

## **Telecom Policy Review Panel**

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of the Consumer Groups (Public Interest Advocacy Centre, the  
Canadian Internet Policy and Public Interest Clinic, the  
Consumers Association of Canada, and the National Anti-  
Poverty Organization)**

August 15, 2005

# Executive Summary

## A. The Changing Telecommunications Environment

### Forces Shaping the Future

1. A.1 The most likely scenario is the emergence of a technologically differentiated and economically segmented environment. ICT will be organized around a standardized IP network platform, which will be more differentiated than envisioned by the original end-to-end architects of the Internet. Wireline and wireless broadband platforms will coexist with wireline and wireless narrowband platforms. Diffusion of these technologies will be uneven; some areas may continue to be dependent on narrowband and dial-up Internet service and not have broadband available without explicit public policy measures.
2. A.2 With the migration to digital technology, different networks will be capable of carrying a much broader range of applications than presently. Nevertheless, important functional differences, for example with regard to bandwidth, mobility, reliability, and security, will remain. Networks also differ with regard to their capital and operating expenditures. Consequently, different networks will be capable of supporting an overlapping but not identical range of services.
3. A.3 “One pipe, multiple applications” networks will increase in importance but it is uncertain whether they will be the primary means for the delivery of ICT applications and services to most Canadians within the next decade. The investment cost of upgrading to a ubiquitous broadband network, heterogeneous demand, and different functionality of network platforms will more likely result in an environment where one pipe multiple applications solutions will be adopted by many consumers but others will continue to utilize multiple, specialized platforms.
4. A.4 In most markets, a duopoly between cable and telephone companies seems to be a likely outcome. Other platforms, such as terrestrial wireless broadband networks and satellite-based networks may provide a third, not fully equivalent alternative platform to provide broadband Internet access in urban and suburban areas. In rural markets wireless broadband may be the only competitor to IP network services provided by the telephone companies or the cable companies. Some limited areas in which only one reasonable option is available may remain.
5. A.5 IP network platforms with high economies of scope and scale as well as business strategies that emphasize bundled service offerings constitute strong forces toward a concentrated market structure. Should a permissive policy framework be adopted, a duopoly with a competitive fringe is the most probable outcome. Should a more cautious approach prevail, more effective competition may be preserved in some market segments. The implications for regulation are twofold: (1) where regulation is presently in place, it is important to avoid premature or belated forbearance; (2) it is

important to safeguard relatively open and non-discriminatory access to IP network platforms so that more robust competition can be established at the level of applications and services.

6. A.6 Inter-regional competition will probably intensify further for a while, with strong economic forces toward consolidation in the medium and long run.
7. A.7 In a one pipe, multiple applications environment, cable companies and ILECs are the two players with the strongest advantages and weakest disadvantages. Terrestrial wireless and satellite service providers will be strong players in one or two market segments but will face more significant hurdles in a fully integrated environment.
8. A.8 A significant part of the advanced ICT infrastructure will be financed via market transactions. However, given the public good aspects of advanced telecommunications infrastructure, additional measures will likely be needed to achieve a desirable level of connectivity and service diffusion. Funding sources and mechanisms should better reflect the distinction between network access and service. Connectivity would best be funded from the access component of services.
9. A.9 The transition to IP and other new technologies in the emerging advanced network environment requires the development of appropriate knowledge and skills, both in the work force and in consumers, to harness the benefits of these technologies.
10. A.10 Wireless technology holds great promise and will continue to be an important component of ubiquitous connectivity both within homes and businesses and outdoors. Technological change has been particularly rapid in license-exempt bands. It is critical that spectrum and other policies be adopted that facilitate continued experimentation and harness this innovation potential.
11. A.11 Public policy can help channel technological advanced in socially beneficial ways. One of the most important contributions of public policy is to assure that innovations can be developed and brought to the market. This implies securing reasonable openness in the emerging general-purpose network platforms. It also implies the creation and protection of open market entry conditions. Most importantly, it implies that public policy allow and facilitate institutional innovation and experimentation.

## B. The Regulatory Framework

### 2. Economic Regulation

12. B.3 The overarching role of regulation is to facilitate the pursuit of public interest goals. More specifically, economic regulation should (1) protect consumers from the abuse of market power; (2) safeguard competition in areas where workable competition does not prevail; (3) ascertain the benefits of ubiquitous availability of telecommunications services.

13. B.4 The two principles of economic regulation set out in the Telecommunications Act, namely “just and reasonable rates” and “no unjust discrimination”, continue to be appropriate. There is no need to change the language in the Act. Where increased pricing flexibility is in the mutual interest of consumer and suppliers, the Commission could develop approaches to allow a gradual modification of the historically established prices.
14. B.5 The present framework is generally appropriate to deal effectively with the tasks of economic regulation. Furthermore, the framework is sufficiently flexible to adapt the scope and intensity of economic regulation to pursue the public interest goals stated in the Act. Caution is required in the design and implementation of specific policies. Of central importance are (1) the delineation of workably competitive market segments, in particular resisting the temptation of premature forbearance with its negative consequences for the further evolution of competition; and (2) the development of principles that should govern network openness and access in a one pipe, multiple applications environment.
15. B.6 Rational telecommunications policy has to allow for the possibility that re-regulation might be necessary. If a market segment develops a high degree of concentration and/or substantially increased entry barriers, re-regulation may be appropriate. A decision should be based on an assessment as to the overall costs and benefits of renewed regulation. Competition analysis will play a strong role in such an assessment.
16. B.7 In principle, the present tools are capable of realizing the stated policy goals. They are used worldwide and considered state of the art to tackle the issues faced in telecommunications. However, the present implementation does not always measure up to best-practice and will need to be improved.
17. B.8 While the wholesale and the retail levels are related, an evaluation of whether to regulate wholesale services and underlying facilities has to be made independently of the retail market situation. The test is whether wholesale markets are workably competitive. If this is not the case, cost plus markup or possibly price cap regulation should be employed in addition to a specification of the rights and obligations of different service providers.
18. B.9 As mentioned in B.8, the conditions at the wholesale and retail levels are related but nevertheless require independent assessment. The presence of wholesale regulation may reduce the need for retail regulation somewhat but cannot fully substitute for it.
19. B.10 Ex ante regulation will continue to be the default choice under conditions of monopoly or dominance. Ex post forms or regulation have an increasing role to play if a market segments falls in the transition zone between classical regulated monopoly

and workable competition. However, appropriate safeguards and bounds need to be in place.

20. B.11 The present challenges faced in the basic access network can be dealt with effectively in the framework of the existing contribution system. Should the market share of the ILECs decline, it will become increasingly unsustainable to place an obligation to serve solely on them. There are two principal options for this problem: (1) to expand an obligation to serve all customers in their service territory to all service providers; or (2) to define a more flexible system of universal service provision in which all carriers could participate. With regard to broadband access, the present targeted funding programs should be continued. Moreover, it would be timely for the CRTC to start a proceeding to study issues of broadband connectivity more closely and to develop a long-term model for increasing connectivity.
21. B.12 As industry structure changes, the requirement that ILECs serve any requesting customer on demand might have to be modified. Options include (1) expansion of an obligation to serve to all carriers; (2) establishment of a “provider of last resort status”, possibly awarded in a bidding process, with compensatory funding where necessary; or (3) introduction of individual subsidy schemes.

## **A. The Changing Telecommunications Environment**

### ***Forces Shaping the Future***

***A.1 Comment on the technological developments described above and provide your views on how telecommunications and ICT will change over the next 10 years.***

22. The history of technology forecasts is full of erroneous predictions. Technology enthusiasts often delight in pointing out how badly managers at IBM and AT&T underestimated the market potential for computers (estimated to be about three mainframe computers worldwide) and mobile phones (estimated to be about 5,000 in the U.S.). In the fascination with new technology, it is often overlooked, however, that the history of information technology brims with many more cases of overly optimistic predictions that never materialized or unfolded in ways very different from what had been anticipated.
23. Examples in that latter category include the home fax machine that would deliver newspapers, 3D television, or the videophone. Other technologies took much longer to be deployed by suppliers and adopted by consumers. For example, video-on-demand was widely announced as ready for mass market deployment in the early 1990s; likewise cable companies such as TCI in the U.S. (now part of Comcast) advertised cable telephony in the mid-1990s; it took nearly 10 years before service is now actually deployed and adopted by consumers on a broader scale. Another more recent example is the evolution of competition in the local exchange markets, which progresses much slower than originally expected.
24. With these caveats in mind, it is likely that the three identified trends — shift to IP-based technologies, further deployment of fiber optic technology, increasing importance of wireless services — will continue for the next decade. However, given the rapidly changing technological basis, the significant investment requirements to expand fiber to the premises, considerable uncertainty as to consumer adoption patterns, and growing concern about privacy and security issues, caution is required when assessing likely scenarios.
25. The next decade will see the gradual migration from IPv4 to IPv6, a version of the Internet protocol that will facilitate expanded numbering, more efficient routing, and allow better quality of service management on the Internet. IP-based protocols will likely become more ubiquitously available in devices and network platforms. However, given the different demands of services and applications, it is probable that the present end-to-end architecture of the Internet will at least in parts give way to a more differentiated network platform in which open and proprietary protocols co-

exist. If this scenario materializes, the widespread assumption that applications and services will evolve in an “access-independent” fashion may be misleading. Rather, a diversified network environment in which systems of providers (of network platform services bundled with content and applications) that compete with other systems of similarly packaged services may emerge, at least for large parts of the information and communication markets. The efficiency implications of such an environment are largely unknown but not necessarily negative, as this environment may be conducive to innovation.

