A Note on Two Points in Optus' Submission

Martin Cave

June 2008

I have been asked by Telstra to comment on two issues raised in Optus' Submission to the ACCC on Telstra's December 2007 Exemption Application.[1]

The two issues are:

- the adverse effect of granting the exemption on other potential infrastructure investments; and
- the implications for the proposal of Telstra's ownership of both a copper network and an HFC network, whereas Optus has one network only.

First, however, I briefly recapitulate the overall argument.

1. The underlying proposition.

My paper[2] argues that the reliance unnecessarily placed by Optus on Telstra's local loops to service customers within the service area of its own network mutes competition between Optus and Telstra and discourages efficient investment in two time dimensions:

- it restricts competition and product diversity in the market for current generation broadband; and
- it places Optus in a weaker position to contest the supply of services which will be made available over next generation access networks.

I argue that in both of these time dimensions the exemption application, if granted, supports the long run interests of end users.

2. Sustaining investment incentives

I noted in my paper that granting the exemptions might have an adverse effect on investment in the future as operators might expect a similar exemption to apply to them if they built out their own networks. The same expectation could also influence Optus in its decisions on expanding the geographical extent of its network.

In my opinion, the exemption may in principle have both positive and negative effects- it will promote infrastructure investment within the relevant area, defined in the application as lying within 75 meters of Optus' existing HFC network, an area which is fixed and does not expand as Optus' network expands. But it may in principle cause Optus to think

[1] Optus Submission to ACCC on Telstra's December 2007 Exemption Application for Fixed Line Services in the Optus HFC Area, March 2008

[2] Martin Cave, *Applying the ladder of investment in Australia*, December 2007.

twice before expanding its network, for fear that this might, in due course, provoke a request for a further exemption. It might also provoke concerns on the part of other operators that they would be subject to a similar exemption, if they were to build an access network of their own.

I argued in the earlier paper that the ACCC could effectively dispel such anxieties in respect of investments made by those still in the process of 'climbing the ladder of investment', or taking their services on their own infrastructures closer to the customer. Its remarks in its Fixed Services Review may have already done so.[3] The ACCC has also acknowledged the beneficial effect of an exemption in its recent draft decision on Telstra's LCS and WLR exemption applications.[4] However, I did not consider in that earlier paper evidence relating to the materiality of the threat that granting the exemption would deter Optus from constructing a more geographically extended network.

Optus' HFC network has been in place for well over a decade, so we can seek to project its propensity to expansion on the basis of past data. These are usefully supplied in Optus' submission to the present proceedings, which cites the following expansion projects since 2004: [5]

- a hub in Victoria which supplies 10,000 SDUs;
- a node in Victoria serving about 100 homes, plus some other nodes; and
- a number of 'tap upgrade' projects.

These projects, strictly speaking, do not involve completely new deployment because Optus had already deployed cabling in the node areas and Optus was activating "dead cable" by installing the electronics. However, the projects say something of Optus' propensity to invest in its HFC network in the current regulatory climate.

Suppose that these amount to 4,000 units per year; that expansion on the same scale would continue; and that it would cease if the current exemption were granted. It then becomes apposite to ask whether this assumed adverse effect would be compensated for by the beneficial effect on in-area investment of granting the exemption. Simple arithmetic shows that if Optus chose, after the hypothetical withdrawal of the exemption, annually to make serviceable 0.5% of the 800,000 units it currently regards as unserviceable, the net effect on units passed would be positive.

Of course, there is nothing to say that Optus would not have undertaken these and other node deployments to activate more of its "dead cable" if the exemption were granted. As Optus would not be able to use regulated access services within the "dead cable" areas, it may have more incentive to fire up those areas and therefore expand its effective service area to the full extent of the currently deployed aerial network. These units passed would

[3] See, for example, ACCC Fixed Services Review, Second Position Paper, April 2007, pp. iii and 21.
[4] ACCC, *Telstra's local carriage service and wholesale line rental exemption applications*, Draft Decision and Proposed Class Exemption, April 2008.
[5] Op cit in fn 1

represent an addition to the pool of contestable customers which benefit from competition between two end-to- end facilities-based networks.

