Submission

by

Miraxis, LLC, and Miraxis Australasia, Pty Ltd,

to the

House of Representatives Standing Committee on Communications, Information Technology & the Arts

The Parliament of Australia

Inquiry into

The Current and Potential Use of Wireless Technologies to Provide Broadband Communications Services in Australia

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Attachments Provided in Confidence

Disclosure Statement

In preparing its Submission to the House of Representatives Standing Committee on Communications, Information Technology & the Arts, Miraxis seeks to provide as much information as possible in order to enable the Committee to have the benefit of a comprehensive view of the capabilities and services enabled by Miraxis' technologies. However, certain information is being restricted from disclosure to the public at this time due to:

- its use in patent protection filings which are currently being undertaken,
- protection of certain information by way of non-disclosure agreements between Miraxis, LLC, Miraxis Australasia, Pty Ltd, and third parties, or
- competition-sensitive information as to Miraxis' and Miraxis Australasia's specific plans for the roll-out of services in the United States and Australia

Therefore, certain information which requires such protection may be provided to the Committee in confidence, and is organized as Attachments to the basic Submission document.

Further, certain information provided in this Submission may contain specific schedules, plans, forecasts, or other forward-looking statements. Such information contained in this document, therefore, must be considered in its context as constituting advance planning information, the outcome of which may change, be changed, or be modified by Miraxis or Miraxis Australasia at any time at their sole discretion, and without notification. The statements made in this Submission and its attachments shall be attributable only to Miraxis, Miraxis Australasia, and their officers. Any mention or statement made with respect to any other company as a supplier, partner, service provider, or investor with respect to Miraxis or Miraxis Australasia shall not be considered binding upon any such company or organization, unless specifically stated otherwise herein (*i.e.,* by reference to a specific contractual or other relationship, *et cetera*).

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Introduction

In today's world, being "connected" to telecommunications infrastructure is not an option – *it is a requirement*. Businesses and government spend millions of dollars each year to enable their customers, citizens, and visitors – their constituents – to gain access to wired and wireless telecommunications capabilities.

In large, geographically dispersed countries such as Australia and the United States, ensuring such access for everyone throughout the country represents a significant technological and financial challenge. Millions of dollars are dedicated each year to ensuring "universal service" opportunities, and to "bridge the digital divide," in an effort to provide equal access to basic and advanced telecommunication services irrespective of an individual's geographic location. Increasingly, wireless technologies represent a cost-effective means of supporting and delivering advanced telecommunications capabilities across dispersed regions. Wireless connectivity supported by satellite is the most cost-effective means of providing service across an entire continent.

Miraxis has developed an innovative approach, utilizing proven technologies based upon international standards, to provide high-speed two-way access to the global telecommunications infrastructure and services – including video content delivery, wireless access to the Internet and other data communications systems – using satellites and low-cost wireless devices installed directly in the home or office environment. The Miraxis Space Segment is based upon a simple but powerful patented and patent-pending design architecture which dramatically increases the capacity and capability of each of its Ka-band satellites. The Miraxis Ground Segment is based upon techniques pioneered by the direct-to-home television industry, and now able to support two-way wireless connections at high-speed and true-broadband data rates. These Space and Ground Segments combined form the Miraxis System, enabling low-cost delivery of wireless connectivity throughout a continental region and beyond.

Miraxis, LLC, is currently developing and deploying the Miraxis System to provide service in the United States through its Miraxis Broadband North America business unit. Miraxis has established Miraxis Australasia, Pty Ltd (ACN 096 831 104) in order to provide fixed wireless broadband services in Australia and in the Asia-Pacific region. Currently, the Miraxis Team is examining the operational and technical requirements of deploying the Miraxis System in the region, as well as the size and scope of the market, identification of potential business partners, *et cetera*. In support of this effort, the Miraxis Team is working closely with a number of Australian-based companies, as well as with a variety of agencies of Commonwealth and State Governments.

> "Changes in wireless technology over the next decade will contribute more than ever before to the way Australians are entertained, informed and communicate – in urban, rural and remote areas."
>
> -- Prime Minister's Science & Engineering Council
> *Connecting Australians*

Miraxis-Based Services

Miraxis is a fully integrated satellite TV *and* two-way data communications service optimized for general consumer use, but also capable of supporting business, Government, and other specialized applications. Employing an advanced, high-capacity space and ground system architecture, based upon field-proven, commercially available components and sub-systems, Miraxis is capable of supporting an unprecedented level of service throughout Australia – including rural and remote areas.