26. Whereas fiber doubtlessly will play an ever-expanding role during the next decade, the speed of its deployment in access networks is somewhat less certain and will depend on the evolution of demand for broadband access and services. Most likely, fiber will be deployed in different configurations, depending on the local market characteristics. Fiber-to-the-home (FTTH) will predominantly be available in urban and suburban areas. Smaller towns and less densely populated areas may only see fiber-to-the-curb (FTTC) or fiber-to-the-neighborhood (FTTN), perhaps as an intermediate stage in the evolution of networks. In these cases, the last portion of the access link will probably be provided by xDSL technology or wireless broadband.
27. Wireless technology will for the most part complement wireline networks although it might substitute for it in certain areas. A broad range of wireless technologies is in development and being deployed. One trajectory is the upgrading of the existing mobile voice networks to more data-centric mobile platforms. 2.5 G capability, permitting lower speed mobile data communications, is available in large parts of the networks. North American carriers have been slower than their Asian and European counterparts in deploying 3G functionality, which will eventually facilitate more sophisticated multi-media services and faster data communications.
28. In addition to these evolutions of mobile voice service platforms, an ever-broadening range of broadband wireless data platforms will become available. Some of these platforms, such as the family of IEEE developed protocols, are based upon open standards whereas others, such as Tropos Networks’ Metro Mesh network, are based on (wholly or partially) proprietary technology. Some of these technologies, including different generations of 802.11-based services or ultra-wideband (UWB) services, have short range and will primarily be deployed within offices and residences (with some applications outdoors). Others, such as WiMAX (802.16), MobileFi (802.20) or 802.22 are engineered to cover longer ranges and will predominantly be deployed outdoors.
29. Although there is still considerable technological and economic uncertainty, these platforms could develop into competing broadband access platforms to wireline networks, especially in rural areas (however, there are important technical and functional differences, see below A.2). These platforms may be configured in license-exempt frequency bands or in licensed bands. License-exempt bands facilitate innovation and market experimentation by allowing free market entry, typically subject to minimal technical requirements but they create complicated issues

of coordination among service providers to avoid interference. Thus, compared to licensed bands, license-exempt services may not be as conducive to long-term infrastructure investment in locations where interference is a more pressing issue.

30. Overall, these wireless platforms offer promising opportunities for innovative mobile broadband services, including a platform for VoIP. However, due to the economics of broadband networks it is unlikely that they will develop into a ubiquitously available third broadband access platform. Rather, it is most likely that in many market segments they will complement wireline broadband networks, for example to provide nomadic access or to expand access beyond the reach of DSL. In some locations they may compete with wireline broadband, although the technological features of the two platforms differ, reducing the intensity of competition.
31. The relation between these wireless broadband platforms and mobile voice and data service is influenced by the timing of investment and service deployment. Fixed mobile wireless services will be a partial substitute for 2.5G and 3G mobile data services. If mobile versions of WiMAX will be deployed as predicted in 2008, it will create even stronger competition for 3G, possibly slowing the diffusion of 3G and putting pressure on revenues and profits for 3G. Some stakeholders (e.g., Intel Corporation) predict that the different wireless platforms will eventually be integrated seamlessly; for any communication purpose, cognitive radio devices would be able to take advantages of the most efficient network platform. If this scenario materializes, competition between alternative platform providers could evolve in one of two opposite directions: it could, first, become more intense as different platforms rival for traffic; however, it could also, second, become less intense as service providers may form alliances or consolidate to offer a whole range of wireless platforms in one integrated package. At this point it is too early to tell which scenario will be dominant.
32. Taking these different and conflicting developments into account, the most likely consequence for the ICT infrastructure is a technologically differentiated and economically segmented environment. These developments will likely be organized around a relatively coherent IP network platform but it will be less homogenous than envisioned by the original end-to-end architecture of the Internet. Wireline and wireless broadband platforms will coexist with wireline and wireless narrowband platforms. Diffusion of these technologies will likely be uneven; some areas may continue to be dependent on narrowband and dial-up Internet service and not have broadband available without explicit public policy measures. This heterogeneous future will create new challenges to the maintenance of a coherent and ubiquitously available information and communication infrastructure and related services. In those areas where multiple platforms will be available, it is most likely that wireline and wireless will be in a co-opetitive<sup>1</sup> relation, that is, compete in certain applications, customers, or locations but function as complements in others. Particularly if fixed-mobile convergence happens as some predict, wireless and wireline will cease to be

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<sup>1</sup>Co-opetition refers to a situation in which firms compete in certain market segments but cooperate in others. See Adam M. Brandenburger and Barry J. Nalebuff, *Co-opetition*, New York: Doubleday, 1996.

direct competitors and competition will predominantly unfold between the bundles of different providers. This will result in additional economic incentives for industry consolidation, although, assuming appropriate spectrum policies, the dynamics of wireless technologies probably will facilitate the existence of a vibrant competitive fringe.

***A.2 Comment on the potential for different networks (i.e., wireline telephone and cable networks, terrestrial wireless, satellite and hybrid networks) to carry existing and new ICT applications. Provide any relevant information on the infrastructure costs, bandwidth, security, reliability, and other features of such networks.***

33. Given the rapid technological pace of the industry, any answer to this question is afflicted with a considerable degree of uncertainty. It is likely that many future applications will be higher-quality versions of existing applications and services that will require considerably higher bandwidth than the present versions, at least if users want to take advantage of more sophisticated features.<sup>2</sup> On the other hand, advances in compression technology and network topology may alleviate the need to move to higher bandwidth. These conflicting forces have to be borne in mind when assessing the potential of different networks to carry existing and new ICT applications.

34. Applications differ with regard to several dimensions, such as required bandwidth, the sensitivity to error, tolerable time delay, and security needs. As network platforms differ in their functional characteristics (and can be configured differently), they will not support all applications equally well. Even if IP-based protocols will be deployed widely throughout the backbone and access networks, such differences will prevail. Table A.2 summarizes important (but by no means all) features of selected different network platforms, based on the present state of technology:

Table A.2: Comparison of selected features of network platforms

	<b>Data speed</b>	<b>Range (where a limitation)</b>	<b>Reliability</b>	<b>Mobility</b>
Wireline telephone				
Narrowband	Up to 56 kbps	n/a	Very high	Fixed
ADSL	up to 8.4 Mbps downstream	1.5 Mbps up to 6 km; 8.4 Mbps up to 3 km	Very high	Fixed
VDSL	up to 55 Mbps	12 Mbps up to 1.5 km; 55 Mbps up to 300 m	Very high	Fixed
FTTx	Gigabit range	n/a	Very high	Fixed

<sup>2</sup> For this reason, the U.S. Computer Science and Telecommunications Board (CSTB) of the National Research Council proposed a flexible definition of “broadband” rather than select a specific transmission speed. See CSTB, *Bringing Home the Bits*, Washington, DC, 2002, available at <http://books.nap.edu/html/broadband/>.

Cable networks	Variable	n/a	Very high	Fixed
Wireless networks				
2G	Up to 14.4 kbps	Coverage area	Medium-high	Mobile
2.5 G	Up to 171.2 kbps	Coverage area	Medium-high	Mobile
3 G	Goal 144 kbps-2 Mbps	Coverage area	Medium-high	Mobile
WiFi/Mesh	11-54 Mbps (shared)	Standard up to 100 m, longer range possible	Medium-high	Nomadic
WiMAX	Up to 75 Mbps claimed by supporters	Up to 8 km (up to 50 km for with special antennas)	Not yet known	Fixed (mobile beginning in 2008)
Satellite	Variable	Footprint	Medium-high	Fixed/mobile

Sources: own research.

35. Network platforms differ also in their investment and operational cost, although the costs of building and operating a network depend on a number of factors other than the technology, including the population density of the area to be served or the topology of the territory. Some network platforms, such as DSL, 2.5 and 3G wireless, or cable modem service, are upgrades of existing networks and thus cheaper on a per capita basis than greenfield network developments. While network upgrades presently may be achieved at \$300-500 per customer, deployment of fiber is more likely in the \$1,400-1,800 range in favorable conditions, could reach the \$3,000 range in less favorable conditions, and is way above that figure in difficult conditions.<sup>3</sup> Industry data suggest that WiFi and Mesh networks can be deployed at a cost of \$35-70,000 per square kilometer and that open source WiFi networks, such as the architecture developed by the University of Illinois, Urbana-Champaign, can be deployed at an even lower cost.

***A.3 Are “one pipe, multiple applications” networks likely to become the primary means for ICT applications to be provided to Canadians? If not, why not?***

36. “One pipe, multiple applications” networks will increase in importance but it is unlikely that within the next decade they will be the primary means for the delivery of ICT applications and services to most Canadians. Several factors contribute to this

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<sup>3</sup> See, for example, the information presented at the USTA Webinar “FTTH: Market Drivers, Economics, and Technologies and Deployments”, July 12, 2005. See also WiMAX Forum, “Business Case Models for Fixed Broadband Wireless Access based on WiMAX Technology and the 802.16 Standard, October 10, 2004; and Tropos Networks, “Maximizing Profitability: Tropos Networks and the Wireless ISP”, February 2005. The range of \$35-70,000 per square kilometer is calculated from industry estimates that the cost of an outdoor WiFi network would range from US\$75-150,000 (approximately CAN\$90-180,000) per square mile. A square mile equals approximately 2.59 square kilometers, yielding approximately \$35-70,000 per square kilometer.

development. First, it will take time to upgrade the existing network infrastructure to provide multiple applications. Second, not all platforms are equally capable of providing certain services. For example, wireless platforms, especially in the frequency bands above 3GHz, have potential reliability issues whereas fixed platforms provide no mobility (apart from the portability enabled by VoIP). It is possible, however, that fixed and mobile services will be offered as integrated packages by one supplier.

37. Third, it is not self-evident that all Canadian households will want to subscribe to broadband access platforms, although the actual rate of adoption and saturation level will depend on the available services (a positive network effect) and the price for services. Fourth, even if bundles are available, some consumers may prefer purchasing service from different suppliers to purchasing it from one company. Network platform providers face mixed incentives when it comes to opening their networks to independent ISPs, applications, or service providers. A precondition for customers who prefer services from multiple vendors to be served via one pipe is the openness of that platform to third parties, either voluntarily or mandated.
38. Therefore, the most likely scenario is one in which technology platforms and services are more integrated for many users but a considerable degree of network and market segmentation and differentiation will persist.