As an alternative basis of comparison, if, following the granting of the exemption, Optus increased its ratio of units considered serviceable from the current 65% to the 95% adopted by Virgin Media in the UK, the increase - over a number of years - would be 240,000 units. While crude, these calculations suggest that it is more than likely that the effect of the exemption on investment by Optus is likely to be positive.

These calculations do not take account of the Government's plans, now being implemented,for investment in a high capacity access network covering 98% of the population- a project to which the Government has committed $4.7 billion and for which a request for proposals has been announced. It is clear that this will be an open access network, although the precise form of regulation is subject to current consultation. It is also intended that funding will not be available in areas where there are competing networks.In my opinion, the long term interests of end users are best met by maximising the scope of competitive areas, and creating conditions for an 'investment race' in those areas.

3. *Taking account of Telstra's HFC network.*

Telstra's possession of both a copper and an HFC network in the major cities- the latter overlapping considerably with Optus' HFC network – has been an unusual feature of the situation. Optus' submission refers to an article by Professors Gans and Hausman in 2006, which asserts that 'Australia is perhaps the only country in the world where a single firm owns both of the key fixed line networks.'[6]

However, duplication of networks is becoming increasingly common. Incumbents in a number of countries are deploying FTTP networks in parallel with their copper networks. Whilst Verizon in the US has deployed its FiOS network passed many millions of homes, its copper network remains active and Verizon continues to sell services based on it. Verizon's main competitor in its FiOS footprint is a cable operator. Thus, the competitive situation now emerging in the US is not dissimilar that which has historically applied in Australia. Cable operators in the Verizon footprint are still capturing a substantial share of broadband services and have themselves responded by upgrading their cable networks to the DOCSIS 3 standard. As I also discuss below, one carrier owning two networks is also not unusual in mobile markets, which are usually recognised as being the most successful example of end-to-end facilities-based competition.

However, assuming for current purposes that the dual ownership of cable and copper by Telstra is unusual, how influential should this circumstance be in evaluating the application for an exemption. Optus' own view- see para 5.22- is that

[6] This is rather a strange observation, given the obvious existence, for a decade or more, of Optus' network , which passes a large number of households.

> '... its HFC network would be better placed to compete with Telstra's copper network if Telstra did not also own an HFC network (which prevents Optus from obtaining scale economies).'

Optus notes at paras 3.37 to 3.46 that Optus does not enjoy a geographical monopoly, as many cable operators do; and that Optus has captured less of the pay TV market than operators in other jurisdictions have been able to do. In this section, I seek to address these and other issues associated with Telstra's ownership of two networks.

Many of Optus' observations are almost certainly true. If it faced less competition, it would be better off. However, the broad objective of regulation is not the long term interests of any firm, or of all firms, but the long term interests of end users. While it might seem fair to Optus to equalise its position vis-à-vis Telstra by granting it access to one of the latter's two networks, such an action would not necessarily benefit end users. That question has to be addressed in other ways, as I attempted to do in my previous paper.

It remains to ask, however, what are the effects on Optus of having a pay TV competitor, and, second, what are the effects on Optus of one company competing with it via both a copper and an HFC network.

Australia is not alone in having competition in its pay TV markets. Households in some countries such as the US were for many years subject to a cable monopoly, and it is often recognised that the effects on end users were deleterious (even though regulation appears to have made things little better[7]). It should therefore be matter not of regret, but for congratulation, that Australians in some areas have had a choice of pay TV retailer.

A country which has experienced competition in pay TV is the UK, where it is available on cable in about 50% of the country and on satellite nearly universally. Moreover the upstream broadcasting operations exhibit some of the characteristics of which Optus complains in the paragraphs cited above. A recent market investigation by Ofcom into pay TV in the UK has noted in relation to wholesale broadcasting markets that[8]:

> 'Sky has a share of (well over 80%) in the premium sports content market- Setanta being its only rival- and 100% of the premium movies market'

More generally, the review concluded (at paras 1.61-3) that aggregation of content by a particular provider may lead to competition problems, that this may further permit leveraging of power into related markets, and that bundling may lead to market 'tipping'.