The principal product of Miraxis is high-speed data communications capability and capacity, made possible by the Miraxis System. Such capabilities will be made possible in a true-broadband and true-wireless manner, using Miraxis-owned systems and system components, operating with and connected to terrestrial fibre and the Internet backbone in Australia and elsewhere. **Miraxis' System design will support comprehensive coverage to all of Australia**, with the bulk of the System's capacity focused upon key target market areas. The types of applications which will be supported by the Miraxis System in Australia include:

- nationwide video content delivery of as many as **100 standard TV and video content channels**
- on the order of **500 standard TV and video content channels** providing regional or local content
- **high definition television** (**HDTV**) channel capability for selected distribution
- wireless two-way Web-enabled T-commerce/interactive television (iTV) applications *plus* …
- … **Australia-wide wireless two-way high-speed Internet access**
- voice-over-IP telephony capabilities

The Miraxis system design features a system architecture which enables end-user customers to communicate using a simple desk-top receiver unit combined with a small outdoor dish antenna (~66 cm as the baseline residential design) – a low cost, first- or last-mile wireless solution for television and broadband applications to *all* regions throughout Australia.

The Miraxis System offers a number of advantages over other existing and planned systems. First, in addition to the capacity advantages over today's Ku-band satellite systems supported by Miraxis' use of the Ka-band spectrum, the Miraxis System architecture employs extensive frequency re-use, enabling a relatively large overall capacity. **The Miraxis System can provide several hundred times the capacity of today's Ku-band systems, and several times the capacity of other planned, "generic" Ka-band systems**. Miraxis' two-satellite system supporting the U.S. market provides ~20 GHz of capacity on the ground using less than 2 GHz of FCC-licensed bandwidth. With a single satellite providing service to Australia, Miraxis expects to use ~1.2 GHz of ACA-licensed bandwidth to provide ~6.2 GHz of capacity on the ground. (These figures are based upon the baseline designs of the Miraxis-A and -B satellites planned to support services in the USA, and upon a conceptual one-satellite design for an Australian service.)

These capabilities and services will be provided through Retail Service Provider partners (RSPs). Miraxis Australasia's RSPs will "own" the end-user customers, providing them with retail customer support, maintenance services, and retail-level billing; Miraxis will provide second-tier customer support services. **Miraxis Australasia offers RSP partners a highly competitive turn-key wholesale managed service, which includes multi-channel video *and* data transport functionality**, as well as value-added capabilities ranging from pay-per-view services to end-user terminal financing, installation & maintenance, training, and other support. Media and content partners can engage Miraxis as a guaranteed distribution channel for their multi-media products, as well as partnering in the development, distribution, and operation of new multi-media and interactive products, "micro-channels," ISP/portal/video applications, and other market-specific products and services. Such tailored applications can include channels and capacity dedicated to educational, medical, Government, and Defence applications as well.

Miraxis Technology

One key to providing such services cost-effectively is supporting a large capacity capability within reasonable cost parameters. Miraxis' patented and patent-pending satellite architecture accomplishes this through a combination of continental, tile, and spot beams. The larger continental beam provides an effective means of one-way delivery of video content nationwide. The smaller tile and spot beams support frequency re-use, while also enabling targeted video content delivery, and two-way interactive communications throughout the country.

As mentioned earlier, Miraxis has developed a baseline approach for Australia which would employ a single satellite in geostationary Earth orbit. This satellite design would enable some 6.2 GHz of bandwidth for use in support of the Miraxis-based service offering. Gateway Earth stations would be placed strategically throughout the country in order to most effectively support the system, with a requirement that there would be at least one gateway Earth station located in each spot beam. Each gateway Earth station would be interconnected with the Miraxis network and with the Internet backbone via terrestrial fibre. In addition, one such "Hub" facility would serve as the principal content aggregation and video uplink facility supporting the nationwide broadcast in the continental beam. Other Hubs would provide content aggregation and uplink for local broadcast content (*e.g.*, within tile and spot beam service areas; additional details are provided in Attachments B and C).