***A.4 Are there likely to be multiple IP network providers offering service to the home, business and public sector? If so, how many and which types of network providers are likely to be providing service to each market? If not, which types of network providers are likely to serve each market and with which technologies?***

39. The emerging market structure will likely be different for access and backbone services. The market for backbone services is large enough to allow several service providers to coexist. Several network service providers, using different IP platforms, vie for the provision of access services to ultimate consumers: wireline service providers, cable service providers, wireless Internet Service Providers using terrestrial wireless technology, and satellite service providers. As discussed in the response to A.2, these platforms each have different advantages and disadvantages, thus are not full substitutes for each other. The market outlook of powerline communications is uncertain and it is questionable whether it can capture a significant market presence. In some areas publicly owned access networks will likely be available or cities and municipalities may serve as coordinators of local broadband infrastructure development deployed and operated by the private sector.
40. Whether consumers will buy access to one or more platform will depend on the business strategies of platform, content, and application service providers, in particular their bundling strategies and whether independent content and application providers can gain equal access to network platforms. Other things equal, given the

economics of broadband access networks, is it probable that most residential consumers will only subscribe to one service provider. For consumers in urban areas, alternative IP network platforms will likely be in reach and may be able to extend service with reasonable incremental cost. However, consumers will likely incur switching costs. Small business customers will likely only purchase access to one platform, with competing platforms in reasonably close range, at least in urban areas. However, the diffusion of IP network platforms will be heterogeneous and there will likely remain areas, perhaps even in urban areas, that may not have access to competing service providers.

41. Given the present technological, economic, and regulatory developments, the most likely outcome is that in most geographic markets two IP-based network providers, offering comparable services will be present. In most markets, a duopoly between cable and telephone companies is the most likely outcome. Other platforms, such as terrestrial wireless broadband networks and satellite-based networks may provide a third, not fully equivalent alternative platform to provide broadband Internet access in urban and suburban areas. In rural markets wireless broadband may be the only competitor to IP network services provided by the telephone companies or the cable companies. Lastly, it cannot be excluded that there will remain limited areas in which only one reasonable option is available.
42. Even if multiple technological platforms are available in many areas, this does not necessarily imply that they are priced to offer competing services. For example, wireless IP networks might be used as complements to the wireline networks, for to extend them to areas out of the reach of DSL service. The most likely scenario for the vast majority of locations will be presence of two IP network access providers per area with a small competitive fringe of imperfect alternatives.

***A.5 Is the Canadian competitive environment in telecommunications likely to evolve into a form of duopoly (i.e., incumbent local exchange carriers (ILECs) versus cable companies)? If so, what would be the implications for the telecommunications and ICT markets? What would be the implications for the regulatory framework?***

43. Which market structure will emerge depends on the further evolution of technology, demand-side issues, and the regulatory approach. The coincidence of IP network platforms with high economies of scope and scale as well as business strategies that emphasize bundled service offerings constitute strong forces toward a concentrated market structure. Should a permissive regulatory framework be adopted, a duopoly with a competitive fringe is the most likely market structure. Should a more cautious regulatory approach be adopted, more effective competition may be preserved in some market segments. As discussed in A.4, in most markets a duopoly would be formed between ILECs and cable companies but other constellations are possible in certain areas.

44. At this point it is difficult to anticipate what distribution of market shares will emerge. ILECs have a strong presence in voice markets but face challenging network upgrades and content acquisition issues before they can offer entertainment services. Cable companies have a strong presence in entertainment services, broadband Internet access, and have made inroads in attracting consumers to their voice services. Wireless terrestrial broadband and satellite-based services, will likely remain more limited “niche” players, focusing on one or two market segments, rather than effective competitors in bundled triple or quadruple play markets. Fixed wireless terrestrial broadband may be able to compete in the broadband Internet access market and attract some nomadic data communications users who do not need the fully mobile broadband offered by 3G. Although progress is made in streaming music, videos and IPTV, either via terrestrial or satellite services, to mobile devices, the overall outlook of wireless platforms as competitors in situations other than for mobile users remains highly uncertain.
45. What balance will emerge between these players will not least depend on the regulatory framework. For example, premature forbearance in local exchange markets could tilt the balance in favor of the ILECs whereas delayed forbearance might give the upper hand to cable. Moreover, policies in the field of spectrum management, rights of way, and policies governing the ability of cities and municipalities to offer wireless and wireline broadband services will all have a bearing on the evolution of the market structure.
46. It is unlikely that a fully converged, integrated market for communications services will emerge. The economics of telecommunications technology, business strategy, and consumer preferences all work against such an outcome. If IP-based, open (rather than proprietary, segmented) network architectures were to be used as the dominant platforms, the markets for transmission capacity would begin to resemble commodity markets. This would imply an unfortunate combination of relatively high investment cost, low value-added at the network level, and low margins. On the other hand, applications and services, which promise much higher value added and potential margins than network services, could be configured relatively easily at the edges of the network.
47. This constellation will create strong incentives for the owners of the network platforms to integrate vertically into service provision and to keep their platforms relatively closed to third parties other than a few select alliance partners. Moreover, while convergence of other things equal will intensify competition, service providers, facing cost structures with high fixed and low incremental costs, will make strong efforts to differentiate their service offerings to reduce these effects. All these strategies will tend to reduce the intensity of competition. These incentives to differentiate will likely be facilitated by demand-side factors. Not all consumers will want to buy bundled services, leaving room for smaller niche players. Furthermore, consumers may want different bundles. Lastly, consumers will face switching costs and lock-in effects.

48. These conflicting forces of integration, differentiation, and continued fragmentation have important consequences for the patterns of competition. In general, in markets with few players, they are aware of their interdependence and will attempt to pursue strategies that avoid destructive forms of competition. (Whether they will succeed in this endeavor, depends on the specific competitive interaction and management strategies.) In markets with high fixed and low incremental costs, such as broadband markets, competition can be analyzed as a two-step process. In the first step, a race may develop among companies striving to rollout capacity required to provide service. During this phase, price competition is typically relatively limited.
49. Once capacity has been rolled out and the cost is sunk, the competitive interaction will likely take on another dynamic. Three scenarios are possible: vigorous competition, coexistence, or collusion. In the first case, firms will attempt to build market share by reducing the prices for their services. Some economists argue that the sunken nature of the investment cost will vigorous competition even in the presence of few service providers. For example, it is possible that, after the cost for the required network upgrades is sunk, competition even in a duopoly will reduce prices to the level of incremental cost. Moreover, it is possible that firms will not be able to increase prices if they operate in sufficiently elastic markets, as they may lose contributions to fixed costs.
50. However, unless managers react myopically, they will realize that in industries with high sunk costs prices set at incremental costs will not cover the full cost of operations. Thus, it is possible that the vigorous competition scenario will not materialize and that, instead, firms will seek to peacefully coexist at stable prices or even attempt to collude. As duopolists often know their respective cost relations quite well, such forms of coordination may have a good chance to succeed. If coordination does not succeed, firms in markets with high sunk costs often tend to consolidate.<sup>4</sup> Thus, a scenario of less intense competition is another possible outcome of the specific cost structure in advanced information and communication markets.
51. The implications for regulation are twofold: (1) where regulation is presently in place, it is important to time forbearance measures to increase the likelihood that more than two main service providers emerge, at least that a strong competitive fringe is established; however, the task is to protect competition and not competitors; (2) it is important to safeguard relatively open and non-discriminatory access to IP network platforms so that more robust competition can be established at the level of applications and services.<sup>5</sup>

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<sup>4</sup> See the exposition of these issues in John Sutton, *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*, Cambridge, MA: MIT Press, 1991.

<sup>5</sup> In this vein, on August 5, 2005, the U.S. Federal Communications Commission (FCC) adopted a policy statement that it would enforce unfettered access to the Internet. The statement contains four principles: “(1) consumers are entitled to access the lawful Internet content of their choice; (2) consumers are entitled to run applications and services of their choice, subject to the needs of law enforcement; (3) consumers are entitled to connect their choice of legal devices that do not harm the network; and (4) consumers are entitled to competition among network providers, application and service providers, and content providers” (see *FCC Adopts Policy Statement: New Principles Preserve and Promote the Open and Interconnected*

***A.6 Is vigorous inter-regional competition by ILECs and cable companies likely? Please explain the basis for your views.***

52. In the short-run it is likely that ILECs and cable companies will attempt to expand their footprint. Greenfield overbuilds will only make economic sense in a few large markets. The most probable strategy is one of mergers and acquisitions of already existing smaller service providers or of alliances with other service providers. Similar developments may affect the emerging markets for wireless broadband. It is not yet clear whether these platforms — such as WiFi or mesh city networks or WiMAX — will succeed. From the vantage point of an ILEC or a cable company it may thus make sense to observe the evolution of this segment with the goal to acquire selected companies, should the technology succeed. This seems a particularly appealing strategy as WiMAX in many ways offers a complement to existing wireline broadband networks. Some carriers in the U.S., for example Bell South, rely on wireless broadband to reach customers out of range of their present DSL footprint. Therefore, in most cases, this expansion will not increase the number of effective competitors in any specific area or even decrease it. In sum, inter-regional competition will probably intensify further for a while, with important counter-acting trends in the medium and long run.

***A.7 Assuming a “one pipe, multiple applications” environment does evolve, describe the effect of this environment on the market position of existing service providers (e.g., ILECs, cable companies, wireless service providers, Internet Service Providers, etcetera) and any new entrants. Provide market share projections, if possible.***

53. If a “one-pipe, multiple applications” environment should evolve, the market position of existing service providers will be shaped by their structural and strategic competitive advantages and core competencies. These advantages are not only related to the technological basis of the various players but also to their comparative strengths in acquiring and packaging content, customer relations, their present market share, their capability to innovate, their ability to adapt to the new environment, and public policy decisions. As some of these factors are related to individual firm’s resource base and management decisions, there will be some degree of variability. However, there are also some structural forces at work that affect the relative position of the various players. Table A.7 synthesizes important structural factors.