I conclude from this analysis that the UK cable operator, Virgin Media, is in a position of dependence for content, in relation to its pay TV competitor, Sky, which has features in common with Optus' position in relation to Foxtel, but that the UK cable operator

[7] See T Hazlett 'Cable television', in S Majumdar, I Vogelsang and M Cave (eds) Handbook of Telecommunications Economics, Vol 2, 2006, pp 192-240.
[8] Ofcom, Pay TV Market Investigation Consultation, December 2007, para 5.56.

probably lacks many of the regulatory protections available to Optus.[9] This position has not prevented Virgin Media from achieving a much higher level of customer serviceability than Optus within its footprint. Virgin Media has also committed to a policy of increasing its broadband speeds to 50 Mbps by the end of 2009. The notion that a pay TV monopoly is strictly necessary to achieve a high roll-out and further investment is at best not proven.

However, an additional feature of the Australian situation is that 50% of Optus' main pay TV competitor belongs to Telstra, the owner of the copper network, whereas in the UK Sky and BT are entirely separate companies, even if they have formed an alliance in the past.

The issue of co-ownership was especially prominent in the 1990s, as the two HFC networks were under construction, in the light of allegations that the roll-out of Telstra's HFC network was contrary to competition law or otherwise inappropriate. Whatever view is taken of events ten years ago, there has been a fundamental change in the market for communications in Australia since the two HFC networks were constructed. First, internet access emerged as a product in high demand; then narrowband access was itself largely overtaken by demand on the part of households and firms for broadband- services which both copper and HFC networks were particularly well-suited to supply. This demand was also accompanied by growing popularity of triple play solutions (a bundle of voice, broadband and entertainment services), to which HFC networks are particularly well suited.[10]

In this circumstance, the question at issue in the current proceedings is whether the co-ownership has an influence on the current and prospective state of the market of the kind which would justify refusal to grant the exemption. This would require, in my opinion, establishing a link between the state of co-ownership and the exemption request which would be strong enough to justify refusal of the exemption application.

It is inevitable that Telstra's competitive strategy as owner of two networks is likely to be different from its strategy would be if it owned only one, but the picture is more complex than the simple statement "two is better than one" might imply. In the first place, the obligation to maintain and operate two networks imposes significant additional costs, which, by themselves, weaken Telstra's position. Secondly, its pricing policies must take into account the fact that, if it lowers prices on one network, it may not gain net new business but simply encourage customers to switch between its networks. If anything, this consideration alone will tend to constrain Telstra.

[9] These include commitments from FOXTEL not to acquire or renew certain channels on an exclusive basis; and the commitment to supply its pay TV service to infrastructure operators, with provision to maintain pricing relativity to that at which FOXTEL supplies Telstra.

[10] In fact, I understand that Optus does not offer triple play in its own network area; this may be because of its choice to offer service indifferently in that area using both its own network, which can support a triple play, and using Telstra's unbundled loops, which cannot deliver entertainment services.

Thirdly, it could utilise its two networks to 'triangulate' an opponent, in the manner of 'fighting ships' in the transport sector, or, more generally of 'fighting brands'[11]. This might involve cuts to below-cost prices in 'competitive' areas, with a view to eliminating or weakening the competitor.

I am not aware of allegations of this kind being levelled at Telstra, nor is the evidence consistent with such conduct. The evidence in Telstra's original submission[12] suggests that Optus is capturing a significant share of broadband customers in the homes passed which it treats as serviceable – possibly more than the Telstra copper and cable broadband services combined. Optus also has more cable modem subscribers over much its smaller pool of serviceable homes than Telstra does on its HFC network. Optus appears to be competing aggressively on its Fusion packages which combine telephony and broadband on cable. Optus continues to report that its penetration level of broadband in its pool of serviceable homes is growing – up from 36% to 37% in the last quarter. This evidence is not suggestive of a 'triangulation' of Optus by Telstra on its copper and cable network.

