regulated under like conditions regardless of the technologies employed to deliver the services. As such, the regulatory requirement for VoIP services would depend on the class of service providers (e.g. incumbent local exchange carrier (ILEC), competitive local exchange carrier (CLEC)[8] or re-seller) and the types of services being offered. In Canada, resellers are subject to lesser regulation, while CLECs and ILECs are entitled to additional rights (such as number portability and interconnection rights) and obligations (such as disability access[9] and protection of consumer privacy[10]).

3.4 The Public Notice also sets out CRTC's preliminary views on other regulatory issues, including access to the emergency services, consumer protection and USO.

---

7 In November 2003, CRTC received an application from a major telecommunications operator requesting it, among other things, to clarify the rules that governed providers of VoIP services. In January 2004, CRTC received another application requesting an investigation of whether the VoIP services provided by a local service provider complied with applicable regulatory requirements.

8 In Canada, CLECs are companies offering local residential or business services in competition with ILECs that have provided similar services prior to the introduction of competition in local service.

9 Disability access refers to the obligation imposed on a service provider to provide, on request, disability equipment to persons with disabilities to access basic telephony services. For example, message relay services provide specially-trained operators to relay messages between the deaf and persons who can hear and speak. The operator verbalizes messages typed by the deaf, and types whatever the hearing person says.

10 For the protection of consumer privacy, local exchange carriers are required to abide by the rules set by CRTC regarding the confidentiality of sensitive consumer information.

Access to emergency services

3.5 VoIP service providers are not required to immediately provide access to the emergency services, but they should provide such services as soon as practicable.

Consumer protection

3.6 VoIP service providers who do not provide access to the emergency services must clearly advise potential and existing consumers of such a limitation.

Universal service obligation

3.7 CRTC has put in place a national contribution collection mechanism, under which telecommunications service providers exceeding a certain revenue threshold are required to contribute to a central fund. The fund is used to subsidize the provision of local telephony services in high-cost service areas, such as rural and remote regions. In the Public Notice, CRTC proposes that VoIP service providers may also be required to contribute to the central fund based on the revenue generated from the telecommunications services provided.

4. Singapore

4.1 Although Singapore does not have a particular regulatory regime for IP Telephony services, its telecommunications regulator — the Infocomm Development Authority of Singapore (iDA) — has recently issued a consultation paper to seek public comments on the regulatory issues of IP Telephony services. The consultation paper, published on 21 September 2004, sets out iDA's preliminary views on IP Telephony with respect to the regulatory status, regulatory approach, access to the emergency services, consumer protection, interconnection and numbering arrangements, and number portability.

Regulatory status of Internet Protocol Telephony services

4.2 iDA is of the view that it is premature to consider IP Telephony and circuit-switched telephony services as being identical services, as they are delivered on different technology platforms.

Regulatory approach

4.3 iDA proposes to adopt the approach of *"imposing regulations only to the extent necessary to address certain economic, social/public and regulatory concerns relating to the provision of IP Telephony services"*.[11] The proposal is to allow emerging technologies such as IP Telephony to fully develop at the introductory phase.

Access to emergency services

4.4 In Singapore, telecommunications licensees providing local fixed-line services are required under the licence to provide, among other things, access to the emergency services. As IP Telephony services can be used in a "nomadic" way, there may be practical constraints for IP Telephony to provide access to the emergency services, particularly routing the caller location information to the emergency agencies. Hence, iDA proposes to allow IP Telephony service providers to decide whether or not to provide access to the emergency services.

Consumer protection

4.5 According to iDA, the Internet is designed primarily for data traffic and does not provide any Quality of Service (QoS) guarantee for real-time voice and video transmission. Nonetheless, subscribers to IP Telephony services may accept lower voice quality as a trade-off for cheaper phone calls. Therefore, iDA proposes not to impose QoS on IP Telephony and allow market forces to determine the prices and the corresponding QoS levels. However, IP Telephony service providers must inform their users that the services provided may not comply with the minimum QoS standards set by iDA for local fixed-line and mobile phone services.