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*Nature of Public Internet*, Press Release, Washington, DC, August 5, 2005, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-260435A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260435A1.pdf)). The FCC did not adopt any formal rules but emphasized that these principles would be incorporated into any ongoing rulemaking.

Table A.7: Advantages and disadvantages of service providers in a hypothetical “one pipe, multiple applications” environment

	Advantages	Disadvantages
ILECs	Ubiquitous network, established brand name	Need to upgrade narrowband network, DSL only intermediate technology, fiber required in the long run, limited experience in contracting with content suppliers, possibly limited credibility as entertainment providers
CLECs	No legacy network and access to newer technology, possibly attractive new brand name	Need to upgrade networks, need access to essential facilities, limited experience in contracting with content suppliers, possibly limited credibility as entertainment providers
Cable companies	Existing broadband network, established relations with content providers, brand name as entertainment providers	Smaller footprint than ILECs, eventually may run into bandwidth limits
Wireless service providers	Offer mobility	Bandwidth ultimately limited, significant investment needed, challenges of coordinating network, content, and applications
Fixed wireless broadband	High bandwidth, easy to deploy, low investment per user, most likely would serve as conduit	Potential limits as a platform for multimedia and entertainment
ISPs	Some have established brand names and loyal customers	Are in weak position to get access to network platforms (unless facilitated by legislation and regulation)

54. Overall, cable companies and ILECs emerge as the two players with the strongest advantages and weakest disadvantages. Given the economics of advanced ICT, the relative market positions of players will be strongly influenced by the legal and regulatory framework that is in place. The legal and regulatory framework should attempt to design rules that maximize benefits along the entire value chain.

***A.8 Comment on the need for ongoing financing of advanced and legacy network infrastructure in Canada and on how such funding should be obtained by network***

*providers in a “one pipe, multiple applications” environment. Since VoIP and other advanced ICT services may be provided separately from access networks, how should network infrastructure be financed in the future?*

55. A significant part of the advanced ICT infrastructure will be financed in open market transactions. However, given the public good aspects of advanced telecommunications infrastructure, additional measures will likely be needed to achieve a desirable level of connectivity and service diffusion. Such measures include targeted funding by the national government and provinces. Moreover, it is important to update the definition of basic service used for universal service purposes to better reflect connectivity requirements in an era past dial-up Internet access. It is probably appropriate to monitor the evolution of broadband connectivity for some more time before broad-based universal service funding is established. The appropriate definition of the types of access and services that are included in such expanded universal service funding is an important political task and needs to precede any decision as to how funds are generated.
56. A hypothetical “one pipe, multiple applications” environment poses fewer funding challenges than the more likely hybrid environment, in which some services are provided as applications via general purpose networks and others via more specialized networks. Any funding mechanisms should, as far as possible, be competitively and technologically relatively neutral, broad-based, and treat providers as symmetrically as possible. In the emerging environment, access and services will be more distinct than in the past networks. Funding sources and mechanisms should better reflect this distinction. Connectivity might best be funded from the access component of services. This would alleviate the problems associated with levying contributions on services, some of which will be configured as applications residing on a broadband platform.
57. In addition to such a redefinition of universal service and its funding, more targeted forms of subsidies from general tax funds will play an important role.

***A.9 Provide any other comments on the implications of IP and other new technologies for the Canadian telecommunications and ICT sector that the Panel should take into account in developing its recommendations.***

58. One important aspect of the transition to IP and other new technologies in the emerging advanced network environment is the development of the knowledge and skills, both in the work force and in consumers, to harness the benefits of these technologies. Furthermore, the transition to IP and other advanced telecommunications and ICT technologies may not only have advantages but also have possible downsides, for example, on privacy, the privatization of formerly public information, and so forth. Comprehensive approaches to technology

assessment could help in developing policies and approaches that minimize such undesirable effects.

***A.10 Comment on the development of wireless services in Canada over the next 10 years and the implications for Canadian productivity, competitiveness and social benefits.***

59. The speed of technological change in wireless services has been rapid, in particular in license-exempt bands. The family of 802.11 standards, ranging from 802.11b (11 MHz bandwidth) via 802.11a (54 MHz bandwidth) to the emerging 802.11n (100+ MHz bandwidth) has opened a whole new dimension of wireless broadband communication and is rapidly adopted in homes and offices. Moreover, proprietary wireless broadband technologies are deployed either in competition with or on the edges of wireline broadband networks. The diffusion of licensed mobile voice services in Canada has been somewhat lower than in peer nations. Likewise, the diffusion of 2.5G and 3G technology is proceeding at a slower pace.
60. Realizing the potential of wireless broadband, an increasing number of cities in North America have opted to invest directly or coordinate the deployment by private vendors of citywide wireless broadband access networks. Such networks have great potential to accelerate wireless broadband connectivity. In terms of performance, such networks presently are comparable with wireline broadband access. As mobile versions of WiMAX are brought to the market, consumers will be able to get a mobile broadband access platform in addition to 3G services. The entry of municipalities has raised some concerns as to whether these projects bias competition and cause disadvantages for wireline broadband service providers. Whereas safeguards against distortions of competition are acceptable, public sector sponsored projects are an important tool to advance broadband connectivity. It is important that this option remains available and is not prohibited by legal and/or regulatory actions.
61. See also the comments provided under A.1.

***A.11 Please add any comments on the evolution of telecommunications networks or the telecommunications industry structure over the next 10 years that the Panel should take into account in developing its recommendations.***

62. Telecommunications technology is evolving rapidly. While technology may facilitate the pursuit of public interest purposes it will not do so without explicit public policy decisions that channel technologies to their most beneficial uses. One of the most important obligations of public policy is to assure that innovations can be developed and brought to the market. This implies securing conditions of openness in the emerging general-purpose network platforms. It also implies the creation and

protection of open market entry conditions. Most importantly, it implies that public policy allow and facilitate institutional innovation and experimentation. One important area of such experimentation is to allot sufficient spectrum to license-exempt bands to facilitate the innovative potential in these areas. Another is to possibly support the establishment of advanced telecommunications and ICT commons, open access environments that could assist experimentation and innovation.

## **B. The Regulatory Framework**

### **1. Policy Objectives**

*B.1 Should the policy objectives set out in section 7 of the Telecommunications Act be changed? If so, what should they be?*

63. Please see the main comments of the Consumer Groups regarding this question. I have reviewed these comments and agree with their general direction.

*B.2 How detailed should the telecommunications policies set out in the Telecommunications Act be and, conversely, how much discretion should be left to regulators such as the CRTC and Industry Canada?*

64. Please see the main comments of the Consumer Groups regarding this question. I have reviewed these comments and agree with their general direction.

### **2. Economic Regulation**

*B.3 What should be the overall objectives of economic regulation?*

65. Telecommunications regulation has economic, technical and social objectives, which are closely intertwined. The principal objectives of regulation remain valid, although they will need to be adapted to the evolution of the technological and economic conditions of telecommunications. It is important that an appropriate understanding of the role of regulation in the ICT environment of the present and the near future is developed. Economic regulation is often conceptualized as a substitute for market forces in cases where markets fail or do not yield acceptable outcomes. Whereas this view captures important aspects of regulation, it falls short in important respects.

66. Most importantly it is based on the mistaken notion that “unregulated markets” exist and that they inevitably result in a superior overall outcome. Although such “invisible hand theorems” have captivated the public policy debate, they grossly simplify and often suggest trade-off between efficiency and equity goals that do not exist. This is in contrast to a rich and growing body of research by economic historians, institutional economists, and economic sociologists (to name but a few). As demonstrated convincingly by this research,<sup>6</sup> throughout history working markets emerged where they were enabled by and embedded in formal and informal rules and norms that are conducive to private initiative and market coordination. In this perspective, regulation is one set of rules that, together with other rules such as legal provisions, antitrust oversight, executive orders, and case law, creates the preconditions for the telecommunications industry and markets to evolve in ways compatible with the broader public interest goals of society.
67. This broader view is implicit in the set of objectives expressed in section 7 of the Telecommunications Act (*Act*). As is reflected in the recent survey by Decima, the principles expressed therein are also widely shared among Canadians.<sup>7</sup> This more appropriate view of regulation has important consequences. It first directs attention away from the question of whether there should be regulation at all to the more relevant question of which set of regulatory or other rules is most conducive to achieve the goals stated in the *Act*. Second, in this perspective, markets and competition are recognized not as goals in and of themselves but as means to realize the objectives stated in the *Act*. Third, economic regulation is more clearly seen as a set of public policies that are not only appropriate in cases of market failure but also in cases of “market deficiency”, situations in which the working of markets can be improved by regulation (e.g., where forms of private ordering are afflicted with high transaction costs that could be reduced by regulation). Lastly, sector-specific regulation is properly recognized as one instrument in the toolbox available to realize important public interest goals; whether or not regulation is the best approach needs to be assessed in the context of other policy options (including deregulation).
68. In such a broader view of the role of regulation in the portfolio of public policies, the overarching role of regulation should thus be to facilitate the pursuit of public interest goals. One important aspect of regulation is the creation of the preconditions for decentralized market decisions to contribute to these public interest goals. From these generic tasks follow the more specific objectives of economic regulation:

- a. Protection of consumers from the abuse of market power

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<sup>6</sup> For reviews of the general discussion in these fields see, for example, Douglass C. North, *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press, 1990; Douglass C. North, *Understanding the Process of Economic Change*, Princeton, NJ: Princeton University Press, 2005; Richard A. Swedberg, *Principles of Economic Sociology*, Princeton, NJ: Princeton University Press, 2003; or Oliver E. Williamson, “The New Institutional Economics: Taking Stock, Looking Ahead”, *Journal of Economic Literature*, 38: 595-613.