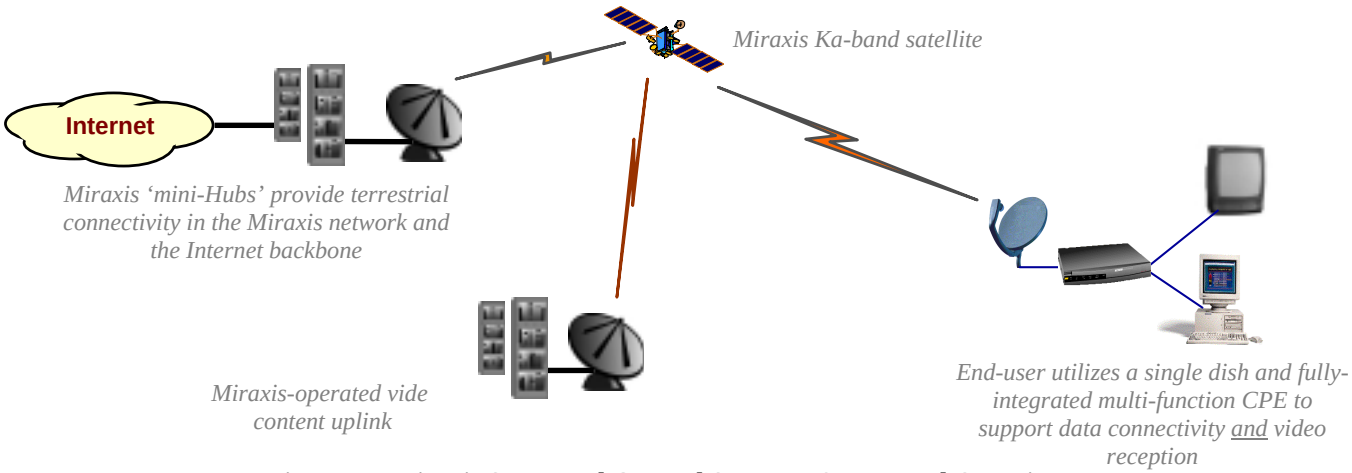

Figure 1 – Miraxis Space and Ground Segment Conceptual Overview.

The second area of major importance involves the ability to deliver and utilize a low-cost, highly-capable end-user terminal, or customer premises equipment (CPE). Miraxis has developed a conceptual design for a multi-media integrated platform which could serve as a home or office network management device, and which would be capable of supporting a variety of applications, including: driving multiple television sets driven connected through the standard indoor coaxial cable wiring found in many homes today, personal video recorder capabilities, video content archiving, pay-per-view selection capability, local area data network management functions, and interactive two-way data functions, to support Internet Web browsing and Web page caching, data transfer, voice-over-IP, and iTV and T-commerce applications, among others.

> "That Ka-band systems will contribute enormously to the evolution of the emerging broadband sector in the first decade of the 21st Century represents the next significant chapter in satellite history."
>
> -- Peter Brown
> *Via Satellite*

Several companies are engaged in the development of such multi-function multi-media terminals which, when integrated with satellite interactive terminal technology (such as that developed by EMS Canada) will support Miraxis-based services. Such an indoor unit would be connected to an outdoor unit which will consist of a ~66 cm dish with a single satellite feed assembly.