4.6 As mentioned above, iDA intends to allow IP Telephony service providers to decide whether or not to provide access to the emergency services. As such, IP Telephony service providers are also required to provide very clear information to their customers on whether or not their services can reach the emergency agencies.

Interconnection arrangement

4.7 iDA proposes that IP Telephony service providers should meet the interconnection-related requirements stipulated under the existing regulatory framework for telecommunications services to ensure seamless and any-to-any communications. Under the framework, IP Telephony service providers can set up a "close-user" network instead of making any interconnection with existing telecommunications networks.

[11] See The Infocomm Development Authority of Singapore (2004).

4.8 However, if IP Telephony service providers choose to interconnect with existing telecommunications networks such as PSTN or mobile networks, existing network operators must observe the interconnection requirements stipulated under the Telecom Competition Code to allow interconnection. Similarly, if existing operators request interconnection with IP Telephony service providers, the latter must observe the requirements stipulated under the Telecom Competition Code and allow interconnection.

Numbering arrangement

4.9 iDA suggests the allocation of a new 8-digit number level starting with "3" (i.e. +65 3xxx xxxx) to IP Telephony services. The new number range is to help consumers avoid confusing IP Telephony services with traditional fixed-line telephony services. If demand warrants, iDA will assign new 4-digit national destination code (i.e. +65 3000 xxxx xxxx) and migrate all level "3" IP Telephony numbers to the 4-digit national destination code.

Number portability

4.10 According to iDA, number portability fosters consumer choice and effective competition. In any event, iDA considers that the development of IP Telephony is still at the early stage and the regulatory requirement for number portability may place an undue burden on new service providers. iDA proposes to consider mandating number portability at a later stage.

5. Finland

5.1 Finland is among the first members states in the EU to have come to a conclusion on how to regulate VoIP services. On 29 October 2003, the Finnish Communications Regulatory Authority (Ficora), the telecommunications regulator in Finland, issued a decision on VoIP services offered by TeliaSonera to its broadband customers. TeliaSonera is a leading telecommunications network and service provider in Finland, with significant market presence in the Internet, mobile and fixed-line markets[12].

5.2 In the decision, Ficora has ruled on a number of regulatory issues relating to VoIP services, including the regulatory status, access to the emergency services, consumer protection, interconnection arrangement and other issues.

[12] In Finland, TeliaSonera ranks first in Internet and mobile services, and third in fixed-line services. See TeliaSonera (2004).

Regulatory status of Voice over Internet Protocol services

5.3 Ficora ruled that VoIP services provided by TeliaSonera should be considered as a substitute to PSTN connection and thus PATS. Ficora's ruling was based on the fact that:

(a) TeliaSonera's VoIP service was available to the public;

(b) the service was offered through a telephone number in the Finnish numbering plan; and

(c) users could originate and receive national and international calls as well as gaining access to the emergency services.

5.4 In its decision, Ficora required TeliaSonera to comply with the same obligations currently accorded to PATS providers, including access to the emergency services, consumer protection and interconnection arrangement.

Access to emergency services

5.5 VoIP service providers must ensure that users can access emergency call numbers free of charge. In addition, they must provide access to the emergency services as reliable as possible even in the event of network disruptions.

Consumer protection

5.6 Communications networks and services must satisfy the quality requirements stipulated in the telecommunications regulations. These requirements include the protection of consumer privacy, reliable access to the emergency services and interoperability of communications networks and services.

Interconnection arrangement

5.7 As a member state of the EU, Finland has the obligation to implement the EU regulatory framework for ECS. As such, operators of public communications networks in Finland have both a right and a duty to negotiate interconnection with each other.

Other issues[13]

5.8 Ficora also requires VoIP service providers to:

(a) ensure that users can make international calls using a prefix "00";

(b) provide itemized bills free of charge;

(c) ensure that the user's name, address and telephone number are published in the telephone directory (if he/she wishes); and

(d) install equipment which allows the legal interception of calls.