<sup>7</sup> See Decima Research, Inc., *Findings from Decima Consumer Study*, 2005.

- b. Safeguarding of competition by preventing anti-competitive practices by suppliers of telecommunications services. In next-generation networks, this may include ascertaining that application and service providers have access to a sufficiently open and transparent network platform at non-discriminatory conditions.
- c. Adoption of measures to realize the benefits of ubiquitous availability of telecommunications services (see the additional discussion in B.4)

***B.4 Are the two main principles of economic regulation set out in the Telecommunications Act, namely “just and reasonable rates” and “no unjust discrimination”, still appropriate? If yes, should they be further clarified in legislation or in other statements of regulatory policy? If not, how should they be modified or replaced?***

69. These two principles remain appropriate as cornerstones of Canadian telecommunications policy. The widely shared goals of Canadian consumers, including the high importance placed on reasonably priced services and access of those living in remote areas,<sup>8</sup> lend additional credence to the relevance of the two goals for Canadian telecommunications policy. However, in areas or market segments in which workable competition exists, they could be interpreted more flexibly than in the past.
70. The two stated principles are rooted in the acknowledgement that basic telecommunications services are associated with positive externalities and public good aspects that cannot or only partially be realized in market transactions. Connection with the pathways of communication allows rural communities participation in the broader flows of commerce with positive repercussions for local economic activity. Conversely, places and regions that are not connected may suffer disadvantages. Likewise, connectivity to communication and information resources has positive repercussions for a broad range of activities from education to health care and thus the quality of life in general. These benefits of ubiquitous availability and comparable pricing across an entire territory are in tension with the economic features of telecommunications services. In particular, the presence of high fixed cost and low incremental cost in conjunction with strongly differing price elasticities of demand between different user groups and possibly regions pose a risk that unregulated prices would vary highly.
71. The requirement that rates be “just and reasonable” and contain “no unjust price discrimination” is the pragmatic policy response trying to balance these unique features of infrastructure service with the public interest. It is a response to forms of market failure (i.e., based on an efficiency rationale) as well as an attempt to correct undesirable market outcomes such as potentially high price differences between different regions of the country (i.e., based on a distributional and equity rationale).

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<sup>8</sup> See Decima Research, Inc., *Telecom Policy Review Consumer Research Study*, August 2005, pp. 1-2.

In the present environment of partial competition, further concerns arise that price discrimination could be used to distort competition. A logical standard to assess reasonableness is the requirement that prices are related to the cost of service provision. While the migration to general-purpose platforms (e.g., IP-based networks), with substantial economies of scale and scope, creates challenges for the determination of a meaningful cost standard this is not impossible.

72. Differentiated pricing weakens or fully eliminates this link to the underlying cost structure. It is only possible if consumers have different willingness to pay and if the service provider possesses some degree of market power. Such market power could be based in a lack of alternative service offerings, deliberate product differentiation that reduces the substitutability of services, incomplete information of consumers, or switching costs. On the other hand, pricing flexibility may allow consumers to purchase price-service packages that better correspond to their preferences. It may also allow service providers to compete more vigorously. Thus, in an assessment of whether a higher degree of pricing flexibility within the bounds set by fairness and reasonableness is merited, the possible negative effects on consumers and competitors need to be weighed against the possible benefits from pricing flexibility.
73. From this discussion (and the additional elaboration in the Technical Note to B.4, in the appendix below) follows that, under certain conditions, price differentiation can be beneficial to consumers while allowing service providers to compete on a broader range of dimensions. More differentiated pricing can be allowed if a market is workably competitive, as competition will protect consumers. If there are concerns that competition does not reach all consumers equally, universal service policies could be designed to address that issue.
74. In market segments without workable competition, a more differentiated and cautious approach is required. Such forms of price discrimination that treat all consumers uniformly (e.g., menus of choices offered to all inhabitants in the service territory) are easier to reconcile with just, fair, and reasonable rates. Forms of price discrimination that treat consumers differently raise more complicated issues and will need specific justification. Nevertheless, some form of targeted flexibility may be allowed if the market segment is in transition to workable competition (see the discussion under B.5).
75. A differentiation of service quality would raise additional issues. In principle, compared to the status quo ante, the offering of higher quality service at a higher price or of a lower service quality at a lower price could increase consumer options and welfare. However, quality of service in an open communications system is a public good and, if some differentiation is permitted, a minimal threshold for service quality may need to be secured by publicly adopted standards.
76. Where merited, the principles guiding increased flexibility should be developed in regulations and do not need to be expressed in the Act.

## Recommendations:

**77. The two principles of economic regulation set out in the Telecommunications Act, namely “just and reasonable rates” and “no unjust discrimination”, continue to be appropriate. There is no need to change the language in the Act. Where increased pricing flexibility is in the mutual interest of consumer and suppliers, the Commission could develop approaches to allow a gradual modification of the historically established prices.**

*B.5 Is the regulatory framework developed by the CRTC appropriate in areas of economic regulation such as protection of retail customers, prevention of anticompetitive practices, prevention of undue price discrimination, and availability and quality of service? If not, what changes should be made? Should other areas be subject to economic regulation?*

78. An assessment of the appropriateness of the regulatory framework needs to ask (1) whether the powers given to the CRTC suffice to achieve the objectives of economic regulation and (2) whether the specific instruments developed in execution of these powers are (a) principally capable of achieving the objectives of economic regulation and (b) are the most effective means of achieving these goals.
79. The present framework is generally appropriate to deal effectively with the tasks of economic regulation. Furthermore, the framework is sufficiently flexible to adapt the scope and intensity of economic regulation to pursue the public interest goals stated in the *Act*. As discussed in the response by the Consumer Groups to B.1, the legal framework is biased in that it declares competition as a goal rather than a means to achieve the broader public interest goals stated in the *Act*. As the telecommunications industry continues to evolve toward a more fragmented and differentiated sector (described in the responses to questions A.1 through A.11), the CRTC will face new challenges in applying its powers. However, these challenges can be successfully confronted within the present framework.
80. The powers of the CRTC pertinent to the stated issues are defined in sections 24, 25, 27, 29 and 31 of the *Act*. These provisions enable the Commission to affect rates, conditions of service, limitations of liability, and inter-carrier arrangements. Section 34 of the *Act* empowers to Commission to forbear from regulation under certain conditions. Sub-section 34(3) prohibits the Commission from forbearing if it “finds as a question of fact that to refrain would be likely to impair unduly the establishment or continuance of a competitive market for that service or class of services.”
81. The overarching challenge faced by the CRTC is to design rules that harness competition as a means to support public interest goals. In areas where effective competition is not feasible or where competition does not or only insufficiently contribute to public interest goals, other means will have a continuing place in the

Commission's toolbox. Where new issues emerge, new rules and regulations may be required.

82. Of critical importance for the further evolution of telecommunications is the delineation of workably competitive market segments from those where the level of competition is ineffective. This assessment cannot rely on the model of perfect competition, which historically has served as a tacit blueprint of regulation (for example, when determining rates in the rate-base-rate-of-return framework). A modified standard based on a more dynamic model of workable competition is required. The forbearance provisions in section 34 of the *Act* give the Commission powers sufficient to address these issues. The timing of forbearance is critical: premature forbearance will likely lead to more concentrated market structures and higher price levels; belated forbearance risks creating disadvantages for the incumbent service providers. Either development would eventually harm consumers. However, the effects on service providers of these two scenarios are unevenly distributed. In the first case of premature forbearance, the incumbent service providers would benefit, in part at the expense of new market entrants and potential entrants. In the second case of belated forbearance, new market entrants and potential entrants would benefit, in part at the expense of the incumbent service providers.
83. Establishing the conditions that indicate the presence of workable competition is thus of utmost importance. Moreover, as section 34 of the *Act* also calls for forbearance in situations where workable competition will emerge within a reasonable time period (often seen as one to two years), it is necessary to devise a framework for this forward-looking assessment. Whether competition in a market, defined by its product and geographic boundaries, is workable depends on the market structure (market shares, degree of concentration); the market entry and exit conditions; the supply conditions; and demand conditions.<sup>9</sup> Competition is not present or absent but a matter of degree; workable competition is reached if the forces of rivalry are sufficiently strong to correct any abuse of market power within a reasonable time period.
84. The most important factors in assessing when competition is thus workable are the market structure, entry and exit conditions, and demand and supply conditions. Market structure data reflect the degree of "actual" competition in a market whereas the market entry and exit conditions are important in assessing the intensity of "potential" competition from firms that are not yet present in a market but might enter. Market entry barriers can assume many forms, ranging from cost advantages of the incumbent to switching costs to bundling as a measure to reduce the intensity of competition.<sup>10</sup> One of the most important entry barriers is sunk costs. Sunk costs are costs incurred by a new market entrant that cannot be recovered should the firm

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<sup>9</sup> A more detailed discussion of these issues is contained in "Economic Foundations of Forbearance in Local Exchange Markets," evidence by Johannes M. Bauer submitted on behalf of the Consumer Groups in the Matter of Forbearance from Regulation of Local Exchange Services, CRTC PN 2005-2, June 22, 2005, available at [http://www.crtc.gc.ca/PartVII/eng/2005/8640/c12\\_200505076.htm#4b](http://www.crtc.gc.ca/PartVII/eng/2005/8640/c12_200505076.htm#4b).

<sup>10</sup> *Ibid*, paragraphs 86-94 and the further references there.

decide to exit the market at a later point. Examples include capital investment in specific assets that cannot be used otherwise or advertising expenditures incurred during the start-up phase of a business. They are also affected by regulatory provisions. For example, if regulation constrains the pricing flexibility of incumbent service providers, this reduces – other things equal – the risk that market entry costs may be sunk (as the incumbent has fewer options to price aggressively in response to market entry).