And if there were allegations of anti-competitive conduct by Telstra, and they were found to be justified, then the natural remedy would be a prohibition on the impugned pricing behaviour, not recourse to an access remedy. I note that the ACCC has substantial powers through Part XIB of the *Trade Practices Act 1974* (Cth). In the context of full infrastructure competition, an access remedy is simply a means of assisting a competitor by offering it a lower cost alternative route to provide its service. It is not a means of correcting retail pricing abuses.

The Australian experience of 3G rollout is illustrative of how full infrastructure competition can thrive in the absence of wholesale access regulation. Telstra has recently deployed an extensive 'NextG' network with data capabilities and a footprint which are superior to the existing networks of the other mobile operators, including Optus. Those other mobile operators have been spurred to deploy their own high speed 3G networks in response to the Telstra network, to the point where three networks have very high levels of actual or announced population coverage. In a country the size and spread of Australia, this is a remarkable outcome. It is interesting to consider what the incentive effects might have been had Optus been given access to the Telstra NextG network, although it is difficult to imagine a keener competitive response.[13]

[11] See OECD, *Glossary of Industrial Organisation and Competition Law*, (n.d.) p.45.
[12] Telstra, *'Application for Exemption from Standard Access Obligations in respect of SingTel Optus' HFC Network'*, December 2007, p 2.
[13] See also Eisenach and Singer (2007), *Irrational Expectations: Can a Regulator Credibly Commit to Removing an Unbundling Obligation?* which elaborates on the Australian 3G example.

For the reasons given above, I have not been able so far to find a ground based on Telstra's co-ownership of a copper and an HFC network for denying the exemption application. In my view, the ownership of two networks by Telstra is no more striking a feature of the Australian market than Optus' multi-sourcing strategy. The latter is more likely to be the culprit in explaining Optus underinvestment in its HFC and the poor track record of that network. In the circumstances, for reasons given in my previous paper, maintaining the existing access remedy for Optus is, in my view, more likely to injure than to benefit the long term interest of end users.

STATEMENT of Professor Martin Cave

On 24____ June 2008, I, Martin Cave, Warwick Business School, University of Warwick, Coventry CV4 7AL, United Kingdom, say as follows:

1 I am the Director of the Centre for Management Under Regulation at Warwick Business School in the University of Warwick in the United Kingdom

2 I was retained by Gilbert + Tobin as an independent expert in this submission in response to Optus' submissions to the ACCC on Telstra's December 2007 exemption application.

3 Apart from the work in preparing my First Report for Peter Waters and Associates, I have no pre-existing relationship with Gilbert + Tobin. I have previously been retained as an expert to provide a report on infrastructure investment considerations in relation to Telstra's request for LCS/WLR and PSTN OA exemptions.

4 I was provided with a copy of Version 6 of the Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia (**Guidelines**), a copy of which I have annexed to this statement. I have prepared my report in accordance with the Guidelines.

5 The factual premises on which I have based my report are the facts:

- contained in the documents and materials provided to me;
- referred to in the body of this report; and
- contained in additional materials as referenced in the body of this report.

6 I have been provided with copies of the following submissions, by Gilbert + Tobin:

(a) Public Version of Telstra's Response to ACCC Discussion Paper on Telstra's Exemption Application Relating to SingTel Optus' HFC Network Submitted on 25 March 2008

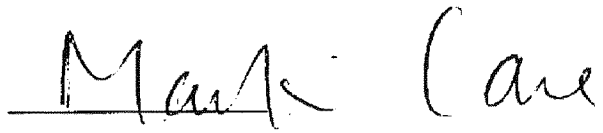
(b) Optus Submission to Australian Competition and Consumer Commission on Telstra's December 2007 Exemption Application for Fixed Line Services in the Optus HFC Area

(c) Optus Supplementary Submission to Australian Competition and Consumer Commission on Telstra's December 2007 Exemption Application for Fixed Line Services in the Optus HFC Area

7 In my report, I have referenced all additional materials relied upon in preparing this report.

8 In preparing this report, I have made all the inquiries that I believe are desirable and appropriate, and no matters of significance that I regard as relevant have to my knowledge, been withheld.