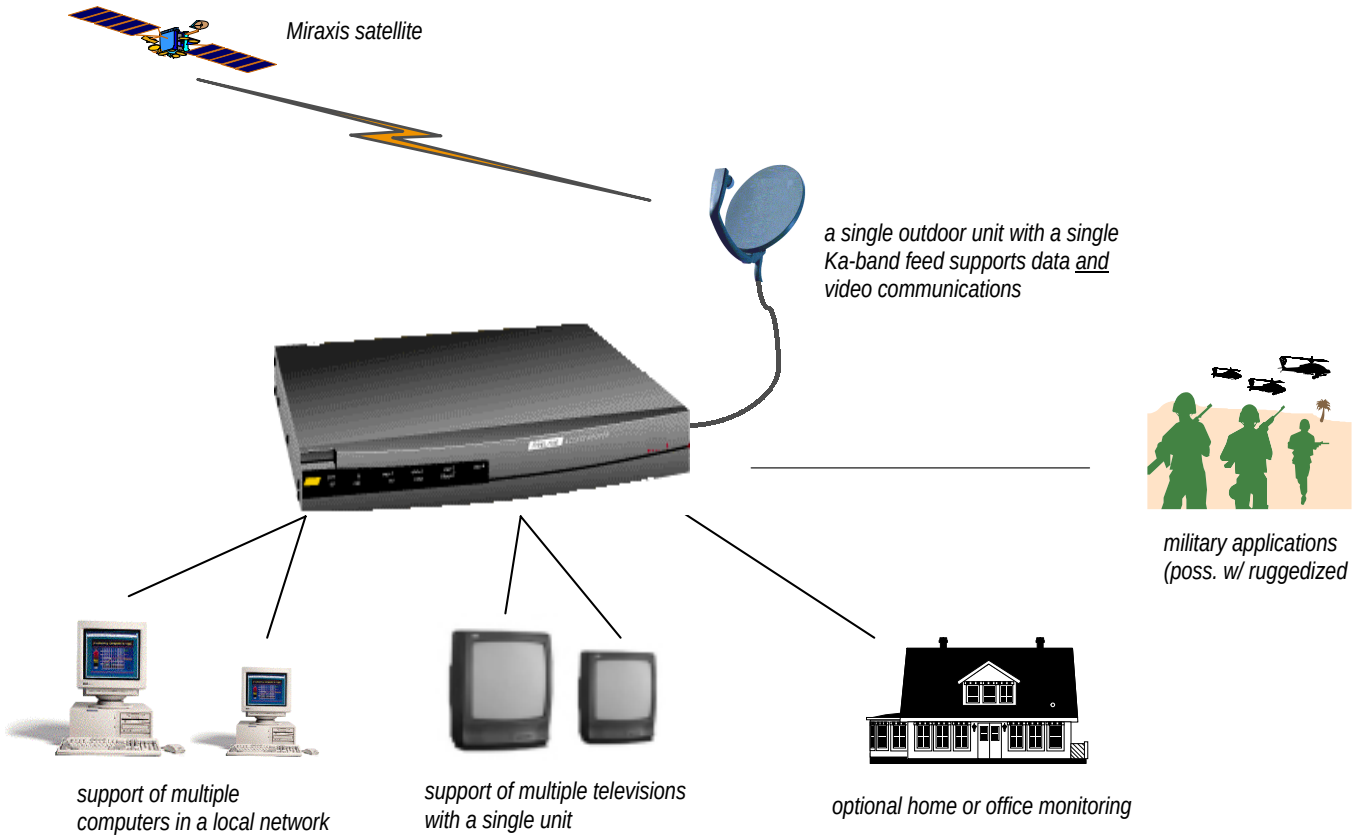

Figure 2 – Miraxis Customer Premise Equipment Concept.

Providing Support to Retail Service Providers in Australia

Miraxis plans to provide functionally equivalent but operationally independent systems based upon Miraxis technologies in regions around the world – including in Australia – as a wholesale managed service provider. As such, Miraxis and its operating affiliates will own and operate the Space Segment's satellites, as well as the Ground Segment's Hub facilities and second-tier customer service and network operations centers, including video content aggregation and uplink facilities.

The provision of Miraxis-based services to end-user customers, however, will be the responsibility of retail service provider partners. Such RSP organizations will work with Miraxis to provide CPE installation support, first-tier retail customer service and support (including end-user customer billing), *et cetera*. RSPs are expected to be existing, well-established firms having in-place customer service capabilities, a base of existing customers which could be expected to "adopt" Miraxis-based services as part of the RSPs mix of products and services, and which have local knowledge useful in the development of Miraxis-based business.

Miraxis Australasia has identified an Australia-based organization interested in working as a partner in the development and operation of the systems required to provide Miraxis-based services in Australia and elsewhere in the Asia-Pacific region. Our team is currently engaged in continuing discussions with potential retail service provider partners, end-user organizations – including agencies of Government – and content provider organizations, in order to ascertain the level of interest which exists within Australia for the deployment of Miraxis-based services. **These efforts are being undertaken in the context of a very difficult environment worldwide for securing capital to support telecommunications infrastructure initiatives such as that represented by Miraxis**.

The Effect of the Regulatory Regime and Legal Framework

"Uncertainty" is the limiting factor with respect to the deployment of a system offering the capabilities and services envisioned by Miraxis. Market uncertainty can be addressed by engaging with established and committed service and content provider partners. Technical uncertainty is addressed through the use of proven sub-systems and components, as well as through the selection of highly-experienced and highly-capable contractors. Regulatory uncertainty presents particular difficulties, since policies and regulations are put into place by sovereign governments and their agencies – and these policies and regulations are subject to change at any time.