85. The effect of sunk costs on firm behavior and competition differs before and after the cost has been sunk. Ex ante, before the sunk cost is incurred, these costs reduce the incentive to enter a market and thus reduce the effectiveness of potential competition as a disciplining force on incumbents. Once the sunk cost has been incurred, they act as a barrier to exit. The implications of this latter scenario for competition cannot be predicted with certainty. One possibility is that the firms in the market will attempt to gain market share via price competition as long as they earn some contribution to the already sunk costs. In this scenario, firms could be trapped in a price war that eventually reduces prices to incremental costs, leaving them with substantial losses. Hence, if firms are not myopic, they may attempt to pursue a different strategy of peaceful coexistence or collusion. If none of these work, industry consolidation may be inevitable.<sup>11</sup> Such strategies are generally more likely, the lower the number of actual competitors. For this reason, even after costs have been sunk, the number of competitors and their market shares is not irrelevant in assessing the workability of competition.
86. To a certain degree, potential competition can substitute for actual competition: with the caveats just mentioned, if market entry is easy (or market exit difficult), a higher market share of the incumbent(s) and higher market concentration are acceptable. The strength and precise shape of this trade-off is difficult to specify. However, a large number of empirical studies of firm behavior and sector performance indicate that market share is the more important variable and that entry and exit conditions are only a weak substitute for larger numbers of competitors and lower market concentration.
87. Due to its historically monopolistic market structure, the telecommunications sector raises some unique issues. The market share of incumbent service providers is, by definition, very high and significantly above the thresholds that are often used to diagnose significant market power and dominance.<sup>12</sup> Requiring that market shares of incumbents fall to levels comparable to other industries, even loose oligopolies, could

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<sup>11</sup> The relation between sunk costs and industry concentration is explored by John Sutton, *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*, Cambridge, MA: MIT Press, 1991.

<sup>12</sup> For example, the European Union uses a 50% market share as a threshold triggering closer scrutiny for dominance. Together with an assessment of entry conditions, supply and demand conditions, this threshold is used to designate areas that justify continued ex ante regulation. Many authors in industrial organization have proposed that a market share of the largest firm exceeding 40% raises concern about the workability of competition, although this threshold may be modified depending on entry and exit conditions and other structural factors of the market.

inflict considerable financial strain on the incumbent service providers. Moreover, given the gradual deployment of alternative infrastructure platforms and the availability of weak (and in limited cases strong) substitutes, it can be justified to adopt a higher market share threshold as a telltale sign of workable competition.

88. For the case of local exchange markets, the Consumer Groups proposed such a pragmatic set of triggers for forbearance in local markets, discussed in more detail in the submission of the Consumer Groups in Telecom Public Notice CRTC 2005-2.<sup>13</sup> (The approach could be used to decide when forbearance is appropriate in other areas as well.) According to the proposal, full forbearance in local exchange markets is justified once new market entrants have been able to capture 30% market share and at least three competitors, each serving at least 5% of the market, are present.<sup>14</sup> This standard assures that an emerging local ILEC-cable duopoly would face a sufficiently large competitive fringe to avoid the potential problems of duopoly markets such as coordinated behavior. It allows forbearance at a market share of the largest service provider that is substantially above the threshold often used in antitrust analysis (and by other regulatory agencies) as an indicator of dominance. A lower threshold for forbearance risks that emerging nascent competition will be delayed or otherwise impaired.
89. The proposed threshold reflects the unique conditions of telecommunications local markets, in particular the presence of high fixed costs and low incremental costs, the fact that complementary regulations of inter-carrier markets are in place that reduce market entry barriers, and the partial availability of substitutes for basic local exchange services. Mobile voice services, cable telephony, and VoIP may be close substitutes for local telephone service for some consumer groups. However, given their functional attributes, their present pricing, and the bundling with other services, for many consumers they will not serve as a close substitute for basic local exchange services. Should these factors change, the proposed threshold for workable competition could be reevaluated.
90. Given the past monopoly structures, workable competition needs some time to evolve. During the transition to robust local competition it is, in the views of the Consumer Groups, justified to grant the ILECs more freedom to compete, subject to safeguards for residential consumers. The proposed thresholds are: (1) elimination of the no-contact provision and the ability to waive reconnection service charges once competing LECs have reached a 10% market share for 12 consecutive months; (2) ability to file minimum and maximum prices once competitors have reached 15% market share for at least 12 consecutive months; (3) permission for the ILECs to use

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<sup>13</sup> See Comments of the Consumers' Association of Canada, the National Anti-Poverty Organization, and l'Union des Consommateurs ("The Consumer Groups") in Telecom Public Notice CRTC 2005-2, Forbearance of Regulation of Local Exchange Services, Ottawa, June 22, 2005 (hereinafter "Consumer Groups PN 2005-2").

<sup>14</sup> Ibid., paragraphs 49-52.

promotions that are not offered across an entire rate band once competitors have reached 20% market share for 12 consecutive months.<sup>15</sup>

91. As with full forbearance, these thresholds are, to some degree, contingent on the state of technology and the deployment of alternative infrastructures and should thus be revisited periodically. For example, if alternative infrastructures were deployed ubiquitously and the services offered using these platforms were packaged so as to constitute close substitutes in terms of functionality and pricing, the thresholds for the market shares of competitors might be reduced or the degree of competitive flexibility could be increased according to an accelerated schedule.
92. As discussed in B.4, the principles of just and reasonable rates as well as the principle that rates are not unjustly discriminatory continue to be valid. The Commission's tools to ascertain these goals are appropriate and allow dynamic adaptation should the circumstances of market segments warrant increased pricing flexibility. However, when considering pricing flexibility, it is important that the objectives of a national coherent telecommunications infrastructure and services as stated in section 7 of the Act are served.
93. One important issue in this context is the degree of flexibility to reduce prices and the potential anticompetitive implications of such freedom. The concern with predatory forms of pricing is legitimate but the empirical evidence that such strategies are widespread is scarce. To a certain degree, the emphasis on predatory pricing draws attention away from other pricing strategies that – while no direct violation of competition rules – may nevertheless have undesirable implications for the state of competition overall. For example, service providers who have sunk investment into a certain area, may have a credible threat to reduce prices to incremental costs should new competitors attempt to enter the market, rendering market entry unprofitable. It is important to see that this entry-detering effect does not require that prices are actually at the level of incremental costs, only that the incumbent could reduce prices swiftly. It is not a priori clear what the possible welfare effects of such strategies are. Moreover, the trend toward bundled services may raise new issues about forms of umbrella pricing and their potential negative effects for competitors who only offer one service or are otherwise unable to bundle their offerings.
94. In network industries like telecommunications, the quality of service for many or all users is affected by the lowest quality component of a link or a node. Unregulated markets will tend to differentiate service quality and prices. Historically, this has led to the entry of new competitors such as MCI in the U.S. market, which offered lower service quality at a lower price. On the other hand, some data applications require very high quality of service, creating market segments for specialized services at a higher price. Some differentiation of service quality and prices is therefore welfare enhancing. Nevertheless, for the public telecommunications network, service quality is a quasi-public good and decentralized decisions may not result in the optimal service quality overall. Regulatory agencies that have deregulated

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<sup>15</sup> Ibid, paragraphs 115-125.

telecommunications market segments or forborne from the regulation of market segments regularly retain the ability to monitor the quality of service and set quality of service standards.<sup>16</sup> It is thus important that the Commission retain its powers as stated in sections 24 and 27 of the *Act*.

95. The evolution toward one pipe, multiple application services for a growing number of consumers possibly raises the question of access of application and service providers to network platforms. Whether or not access to the network platform will be an issue, is not yet clear. Network owners face conflicting incentives. On the one hand, vertical integration of network and services promises to overcome the economic complications referred to in A.5: low value-added but high cost at the level of the network; high-value added and lower costs in applications and services. This could result in “walled garden” business models that could limit access of independent service providers and reduce the innovativeness of the sector overall. On the other hand, network owners risk overextending themselves beyond their core competencies if they attempt to be present in too many applications and services. Thus, they may seek partnerships and alliances and perhaps facilitate open access arrangements voluntarily, if only with a few selected partners.
96. The net effect of these two conflicting incentives is not self-evident. The historical record in similar situations is not fully conclusive. For example, in the Japanese mobile Internet environment, NTT DoCoMo developed a business model that is built around a walled garden environment in which consumers can easily access services and pay conveniently via their phone service provider. Consumers are not principally blocked from accessing any other content on the mobile Internet but have to set up services and payment processes themselves, an additional complication and transaction cost that may be prohibitive for some users.
97. In wireline environments, there is some scattered and anecdotal evidence that network owners have configured their routers to delay competitors’ packets. For example, in February 2005, VoIP service provider Vonage complained informally to the Federal Communications Commission (FCC) that some of its customers had been blocked from reaching certain SIP addresses for end-user devices. Rather than promulgate specific rules at this point, it would be desirable to adopt a principal policy framework that could guide addressing potential problems associated with the emerging one pipe, multiple applications environment.<sup>17</sup>
98. Lastly, the emerging environment poses ever more complicated issues in which measures affecting one aspects of the industry may have wide repercussions. Legal and regulatory measures will typically have indirect effects and may have unintended

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<sup>16</sup> For example, the Iowa Utilities, In Re *Deregulation of Local Exchange Services in Competitive Markets*, Docket No. INU-04-1, December 23, 2004.

<sup>17</sup> See the recent policy statement by the Federal Communications Commission that it would enforce unfettered access to the Internet. See *FCC Adopts Policy Statement: New Principles Preserve and Promote the Open and Interconnected Nature of Public Internet*, Press Release, Washington, DC, August 5, 2005, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-260435A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260435A1.pdf).

consequences. This has led many to suggest that public policy should retreat entirely; market forces are promoted as the superior coordination mechanism. This misconceives the role of legal and regulatory measures in facilitating market forces. To develop a more dynamic, holistic view of the interaction of regulation with the performance of the telecommunications sector, it would be desirable to dedicate sufficient resources to enable adequate background research, the development of new modeling tools, and a program of active monitoring of sector outcomes. Whereas these tasks point beyond regulation and could be organized by other government agencies or subcontracted to the private sector, the Commission should have an important role in advancing such a rational effort to elevate the quality of policy-making.