6. Summary

6.1 Table 1 summarizes the regulatory frameworks proposed or adopted by selected overseas places for the regulation of IP Telephony services.

[13] Other issues do not include USO as there is no such stipulation in Finland.

Table 1 - Regulatory frameworks proposed or adopted by selected overseas places for the regulation of Internet Protocol (IP) Telephony services

	United Kingdom	Canada	Singapore	Finland
Latest developments in the regulation of IP Telephony services	• Application of the European Union regulatory framework to the services regarding the regulatory status, interconnection and numbering arrangements, and number portability • Consultation being conducted on other regulatory issues	• Conducting public consultation	• Conducting public consultation	• Already reached a decision on how to regulate the services
Regulatory status of IP Telephony services	• The existing regulatory framework for telecommunications services is also generally applicable to IP Telephony services[1]	• The existing regulatory framework for circuit-switched voice services is also applicable to IP Telephony services[1]	• Telecommunications regulator is of the view that it is premature to consider IP Telephony and circuit-switched telephony services as being identical services	• IP Telephony services are regulated as publicly available telephone services based on the criteria set by the telecommunications regulator[2]
Access to the emergency services	• Service providers are not required to provide the access with the same level of reliability as traditional telephony services	• Service providers should provide the access as soon as practicable	• Service providers can decide whether or not to provide the access	• Service providers should provide free and reliable access

Notes: (1) In the United Kingdom and Canada, IP Telephony services are subject to the existing regulatory framework for telecommunications services if they meet certain criteria set by the telecommunications regulator. See paragraphs 2.4 - 2.5 and 3.2 for details.

(2) Please refer to paragraph 5.3 for discussion of these criteria.

Table 1 - Regulatory frameworks proposed or adopted by selected overseas places for the regulation of Internet Protocol (IP) Telephony services (cont'd)

	United Kingdom	Canada	Singapore	Finland
Consumer protection	• Purchasers and users of IP Telephony services must be adequately informed of the nature and technical limitations of the services	• IP Telephony service providers must inform their customers if their services do not provide access to the emergency services	• Consumers must be informed of whether or not the IP Telephony services they are using can reach the emergency agencies	• Communications networks and services must satisfy the quality requirements stipulated in the telecommunications regulations, including reliable access to the emergency services
Numbering arrangement	• Consumers are entitled to both geographical number ranges and a new number range	• Information not available	• Consumers are entitled to a new 8-digit number range	• Information not available
Interconnection arrangement	• Available to IP Telephony services	• Available to IP Telephony services	• Available to IP Telephony services	• Available to IP Telephony services
Universal service obligation	• To be separately considered in the forthcoming Universal Service Review	• IP Telephony service providers may need to contribute to the central fund under the universal service funding scheme	• Information not available	• No universal service system

Prepared by Michael YU
6 December 2004
Tel: 2869 9695

References

1. Abrahams, N. & Farrell, B. (2004) Regulators at the Doorstep. *Telecom Asia*. 1 August. Available from: http://www.telecomasia.net/telecomasia/article/articleDetail.jsp?id=106797 [Accessed 2 December 2004].

2. Analysys. (2004) *IP Voice and Associated Convergent Services.* Available from: http://www.analysys.com/pdfs/EC_VoIP_Report.pdf [Accessed 2 December 2004].

3. Canadian Radio-television and Telecommunications Commission. (2004) *Regulatory Framework for Voice Communication Services Using Internet Protocol.* Available from: http://www.crtc.gc.ca/archive/ENG/Notices/2004/pt2004-2.htm [Accessed 2 December 2004].

4. Darlington, R. (2004) *A Guide to Voice Over Internet Protocol.* Available from: http://www.rogerdarlington.co.uk/VoIP.html#World [Accessed 2 December 2004].

5. Electronic Communications Committee. (2002) *Application of the New EU Regulatory Framework to IP Telephony.* Available from: http://www.ero.dk/documentation/docs/doc98/official/Word/ECCREP008.DOC [Accessed 2 December 2004].