Miraxis and its affiliates are working with the Government of Australia – in particular with the Australian Communications Authority – precisely because of Australia's stable and progressive policies in support of open markets, support of new technology's adoption, and not least, the ACA's excellent reputation in international telecommunications circles, most particularly within the International Telecommunications Union. The Miraxis team greatly appreciates the strong support and assistance which it has received from the ACA to date.

Miraxis presents a number of difficulties with respect to regulatory agencies, and these difficulties in turn represent "risk" to potential investors, partners, and other backers of a project such as Miraxis. Many of these difficulties stem from the fact that as a satellite project, Miraxis cuts across a number of technological – as well as geographic – boundaries which are often used to segregate regulated services. In the case of Miraxis, this is exacerbated by the fact that Miraxis' capabilities as a Ka-band system cut across previously-defined categories of satellite services.

Class of Service. In the United States, Miraxis has access to a license by the Federal Communications Commission to provide Ka-band fixed satellite services (Miraxis is not envisioned as a "mobile" system). Traditionally, FSS operators have provided telecommunications back-haul and content transport services principally to industrial users in the C- and Ku-bands of the radio spectrum, using small but rather expensive VSAT (for, "Very Small Aperture Terminal") technology. Ka-band FSS systems were first licensed in the USA in the mid-1990s, and to date no Ka-band-based commercial FSS system has been deployed to provide service to the USA. A special subset of the Ku-band frequencies has been defined as the "Direct Broadcast Satellite" services spectrum. DBS satellites provide commercial direct-to-home satellite television services using the relatively limited amount of bandwidth allocated to such services (usually referred to as the "DBS" or "satellite DTH" industry).

From the preceding discussion, it can be seen that Miraxis-based technology is ideally suited to providing video content delivery directly to a small end-user terminal suitable for use in a commercial, direct-to-home environment. Thus, in addition to providing two-way wireless data communications capability, Miraxis can support direct-to-home satellite television services – among other video content delivery applications, such as pay-per-view movies, distance learning and education, tele-medicine, *et cetera*. Miraxis does not, however, fall in the generally defined DBS Ku-band frequencies, and therefore is not technically a "satellite DBS" system. The limiting issue, therefore, is not technical or operational, but rather a matter of regulatory and industry definition.

Miraxis believes that, from a residential end-user perspective, consumers are not willing to pay an amount required on a monthly basis for a wireless telecommunications service which provides data communications and/or Internet access *alone*. There is, however, a demonstrated willingness on the part of consumers to pay for television and entertainment content; this willingness can be engaged, therefore, to provide the economic justification for an integrated multi-media platform, such as that proposed by Miraxis, which would provide satellite television ***plus*** wireless Internet access. (The economic model for business-class users is somewhat different, however, Miraxis' market research indicates that providing services solely to business-class users in Australia is not sufficient to justify the investment required. Satellite TV is the "killer application;" see Alcatel Submission, pg. 10.)

- **Recommendation** – In the interest of "improved technology neutrality," systems such as Miraxis should be authorized to provide the diverse range of services enabled by their technical capabilities, and should not be arbitrarily restricted from providing any such services because of the particular frequency band within which they operate. (Respecting, however, any internationally agreed class of service restrictions which may exist, such as the reservation of certain bandwidths for utilization for emergency and search-and-rescue applications on an international basis; such restrictions often support the limitation of interference for a particular reason, such as military, governmental, or life-saving applications. It is immaterial, however, whether Miraxis' Ka-band bit-stream is carrying ones-and-zeroes in support of a "pure data" application versus ones-and-zeroes in support of a television program. Indeed, one of the key market segments of the Ku-band FSS business is the back-haul "via satellite" of television content, for distribution to end-user viewers by terrestrial or other wireless means; this is not usually classified as "satellite television." Likewise, certain service offerings which strongly support Government policies such as "universal service access" must be able to be offered with no penalizing fees or adverse regulation; the example here would be voice-over-IP telephone service delivery via satellite.) A positive legal framework – not to mention an actual regulatory ruling – would eliminate a major uncertainty facing Ka-band satellite-enabled video delivery.

In-Country Licensing. As mentioned earlier, Miraxis (and its partner, Kagoe Communications) is working closely with the ACA in support of a number of Ka-band FSS filings lodged with the ITU. Gaining access to an orbital slot, however important, is only one-half of the equation with respect to a satellite communications system; the system must also be licensed on the ground within the country or countries it plans to operate – often referred to as gaining "landing rights." Any company seeking to raise capital to support the development of a satellite system – wherein the build-out of the satellite itself can take from two to three years – needs to be in a position to assure its investors that it will gain landing rights in the country or countries which form the intended market region.