9 Exhibited to me at the time of signing this statement is a copy of my report dated 24 June 2008 which has been prepared for the purposes of these proceedings.



Martin Cave

Dated 24___ June 2008

Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia

This replaces the Practice Direction on Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia issued on 6 June 2007.

Practitioners should give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see - **Part 3.3 - Opinion** of the *Evidence Act 1995* (Cth)).

M.E.J. BLACK

Chief Justice

5 May 2008

Explanatory Memorandum

The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence (footnote #1), and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

Ways by which an expert witness giving opinion evidence may avoid criticism of partiality include ensuring that the report, or other statement of evidence:

(a) is clearly expressed and not argumentative in tone;

(b) is centrally concerned to express an opinion, upon a clearly defined question or questions, based on the expert's specialised knowledge;

(c) identifies with precision the factual premises upon which the opinion is based;

(d) explains the process of reasoning by which the expert reached the opinion expressed in the report;

(e) is confined to the area or areas of the expert's specialised knowledge; and

(f) identifies any pre-existing relationship (such as that of treating medical practitioner or a firm's accountant) between the author of the report, or his or her firm, company etc, and a party to the litigation.

An expert is not disqualified from giving evidence by reason only of a pre-existing relationship with the party that proffers the expert as a witness, but the nature of the pre-existing relationship should be disclosed.

The expert should make it clear whether, and to what extent, the opinion is based on the personal knowledge of the expert (the factual basis for which might be required to be established by admissible evidence of the expert or another witness) derived from the ongoing relationship rather than on factual premises or assumptions provided to the expert by way of instructions.

All experts need to be aware that if they participate to a significant degree in the process of formulating and preparing the case of a party, they may find it difficult to maintain objectivity.

An expert witness does not compromise objectivity by defending, forcefully if necessary, an opinion based on the expert's specialised knowledge which is genuinely held but may do so if the expert is, for example, unwilling to give consideration to alternative factual premises or is unwilling, where appropriate, to acknowledge recognised differences of opinion or approach between experts in the relevant discipline.

Some expert evidence is necessarily evaluative in character and, to an extent, argumentative. Some evidence by economists about the definition of the relevant market in competition law cases and evidence by anthropologists about the identification of a traditional society for the purposes of native title applications may be of such a character. The Court has a discretion to treat essentially argumentative evidence as submission, see Order 10 paragraph 1(2)(j).

The guidelines are, as their title indicates, no more than guidelines. Attempts to apply them literally in every case may prove unhelpful. In some areas of specialised knowledge and in some circumstances (eg some aspects of economic evidence in competition law cases) their literal interpretation may prove unworkable.

The Court expects legal practitioners and experts to work together to ensure that the guidelines are implemented in a practically sensible way which ensures that they achieve their intended purpose.

Nothing in the guidelines is intended to require the retention of more than one expert on the same subject matter – one to assist and one to give evidence. In most cases this would be wasteful. It is not required by the Guidelines. Expert assistance may be required in the early identification of the real issues in dispute.

Guidelines

10 **General Duty to the Court** (footnote #2)

1.1 An expert witness has an overriding duty to assist the Court on matters r relevant to the expert's area of expertise.

1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential (footnote #3).

1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

11 The Form of the Expert Evidence (footnote #4)

2.1 An expert's written report must give details of the expert's qualifications and of the literature or other material used in making the report.

2.2 All assumptions of fact made by the expert should be clearly and fully stated.

2.3 The report should identify and state the qualifications of each person who carried out any tests or experiments upon which the expert relied in compiling the report.