6. European Commission. (2004) *The Treatment of Voice over Internet Protocol (VoIP) under the EU Regulatory Framework – An Information and Consultation Document*. Available from: http://europa.eu.int/information_society/topics/ecomm/useful_information/library/commiss_serv_doc/index_en.htm [Accessed 2 December 2004].

7. *European Universal Service Atlas.* (2004) Available from: http://www.uso-atlas.org/IE8x6/HOME.HTML [Accessed 2 December 2004].

8. EY Law Europe. (2004) *New European Regulatory Framework for Electronic Communications Networks.* Available from: http://www.eylaw.com/global/download.nsf/Spain/New_European_Regulatory_Framework_for_Electronic_Communications_Networks_(2003)/$file/Telecoms_brochure_Oct03.pdf [Accessed 2 December 2004].

9. Federal Communications Commission. (2004) *Notice of Proposed Rulemaking on IP-enabled Services*. Available from: http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-28A1.pdf [Accessed 2 December 2004].

10. Finnish Communications Regulatory Authority. (2003) *Decision of the Finnish Communications Regulatory Authority on Compliance with Law of the Sonera Puhekaista Service*. Available from: http://www.ficora.fi/englanti/document/sonerapuhekaista.pdf [Accessed 2 December 2004].

11. Global Internet Policy Initiative. (2003) *Telecommunications "Liberalization"*. Available from: http://www.internetpolicy.net/telco/ [Accessed 2 December 2004].

12. Kane, G. & Blakey, J. (2004) *CRTC and FCC Grapple with Regulation of Internet Protocol Telephony*. Stikeman Elliott LLP, Ottawa. Available from: http://www.stikeman.com/newslett/TelJun04.htm [Accessed 2 December 2004].

13. Kiedrowski, T. (2004) *ECTA Responds to EU VoIP Consultation*. European Competitive Telecommunications Association. Available from: http://www.telecomtv.com/vzine/ecta/202.html [Accessed 2 December 2004].

14. Lakelaters. (2004) *Information Technology & Communications Newsletter*. September. Available from: http://www.linklaters.com/pdfs/publications/itc/sept04.pdf [Accessed 2 December 2004].

15. Legislative Council Secretariat. (2004) *Information Note on Internet Protocol (IP) Telephony*. LC Paper No. IN05/04-05.

16. Mattila, O. (2004) *Voice over IP (VoIP) – Background and Regulatory Aspects*. Available from: http://erg.eu.int/doc/publications/consult_accounting_sep/erg_0422_voip_discussion_note.ppt [Accessed 2 December 2004].

17. Nieminen, K. (2004) *VoIP Regulation*. Helsinki University of Technology. Available from: http://keskus.hut.fi/opetus/s38042/s04/Presentations/17112004_Nieminen/Nieminen_paper.pdf [Accessed 2 December 2004].

18. Office of Communications. (2004a) *New Voice Services - A Consultation and Interim Guidance*. Available from: http://www.ofcom.org.uk/consultations/current/new_voice/new_voice_services.pdf?a=87101 [Accessed 2 December 2004].

19. Office of Communications. (2004b) *New Voice Services: An Overview - a Regulatory Framework for VoIP and VoB Services.* Available from: http://www.ofcom.org.uk/ind_groups/ind_groups/telecommunications/nvs_index/nvs_oview/?a=87101 [Accessed 2 December 2004].

20. Office of Communications. (2004c) *New Voice Services: Frequently Asked Questions.* Available from: http://www.ofcom.org.uk/ind_groups/ind_groups/telecommunications/nvs_index/nvs_faq/?a=87101 [Accessed 2 December 2004].

21. Office of Communications. (2004d) *Numbering Arrangements for New Voice Services.* Available from: http://www.ofcom.org.uk/ind_groups/ind_groups/telecommunications/nvs_index/nvs_statement.pdf [Accessed 2 December 2004].

22. Office of Communications. (2004e) *Ofcom Response to "The Treatment of Voice over Internet Protocol (VoIP) under the EU Regulatory Framework".* Available from: http://www.ofcom.org.uk/ind_groups/ind_groups/telecommunications/nvs_index/ec_resp?a=87101 [Accessed 2 December 2004].