***B.6 Should economic regulation ever be re-imposed on carriers or services that have been deregulated? If so, what principles and tests should be used to come to such a determination?***

99. Rationally designed economic regulatory reform cannot not be a one-way street toward less regulation but has to allow for the possibility that re-regulation might be necessary. Telecommunication markets are shaped by centrifugal forces that contribute to a more differentiated and competitive market environment as well as centripetal forces that facilitate consolidation and centralization. The high fixed costs of building ubiquitous network infrastructures, consumer switching costs and lock-in, and the complementary nature of certain services, are but a few factors that may lead to a collapse of effective competition.
100. If a market segment had been characterized by robust competition, competition policy may be able to deal with issues of re-concentration and the associated negative repercussions for effective competition. However, it is possible that a market segment develops such a high degree of concentration and entry barriers that the appropriate response is the re-introduction of regulation. Such re-regulation should not be undertaken lightly and its conditions should be established *ex ante* to provide clear guidance and stable expectations for investors and managers.
101. The basic principles used to determine whether a re-imposition of regulation is justified should be derived from competition analysis as used in antitrust cases. Thus it will be necessary to assess the degree of market concentration, the market entry and exit conditions, and the behavior of firms in the market. To a certain limited degree, low entry barriers can compensate for the negative effects of high market concentration. Likewise, if firms have already sunk investment into the rollout of a ubiquitous infrastructure and offer close functional and economic substitutes to an existing service, competition may (but does not have to) be intense even in the presence of relatively high market concentration. However, in all cases where market concentration is high, structural evidence needs to be supported by behavioral data and possibly safeguards.

102. As competition is a gradual process, it would be the most rational approach to establish soft and hard triggers. The Consumer Groups have laid out such a framework for the case of basic local exchange services.<sup>18</sup> In this framework, triggers are related to market share and quality of service data. Soft triggers would initiate a regulatory review of the situation without necessarily requiring any specific regulatory action. They are best viewed as an instrument of precautionary detailed monitoring and review. If hard triggers were reached – in the proposed framework a reduction of the market shares of competitors below 15%, a substantial price increase, or a quality of service drop – the Commission would have to issue a notice of de-forbearance.
103. These thresholds for soft and hard triggers are appropriate for the present environment in which alternative infrastructures are only partially deployed and the degree of substitutability between services is often weak from the perspective of many consumers. They could be adjusted if more universal deployment were to be reached or strong evidence were available demonstrating that no abuse or market power took place over a certain period of time.

***B.7 If economic regulation of telecommunications markets remains necessary, what form should it take? Is the present mix of price cap regulation, service-specific cost-plus markup regulation, and other CRTC approaches appropriate? Would other regulatory mechanisms be preferable?***

104. Once the overall objectives of telecommunications policy are defined, instruments should be chosen that achieve these goals effectively and with the least direct and indirect cost. In principle, the present tools are capable of realizing the stated policy goals (just and reasonable rates, no unjust price discrimination, prevention of anti-competitive practices, and so forth). Moreover, these tools are used worldwide and considered state of the art to tackle the issues faced in telecommunications: price caps can be designed in ways that are both efficient and minimize administrative costs; service-specific cost plus markup is appropriate in certain conditions; and quality of service standards are capable of realizing important infrastructure goals.
105. The practical implementation of an instrument could undermine its efficiency and effectiveness. It is thus important that regulatory methods are used appropriately. Areas that could be improved are the deferral account solution, which is incompatible with design principles of price caps and raises a number of additional concerns regarding the competitive impact of uses or proposed uses of the balances in the deferral accounts. The Commission might also want to consider applying a price cap framework to the pricing of inputs provided to competitors. This could simplify some regulatory tasks while keeping the intended safeguards in place.

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<sup>18</sup> Consumer Groups PN 2005-2, paragraphs 102-109..

***B.8 If a service is sufficiently competitive at the retail level (i.e. in the market for end users) to warrant deregulation, is there a continuing need to regulate the wholesale services and facilities underlying the service? If so, under what circumstances would such regulation be required, and what form should it take?***

106. While the two levels are related, an evaluation of whether to regulate wholesale services and underlying facilities needs to be made independently of the retail market situation. If the retail market allows deregulation, it does not necessarily follow that the related wholesale market can be deregulated as well. To the contrary, the effectiveness of retail competition may be dependent on the continuation of wholesale regulation. Only if a separate assessment of the conditions at the wholesale market reveals that workable competition prevails, is a deregulation of these services and facilities appropriate (see the response to B.5 for a discussion of the criteria for effective competition).
107. The specific conditions for workable competition will, to some degree, depend on the wholesale service and should be developed by the CRTC. In principle, the criterion for wholesale regulation should be the existence of an essential service that cannot be duplicated economically by a reasonably efficient competitor. This definition could encompass access to local loops but also access to a broadband network platform. Several options exist as to the form of regulation, ranging from cost of service regulation to prices based on direct service costs plus a markup to price cap regulation.

***B.9 If a service is not sufficiently competitive at the retail level to warrant deregulation, to what extent can regulation of the underlying wholesale services and facilities be relied upon as a substitute for direct regulation of the retail service?***

108. As stated in B.8, the two levels are related but need to be examined separately. Effective wholesale regulation can render the retail market more contestable. In that sense, it may allow relaxation of the retail regulatory framework. However, from the fact that wholesale prices are regulated it does not necessarily follow that retail prices may be deregulated. Retail service providers that enjoy full pricing flexibility could easily exert a price squeeze and reduce the incentive for competitors to stay in the market or enter the market. This effect may occur even in the absence of predatory pricing. Unfortunately, the threat of price squeezes or limit entry pricing raises the problem that price floors may have to be established, which is a relatively undesirable intervention in the competitive process. One possible approach would be to set the pricing rule for wholesale services to “retail price minus discount”. Overall, whereas the presence of wholesale regulation reduces the need for retail regulation, a rational approach would assess both layers independently.

***B.10 When should telecommunications markets be subject to ex ante and when to ex post regulatory intervention? What criteria should be used to determine the choice of method of regulation?***

109. Ex ante regulation will continue to be the default choice under conditions of monopoly or dominance. If a market segments falls in the zone between classical regulated monopoly and robust effective competition, ex post forms or regulation have an increasing role to play. Methods that trigger closer scrutiny only after protests are received or negative disallowance regimes all can help create a more flexible approach to regulation that matches the market conditions.
110. Ex post forms of regulation are particularly useful when it is uncertain whether competition is already effective or not and a more flexible regulatory approach could assist in creating a more accurate understanding of the market situation. One set of default principles that should be applied in determining when ex post regulation is appropriate is rooted in applied competition theory.
111. However, such forms of regulation should be properly bounded or focused on less important aspects on regulation. For example, it would be possible to limit ex post approaches to rate changes within a limited range as proposed by the Consumer Groups in the CRTC local forbearance proceeding.<sup>19</sup> Moreover, ex post regulation is more appropriate in situations in which there is a reasonable information basis for the Commission and other stakeholders.
112. Lastly, ex post regulation should only be used in cases where the risk is low that competitive actions of the incumbent service providers could undermine competition before corrective action may be undertaken.

***B.11 Are changes required to the present regulatory regime to provide economic incentives for ILECs, cable companies wireless service providers and others to expand, upgrade and maintain the capabilities of Canada's basic access networks? If so, what specific changes should be introduced?***

113. The availability of telecommunications services to all Canadian at just, reasonable and non-discriminatory rates is a cornerstone of telecommunications policy and has served the nation well. The question of whether changes to the present regime of economic incentives are needed touches upon three issues: (1) to what degree the public interest goal of universal connectivity is compatible with the emerging partially competitive industry environment; (2) the funding of universal service obligations in high cost areas and possibly for low income consumers; and (3) what

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<sup>19</sup> *Ibid.*, paragraph 122.

features the “basic access network” should support and whether the present framework provides sufficient incentives to upgrade to this level of connectivity.

114. Establishing and maintaining high levels of connectivity does not necessarily conflict with the business interests of telecommunications service providers. The past view was that the presence of positive network effects and other externalities would require explicit funding of customers in areas whenever the cost of providing service exceeded revenues. Modern network economics has revealed that this standard is incorrect.<sup>20</sup> Rational service providers understand that the size of the network increases the benefits to users in areas that can be served commercially and thus improves the overall revenues of the service provider. Thus, service providers will voluntarily subsidize access to the network to the point where the net cost of serving additional users would exceed the benefits from positive network effects.<sup>21</sup>
115. However, even if the role of network effects is correctly understood there remain customers and areas that will be uneconomic to serve. The present partially competitive environment creates mixed incentives with regard to maintaining high connectivity. On the one hand, competition could spawn innovative service offerings that could benefit low-income customers of residents in high-cost areas. It could also put downward pressure on prices, thus reducing affordability barriers. Given the already efficient telecommunications system, these effects are probably fairly limited. On the other hand, competition combined with interconnection obligations reduces the ability of service providers to internalize positive network effects and will thus reduce their inherent incentive to expand the network compared to a monopoly situation. Moreover, the differentiation and market segmentation that accompany competition will lead to lower prices and better conditions for customers with a higher contribution to profits (and/or better knowledge of the service offerings) but may disadvantage others.
116. In principle, the resulting challenges can be dealt with effectively in the framework of the existing contribution system. Should the market share of the ILECs decline, it will become increasingly unsustainable to place an obligation to serve solely on them. There are two principal options for this problem: (1) to expand an obligation to serve all customers in their service territory to all service providers; or (2) to define a more flexible system of universal service provision in which all carriers could participate.
117. The first option has the advantage of legal and regulatory symmetry. There would likely have to be a clause, limiting the obligation to serve to reasonable requests. The second option could establish a “carrier of last resort” status that would be awarded in an appropriate procedure, such as a competitive bidding process for the market. All carriers would be eligible to bid for that status, perhaps subject to minimal criteria

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<sup>20</sup> See, for example, the discussion in Stanley J. Liebowitz and Stephen E. Margolis, “Network effects,” in Martin E. Cave, Sumit K. Majumdar, and Ingo Vogelsang (editors), *Handbook of Telecommunications Economics*, Volume 1, pp. 75-96, Amsterdam: Elsevier.