2.4 Where several opinions are provided in the report, the expert should summarise them.

2.5 The expert should give the reasons for each opinion.

2.6 At the end of the report the expert should declare that "[the expert] has *made all the inquiries that* [the expert] *believes are desirable and appropriate and that no matters of significance that* [the expert] *regards as relevant have, to* [the expert's] *knowledge, been withheld from the Court.*"

2.7 There should be included in or attached to the report; (i) a statement of the questions or issues that the expert was asked to address; (ii) the factual premises upon which the report proceeds; and (iii) the documents and other materials that the expert has been instructed to consider.

2.8 If, after exchange of reports or at any other stage, an expert witness changes a material opinion, having read another expert's report or for any other reason, the change should be communicated in a timely manner (through legal representatives) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court (footnote #5).

2.9 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report (footnote #5).

2.10 The expert should make it clear when a particular question or issue falls outside the relevant field of expertise.

2.11 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports (footnote #6).

12 Experts' Conference

3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

footnote #1
As to the distinction between expert opinion evidence and expert assistance see Evans Deakin Pty Ltd v Sebel Furniture Ltd [2003] FCA 171 per Allsop J at [676].

footnote #2
See rule 35.3 Civil Procedure Rules (UK); see also Lord Woolf "Medics, Lawyers and the Courts" [1997] 16 CJQ 302 at 313.

footnote #3
See Sampi v State of Western Australia [2005] FCA 777 at [792]-[793], and ACCC v Liquorland and Woolworths [2006] FCA 826 at [836]-[842]

footnote #4
See rule 35.10 Civil Procedure Rules (UK) and Practice Direction 35 – Experts and Assessors (UK); HG v the Queen (1999) 197 CLR 414 per Gleeson CJ at [39]-[43]; Ocean Marine Mutual Insurance Association (Europe) OV v Jetopay Pty Ltd [2000] FCA 1463 (FC) at [17]-[23]

footnote #5
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565

footnote #6
The *"Ikarian Reefer"* [1993] 20 FSR 563 at 565-566. See also Ormrod *"Scientific Evidence in Court"* [1968] Crim LR 240.

CURRICULUM VITAE

MARTIN CAVE

Professor Martin Cave, B.A., BPhil, DPhil

Office Address

Centre for Management under Regulation
Warwick Business School
University of Warwick
Coventry
CV4 7AL

Telephone: (0)24 7652 4153
Private Fax: (0)24 7652 4965
Mobile: 07958 483709

Email: martin.cave@wbs.ac.uk

Date of Birth

13.12.48

Education

BA, First Class, Philosophy, Politics and Economics, Balliol College, University of Oxford, 1969

BPhil in Economics, Nuffield College, University of Oxford, 1971

DPhil, Nuffield College, University of Oxford, 1977

Academic Employment to Date

1971-1974	Research Fellow, Centre for Russian and East European Studies, Birmingham University.
1974-1987	Lecturer and Senior Lecturer, Department of Economics, Brunel University.
1981-1982	Visiting Associate Professor, Department of Economics, University of Virginia.
1987 to 2001	Professor of Economics, Brunel University.
1988 to 1994	Head, Department of Economics, Brunel University.
1989 to 1994	Dean, Faculty of Social Sciences, Brunel University.
1994 to 1996	Pro-Vice-Chancellor, Brunel University.
1996 to 2001	Vice-Principal, Brunel University.
2001 to date	Professor and Director, Centre for Management under Regulation, Warwick Business School, University of Warwick.

Journals

Member, Editorial Board –

Economics of Education
European Journal of Law and Economics

Telecommunications Policy
INFO

Member, Advisory Board - *Communications and Strategies*

Advisory and Consultancy Experience for Government Organisations*

Appointed independent director of **UK Payments Council** (supervising the development of payment systems in the UK) 2007-2010

Appointed by **Department of Communities and Local Government** to conduct independent review of the regulation of social housing. 2006-7

Appointed special adviser to **the European Commissioner for Information Society and Multimedia**, 2006

Adviser to **OFGEM** from 2005

Appointed by **Chancellor of Exchequer** to conduct review of major spectrum holdings, December 2004- November 2005.