Gaining such regulatory approval can often represent a significant cost – a cost which, in the case of a satellite-based system, might be incurred two to three years prior to the generation of any revenue. This situation penalizes a new-start entrant which, while perhaps raising two to three hundred million dollars of investment capital to be used for system construction, may be several years away from any revenues, and even more years away from net earnings.

- **Recommendation** – In the interest of "improved regulatory conditions for small-scale entrants," systems such as Miraxis could be granted authorization to operate under an appropriate carrier licensing regime, but have any of the economic impacts of such license (*i.e.,* fees, USO contributions, *et cetera*) minimized until the proposed system is deployed and/or revenue generation operations have commenced. Such authorization could be made provisional pending the payment of appropriate fees at some time in the future. Such "vest pocket" authorization would eliminate the uncertainties associated with gaining landing rights within Australia.

Spectrum Auctions for Space-Related Programs. Governments around the world have in recent years generated revenues through the auction of radio spectrum. In most countries – even those with open, capitalistic free-market economies such as the United States and Australia – the radio spectrum is seen as a "public resource;" this view is backed-up in law and regulation. Auctions for wireless spectrum have been successful in raising funds for the public treasury. However, it should be noted that the cost of any such payments ultimately must be borne by the end-user customer. Terrestrial systems can, in most cases, engage in a limited, incremental roll-out, generating at least a small amount of revenue almost immediately. As mentioned earlier, however, a satellite-based system often takes several years to deploy; Miraxis itself envisions a 30- to 36-month build cycle for a single Miraxis-class satellite.

Within the current environment, it is essentially not possible to raise the hundreds of millions of dollars necessary to design, construct, and launch a satellite-based system if such a system has

unacceptable costs and/or risks associated with its development and deployment. Paying millions of dollars for spectrum rights is construed as such an unacceptable risk. Many governments have, therefore, refrained from holding spectrum auctions in association with space-based programs; in some cases, such auctions as may have been held have failed to raise any funds due to the unwillingness of investors and/or system operators to participate. A spectrum auction for satellite-based services can, therefore, delay or halt the introduction of new systems and technologies – technologies which are ideally suited to providing support across wide, rural and thinly-populated areas which may of special interest to government policy makers.

- **Recommendation** – Spectrum auctions should be avoided with respect to satellite-based systems, in recognition of such systems' inherent abilities to provide services to rural and thinly-populated areas, and given the long lead-times and tremendous up-front expenditures which must be made by satellite-based system developers prior to the generation of any revenues.

Specific Comments Related to the Terms of Reference

Current rollout of wireless broadband technologies in Australia and overseas … . The details of Miraxis' planned roll-out of broadband services in the United States and Australia are shown in Attachments B and C to this document. By way of summary, Miraxis Broadband North America expects to commence service operations in the United States in calendar year 2005. Regarding Miraxis-based services in Australia, Miraxis expects that it will take 26 to 30 months from the placement of a firm order with its Prime Contractor to have a Miraxis-type Ka-band satellite ready for launch; service could commence in Australia shortly thereafter. The Miraxis team is committed to exploring every opportunity to allow Miraxis services to be made available within Australia at the earliest possible date.

The inter-relationship between the various types of wireless broadband technologies. Miraxis-type services are by design "fixed satellite services" – that is to say, "non-mobile." Miraxis does not plan or expect to support any type of mobile broadband service. ("Mobile" means that the service would be available *while the equipment is in motion*; this *does not* rule out transportable applications, so long as the Miraxis dish antenna could be positioned and pointed prior to and during service operation.) The Miraxis System design is optimized for residential consumers and common "office environment" applications, although with a ruggedized version of a Miraxis end-user terminal, certain heavy-duty environments could also be supported – Defence applications, remote exploration operations, fire-fighting, *et cetera*.