<sup>21</sup> An example of this strategy is the practice by mobile service providers to subsidize the cost of handsets.

regarding their ability to provide the service. This approach would have the advantage of creating a competitive process that would likely reduce the required funding. Countries that have used similar approaches learned that universal service in many areas was provided without extra compensation.

118. The issues are somewhat more complicated with regard to a forward-looking policy regarding access and connectivity. With the migration to broadband there is a risk that new digital divides open between those consumers with access to broadband and those that do not have access. It is probably too soon to launch a broad-based universal service program that incorporates broadband. However, it will be appropriate to continue present targeted funding programs. Moreover, it would be timely for the CRTC to start a proceeding to study issues of broadband connectivity more closely and to develop a long-term model for increasing connectivity.

***B.12 Should the ILECs continue to be required to provide their regulated services to any potential customer on demand? If so, is a new regulatory framework required to finance this obligation to serve?***

119. As market shares in the telecommunications market shift, and CLECs and unregulated service providers' market shares expand, this question needs to be revisited. From a consumer perspective, an obligation to provide service to any consumer with a reasonable request is an integral part of the objectives expressed in section 7 of the Act. However, consumers have an interest that this obligation is implemented in a way that is fair, equitable and efficient.
120. A continuing requirement on the ILECs to provide regulated services to any potential customer could create two potential problems: (1) the requirement could impose unreasonable costs on the ILECs; (2) asymmetric obligations could distort competition.
121. There are some good reasons why ILECs should continue to be the logical choice to make their services available to any customers. Their network is ubiquitously available even if they lost some customers to other CLECs. However, it is important that ILECs are adequately compensated for providing their regulated services on a non-discriminatory and universal basis.<sup>22</sup>
122. From a competitive perspective, an asymmetric obligation could be more problematic. There is a risk that new entrants can cream-skim and offer appealing conditions to attractive consumers whereas the ILECs will have to serve an increasing number of customers that are high-cost low-revenue. There is a risk that these consumers could, over time, suffer from worsening service quality.

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<sup>22</sup> Not all countries agree that the universal service obligation constitutes an unreasonable burden on the incumbent service provider. For example, only three of the 15 core member states of the European Union had universal service funds in place by 2004.

123. Three other options exist to overcome this problem. First, a minimal obligation to serve all requesting consumers in their service territory could be expanded to all carriers. Second, in addition to the system to fund consumers in high-cost areas, a complementary system to provide basic service could be devised. A provider-of-last-resort function could be auctioned or otherwise assigned in a bidding process to carriers. The selected carrier would then be eligible for compensatory funding where necessary. Third, an individual subsidies scheme could be used to assure a high level of connectivity.
124. Changes to the funding regime for the provision of universal service would be required if the latter two options were to be implemented.

***B.13 Are changes required to the contribution regime or other aspects of the regulatory framework that subsidize delivery of telecommunications services in high cost areas?***

125. The present regime is workable and no immediate major changes are necessary. Please see the main comments by the Consumer Groups on issue B.13, which I have reviewed and with which I agree directionally. See also below responses to B.27 through B.29.
126. Please see the main comments of the Consumer Groups regarding the remainder of the Panel's questions.

## **APPENDIX: Technical Note to B.4**

127. The two principles of “just and reasonable rates” and avoidance of “unjust price discrimination” originate in the recognition — during the formative years of the system of regulation — that infrastructure services are of central importance for the well being of society but that their unique economic characteristics conflict with fully realizing these benefits in an unfettered market environment. Most importantly, it was recognized that infrastructure services are associated with positive externalities and public good aspects that could not or only partially be reflected in market transactions.<sup>23</sup>
128. Price discrimination is a form of demand-based pricing which truncates the link between costs and prices. It is not undesirable per se and widespread in competitive markets and occurs in three forms. First degree price discrimination takes place if a firm sells to every customer at his/her willingness to pay. That is, different units of output are sold at different prices to different people. Second degree price discrimination exists if a firm sells different units of output at different prices but each individual buying a certain quantity pays the same price. Third degree price discrimination occurs if different groups of individuals (e.g., students, retired people) pay different prices but every unit of output sold to a group is sold at the same price
129. In markets with high fixed costs, price discrimination is also one way of recovering fixed costs; it may even allow expanding production to consumers who are willing to pay the incremental costs, bringing the market output closer to fully competitive markets. Whereas, under certain conditions, price discrimination is thus efficiency enhancing, it typically has distributional effects: compared to the ideal-typical yardstick of perfect competition, it shifts rents from consumers to producers. Varian, Farrell and Shapiro argue that, in theory, even this effect may be limited if competition for a market is very intense.<sup>24</sup>

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<sup>23</sup> See, the classical and still valid treatment of these issues in James C. Bonbright, *Principles of Public Utility Rates*, New York: Columbia University Press, 1961, part one, especially chapter VII. The original book is available at [http://www.terry.uga.edu/bonbright/pdfs/principles\\_of\\_public\\_utility\\_rates.pdf](http://www.terry.uga.edu/bonbright/pdfs/principles_of_public_utility_rates.pdf). The issues are also covered in detail in the revised and updated second edition, James C. Bonbright, Albert L. Danielsen, David R. Kamerschen (with assistance of John L. Legler), *Principles of Public Utility Rates*, second edition, Arlington, VA: Public Utilities Reports, 1988. These arguments are also discussed in the present literature on externalities associated with infrastructure investment in general, and – somewhat more narrowly – the research on network effects and network externalities in telecommunications as well as the research on industrial clusters. See, for example, Edwin B. Parker, Heather E. Hudson (with Don A. Dillman, Sharon Strover, and Frederick Williams), *Electronic Byways: State Policies for Rural Development Through Telecommunications*, Boulder, CO: Westview Press, 1992; Roberta Capella, *Spatial Economic Analysis of Telecommunications Network Externalities*, Aldershot: Avebury 1994; or Stanley J. Liebowitz and Stephen E. Margoli, “Network effects,” in Martin E. Cave, Sumit K. Majumdar, and Ingo Vogelsang (editors), *Handbook of Telecommunications Economics*, Volume 1, pp. 75-96, Amsterdam: Elsevier, who point to the need for more empirical research.

<sup>24</sup> Hal R. Varian, Joseph Farrell, and Carl Shapiro, *The Economics of Information Technology: An Introduction*, Cambridge: Cambridge University Press, 2004, pp. 28.

130. Forms of price discrimination exist in today's telecommunications markets. Mobile voice services are offered in different packages at different two- or multi-part prices. As a result, the price paid per minute of mobile phone calls varies with the quantity of minutes consumed (but is the same for all consumers who have chosen that plan). Likewise, basic local telephone service priced at a flat rate results in a price per minute that varies indirectly with the quantity of phone calls made (again, the price per minute is the same for every customer consuming the same quantity). Both examples are forms of second degree price discrimination. In principle, price discrimination could enable consumers to purchase service packages that match their needs more closely, possibly at a lower rate than present offerings. Given the presence of these forms of price discrimination and their potential benefits, the question arises as to whether further pricing flexibility should be allowed for basic telecommunications services.
131. Telecommunications networks and services have specific economic characteristics that have important implications for rates. The following aspects are particularly important with regard to price discrimination:
1. High fixed and low incremental costs
  2. Economies of scope, especially in general-purpose network platforms
  3. Spatial differences in the cost of service
  4. Necessity of basic telecommunications services, contributing to a low price elasticity of demand
  5. Presence of switching costs which reduce the intensity of competition for existing customers (including the increasing complexity of service and price offerings which might reduce market transparency)
132. Unless effective competition constrains the ability to price discriminate throughout the relevant geographic markets, these conditions may result in high differences in prices. Economic theory does not offer unanimous guidelines to determine when prices might be unjust or unreasonable or when price discrimination might be unjust. A possible approach is to consider prices that are subsidy-free as meeting these standards. However, no commonly accepted set of principles exists to determine when prices are subsidy-free. Another solution is to establish a priori criteria for fair prices as is done in axiomatic approaches.
133. One standard considers prices as subsidy-free as long as they are cover at least the incremental costs and do not exceed stand alone costs. In network industries with their peculiar cost structure (very low incremental costs, high shared costs), this opens a very wide price range. Moreover, it is not straightforward how the stand-alone costs would be determined, as this would require calculating the costs of a fictitious stand-alone network. Other standards are available and in use that yield much narrower ranges for subsidy-free costs under the specific cost conditions in telecommunications. These range from the classical fully distributed cost standard to long-run incremental cost to axiomatic approaches as a basis for the design of fair sharing of joint and common costs. These alternative approaches differ with regard to

simplicity, the ability to audit cost causation, and how they apportion shared costs among users.<sup>25</sup> However, they must be considered acceptable conventions of costing and pricing in networks. Moreover, they also have been considered fair approaches to solving the problem of assigning joint and common costs.

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<sup>25</sup> See the classical studies by Stephen J. Brown and David S. Sibley, *The Theory of Public Utility Pricing*, Cambridge and New York: Cambridge University Press, 1986; Bridger M. Mitchell and Ingo Vogelsang, *Telecommunications Pricing: Theory and Practice*, Cambridge and New York: Cambridge University Press, 1991; and the more recent treatment of these issues in the context of advanced networks in Costas Courcoubetsis and Richard Weber, *Pricing Communication Networks: Economics, Technology and Modelling*, Chichester, UK: Wiley, 2003.