Adviser to **Lord Chancellor's Department** on legal deregulation 2004-5.

Vice-Chair, **Guernsey Utility Appeals Tribunal**, from 2004

Ofcom Spectrum Advisory Board (OSAB), Member from 2004.

Ofcom: Economic Advisor, from 2003

DEFRA regulatory task force, member, 2003

OFWAT Non-Executive Advisory Director, 2002 -2006

Appointed by **Chancellor of the Exchequer and the Secretary of State for Trade and Industry** to prepare an independent report on spectrum management, March 2001 – March 2002

Postal Services Commission: Adviser from 2000.

Civil Aviation Authority. Adviser 2000-2003.

Spectrum Management Advisory Group, DTI, member 1999-2003

French Ministry of Finance (1999) Member, Groupe d'Expertise, electricity grid pricing.

Competition Commission Member, (1996-2002).

Office of Utility Regulation (Jamaica) Economic Adviser **(1998-2000).**

OFGAS (1994 – 1999) Member of OFGAS Panel of Economic Experts, to advise the Director General of Gas Supply on a variety of economic issues relating to regulation of the industry.

Office of Fair Trading (1990-1992 and 1995-9) Acted as Broadcasting Adviser to the Office of Fair Trading in matters relating to the regulation of networking arrangements for the television

* Consultancy assignments from firms omitted.

industry (1990 to 1992). Adviser on BSkyB Inquiry (from 1995-96). Expert witness for DGFT (1998-1999).

French Ministry of Posts and Telecommunications (1991)
Member, Groupe d'Expertise – advisory committee on universal service and interconnection.

Ministry of Agriculture, Fisheries and Food (1993-1996). Adviser to the Ministry on appropriate procedures for tendering for the decommissioning of the fishing fleet.

HM Treasury (1986-1990) Economic Adviser undertaking advisory work on a consultancy basis for the Public Enterprise Analytical Unit and the Economics of Industry Division involving participation in the design of regulatory regimes for the water and electricity supply industries during privatisation. Secretary to an Inter-Departmental Group reviewing the discount rate and rates of return in the public sector.

Home Office (1985-1986) Consultant to the Committee on financing the BBC, chaired by Sir Alan Peacock. Advice on cost and revenues.

Publications

Books & Monographs

(with Chris Doyle and William Webb) *Essentials of Modern Spectrum Management,* Cambridge University Press, 2007.

Every Tenant Matters – a Review of Social Housing Regulation, Communities and Local Government Publications, 2007.

(edited with K. Nakamura) *Digital Broadcasting*, Edward Elgar, 2006.

Independent Audit of Spectrum Holdings: Report to the Chancellor, HMSO, 2006

(edited with S Majumdar and I Vogelsang) *Handbook of Telecommunications Economics. Vol 2.* Elsevier; 2005.

Review of Radio Spectrum Management, HM Treasury and DTI, 2002.

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(With R W Crandall) *Telecommunications Liberalization on Two Sides of the Atlantic,* Brookings Institution, 2001.

(With R Baldwin), *Understanding Regulation,* 1999, Oxford University Press.

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(With C. Milne and M. Scanlan), *Meeting Universal Service Obligations in a Competitive Telecommunications Sector*, European Commission, 1994, pp 1-74.

(With R. Mills), *Cost Allocation in Regulated Industries*, CRI Regulatory Brief, 1993.

(edited with S. Estrin), *Competition and Competition Policy: A Comparative Analysis of Central and Eastern Europe*, Pinter Publishers, 1993.

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(With P Hare) *Alternative Approaches to Economic Planning*, Macmillan, 1981

Computers and Economic Planning, Cambridge University Press, 1980.

Chapters in books since 1991

(with M. Corkery) 'Communications regulation' in Regulatory Review 2006/2007, 10th Anniversary Edition (P. Vass, ed.) 2006

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Referees

Sir Ian Byatt,
Chair, Scottish Water Commission

Nigel Stapleton
Chairman, Postal Services Commission