The Miraxis System could be used to support data back-haul and feeder links in support of other broadband applications – including 3G installations, remote and to-the-desk-top caching, support of first-mile content generation and transmission, *et cetera*; the Miraxis team would be most interested in discussion such applications with potential service providers so interested. Miraxis does *not*, however, expect to utilize certain wireless technologies, such as 802.11 technology, in support of its operations, owing to security concerns on the part of certain of its content provider partners. Miraxis does, however, expect to utilize high-capacity fibre optic connections and/or satellite connectivity to aggregate certain video content from the content providers' sources, and to interconnect its gateway Earth station Hubs with such supporting terrestrial broadband technologies. (The availability of dark fibre, and its specific location, will play a role in citing Miraxis' Hubs in Australia.)

The benefits and limitations … compared with cable and copper-based broadband delivery platforms. The principal operational benefit of Miraxis technology is that the Miraxis System will be immediately and ubiquitously available to the entire nation upon the commencement of service availability, with no need to develop any further infrastructure – no lengthy and expensive tower build-out schedule, no need to dig-up the countryside, *et cetera*. Simply install the CPE and its small, 66 cm dish, and connect to the System. As designed, the Miraxis System can support a comprehensive bundled service offering, including television and other video and audio content, Internet access, and voice-over-IP capabilities, all driven by a single Miraxis multi-media integrated CPE.

The potential … to provide a "last-mile" broadband solution … . The entire intent of the Miraxis System is the provision of a first- and last-mile broadband solution. As mentioned above, in order to gain access to Miraxis-provided services, one need only install a Miraxis multi-media integrated CPE, with its single-dish, single-feed, 66 cm outdoor unit, to connect to the System and the services provided via the System. It should be noted, however, that Miraxis can also provide a "first-mile" solution. With data rates ranging up to 2 Mbps in the return link, Miraxis can support a variety of data collection applications, including video data collection, at relatively low cost. Applications which now call for a three to four meter dish, or a multi-hundred-thousand-dollar SNG truck, could be supported using Miraxis technology with a two to three meter dish, and equipment costing ten- to twenty-thousand dollars.

… particularly in rural and regional areas … . Miraxis is committed to making its services available throughout the nation, into every part of Australia. This is feasible due to Miraxis' unique, patented and patent-pending system architecture. This system architecture enables Miraxis to cover an entire continent at reasonable cost, while focusing the majority of its capacity upon more populated target market areas.

Following a detailed demographic and target market study, the Miraxis engineering staff will develop a specific, detailed service coverage plan which will be implemented in both the Space and Ground Segments. The entire nation will be provided with both one-way national and regional-content video delivery, as well as varying degrees of two-way data connectivity. The Miraxis System's design is more impacted by a single environmental factor than by any geographic distances – and that factor is rain. Signals in the Ka-band of the radio spectrum are more affected by heavy rain than are Ku-band-based systems. Miraxis, however, operates generally in the lower-end of the Ka-band spectrum, which is relatively more robust in the face of heavy rain. Further, Miraxis has designed the System in such a manner as to focus more spacecraft energy into "high rain regions," as identified by the ITU and other experts in various environmental models (*e.g.*, the Crane Model especially). Therefore, an end-user can expect to see the Miraxis System degrade in performance during periods of heavy downpour, but to not lose connectivity. Certain areas of Australia – such as Cairns and Tasmania, as examples – might experience more difficulty with respect to rain fade than would other areas of the country.

… and to encourage the development and use of broadband content applications. Miraxis will operate in Australia as a wholesale managed service provider. As a result, there will be considerable opportunity for many other firms to engage the Company with respect to the development of specific service offerings – new video entertainment channels, or "micro-channels," industrial and business-related applications, first-mile data collection applications, *et cetera*. The Miraxis System can be configured to support the delivery of high definition TV signals. Miraxis expects to enable the delivery of such signals within Australia, pending the outcome of market research indicating an interest in this application.

Miraxis has created the Miraxis Foundation, Inc., a Florida not-for-profit corporation, whose mission is to make available Miraxis-based services to sectors of the community which might not otherwise be in a position to gain access to such broadband technologies. **The Company and the Foundation are very interested in working with charitable organizations, not-for-profit organizations, and agencies of Government in order to ensure the widest possible distribution of Miraxis technology, and the development of community-interest and public service applications**. (The Miraxis Foundation, Inc., has applied to the U.S. Internal Revenue Service for designation as a tax-exempt, publicly-supported charity, under Section 501 (c) (3) of the U.S. Tax Code.)

The regulatory issues in the terms of reference have been addressed in the previous section.

A thorough discussion of the future development and use of broadband technologies is beyond the scope of this limited Submission to the Committee.