23. Office of Communications. (2004f) *Questions and Answers on Voice over IP and Voice over Broadband Services*. Available from: http://www.ofcom.org.uk/ind_groups/ind_groups/telecommunications/vob/vobqa [Accessed 2 December 2004].

24. Office of the Telecommunications Authority. (2004) *Regulation of Internet Protocol (IP) Telephony*. Available from: http://www.ofta.gov.hk/report-paper-guide/paper/consultation/20041004.pdf [Accessed 2 December 2004].

25. Olswang. (2004a) *Commission Hearing Considers Future of Voice Calls over the Internet.* 6 April. Available from: http://www.olswang.com/news.asp?page=newssing&sid=101&aid=528 [Accessed 2 December 2004].

26. Olswang. (2004b) *European Commission Seeks Views on Future Regulation of VoIP.* 28 July. Available from: http://www.olswang.com/news.asp?page=newssing&sid=101&aid=662 [Accessed 2 December 2004].

27. Olswang. (2004c) *Ofcom Seeks Views on Future Regulation of Voice over Internet Services*. 29 September. Available from: http://www.olswang.com/news.asp?page=newssing&sid=101&aid=707 [Accessed 2 December 2004].

28. Scott, P. (2004) *Voice over IP and the EU Regulatory Framework.* Available from: http://www.eujapan.com/europe/ictsymp_scott_commission.pdf [Accessed 2 December 2004].

29. Simon, J. (2004) VoIP: Some Views from a Paneuropean Operator. In: *CICT Conference*. 4-5 November, Copenhagen. Available from: http://voip.cict.dtu.dk/presentations/Jean_Paul_Simon.pdf [Accessed 2 December 2004].

30. Spies, A. (2004) Internet Telephony in Europe: No more flying under the radar screen. *Business Communications Review.* March. Available from: http://www.swidlaw.com/pubs/files/Spies%20BCR%20Internet%20Telephony%20in%20Europe.pdf [Accessed 2 December 2004].

31. *TeliaSonera.* (2004) Available from: http://www.teliasonera.com/ts/teliasonera/start.do?start=http://www.teliasonera.com/ [Accessed 2 December 2004].

32. The Infocomm Development Authority of Singapore. (2004) *Proposed Policy Framework for IP Telephony and Electronic Numbering in Singapore*. Available from: http://www.ida.gov.sg/idaweb/doc/download/I3048/PC-VOIP&ENUM3.pdf [Accessed 2 December 2004].

33. Todd, J. (2003) *VoIP Regulation in America: A View from the Trenches.* Available from: http://www.oreillynet.com/pub/a/policy/2003/11/21/VoIP.html [Accessed 2 December 2004].

34. Trans-European Research and Education Networking Association. (2004) Regulation of Voice over IP in the European Union. In: *IP Telephony Cookbook.* Available from: http://www.terena.nl/library/IPTELEPHONYCOOKBOOK/ [Accessed 2 December 2004].

35. Victory, N. (2004) *VoIP at the Crossroads.* Wiley Rein & Fielding. Available from: http://www.wrf.com/db30/cgi-bin/pubs/VoIP_at_the_Crossroads.pdf [Accessed 2 December 2004].

36. Wilhelm, W. (2004a) Regulators intensify focus on voice over Internet services. *Internet Telephony*. February. Available from: http://www.tmcnet.com/it/0204/0204wilhelm.htm [Accessed 2 December 2004].

37. Wilhelm, W. (2004b) A leap forward? A closer look at the FCC's rulemaking on the Internet communications services. *Internet Telephony*. June. Available from: http://www.tmcnet.com/it/0604/RegulationWatch.htm [Accessed 2 December 2004].

38. Wilhelm, W. (2004c) Euro regulators propose VoIP framework. *Internet Telephony.* October. Available from: http://www.tmcnet.com/voip/1004/regulationwatch.htm [Accessed 2 December 2004].