

**Notice DGRB-003-09**

**17 GHz BSS Spectrum  
at 113°W**

**31 March 2009**

# Contents

<b>1. EXECUTIVE SUMMARY</b>	<b>1</b>
<b>2. DEVELOPMENT PLAN</b>	<b>3</b>
2.1 Overview	3
2.2 Regulatory Assessment	5
2.3 Ciel's Solution at 113°W	6
<b>3. BENEFITS TO CANADA</b>	<b>8</b>
<b>4. MARKET ANALYSIS</b>	<b>12</b>
4.1 Digital Television Trends	13
4.2 HDTV Trends	14
4.3 Revisiting Nordicity's Research	15
4.4 Actual & Potential Market Demand	16
<b>5. BUSINESS PLAN</b>	<b>18</b>
5.1 Commercial Strategy and Marketing Plan	18
5.2 Human Resources Plan	18
5.3 Financial Model	18
5.4 Funding of Capital Expenditures	19
<b>6. TECHNICAL PLAN</b>	<b>20</b>
6.1 Interim Ka BSS Payload	20
6.2 Ciel-8	20
6.3 Ciel-8 Program Plan	21
6.4 Ciel-8 Procurement and Launch	21
6.5 Ciel-8 Communications Payload	21
6.6 Ciel-8 Bus Description	21
6.7 ITU and Regulatory Matters	21

<b>7. CIEL SATELLITE</b>	<b>23</b>
7.1 The Ciel-2 Program	24
7.2 2006 Satellite Licensing Initiative	25
7.3 Resources	26
7.4 Expertise	26
7.5 Corporate Structure	28
<b>8. SYNOPSIS</b>	<b>30</b>



## 1. Executive Summary

Ciel Satellite Limited Partnership (“Ciel”) is pleased to submit this Application for a radio spectrum licence in the 17 GHz broadcasting-satellite service (“BSS”) at the 113°W orbital position in accordance with the requirements of Canada Gazette Notice DGRB-003-09 (the “Call for Applications”).

The 17 GHz BSS spectrum at the 113°W orbital position is a valuable Canadian resource. The spectrum policy objectives underlying the Call for Applications, including those related to enhancing the competitiveness of Canadian telecommunications providers and ensuring Canadian access to valuable spectrum resources, are central to developing this resource. Ciel describes an approach to satellite operations at the 113°W orbital position in this Application that meets all of the criteria outlined in the Call for Applications in terms of benefits to Canadians, financial commitment, technical and deployment plans, and operational expertise. Moreover, Ciel’s plan significantly advances the Department’s spectrum policy objectives.

Canada enjoys excellent regulatory priority at the 113°W orbital position. The orbital position offers full coverage of Canada, and the 17 GHz BSS spectrum is ideal expansion capacity for existing Canadian Direct-to-Home (“DTH”) operators, for new direct-to-consumer services, and for the development of emerging competitive video distribution services. However, given the uncertain economic circumstances currently facing the Canadian broadcast industry, and the understandable caution of many Canadian satellite users in making long-term investment decisions at this time, it is important that Canada adopt a measured approach to spectrum deployment, an approach that ensures suitable spectrum-orbital resources are available when they are required. Ciel proposes a spectrum development approach in this Application, “Measured Deployment”, that is designed to preserve Canadian access to this important spectrum while the market for 17 GHz BSS matures.

Ciel has made contractual arrangements for interim satellite facilities, contingent upon the success of this Application, to bring the Canadian 17 GHz BSS ITU filings at the 113°W orbital position into use prior to their expiry in May 2012. The use of interim facilities preserves Canadian ITU priority at 113°W while maximizing decision-making flexibility for Canadian satellite users. Construction of Ciel-8, a new dedicated 17 GHz BSS spacecraft, is projected to start in early 2012, and Ciel anticipates an in-service milestone for Ciel-8 of no later than Q1 2015. As additional protection of future Canadian access to the available spectrum, Ciel has also secured the agreement of the party holding future ITU priority at adjacent orbital positions to facilitate the coordination of 113°W for use in Canada.

... this Application relates solely to the potential development of 113° W. Ciel is not submitting an application for the radio spectrum licence in the 17 GHz BSS at 111.1°W, nor does Ciel object to the award to Telesat of such licence.



## 2. Development Plan

Ciel has developed a viable plan for long-term development of the 17GHz BSS spectrum at the 113°W orbital position. The plan is designed to protect the value of the spectrum-orbital resource while the market for 17 GHz BSS services matures in Canada, and then make optimal use of the spectrum for the benefit of Canadian satellite users. This section of the Application provides an overview of the domestic and international environment influencing the pace of adoption of 17 GHz BSS for video distribution, an assessment of the regulatory status of the 113°W orbital resources, and a detailed description of Ciel's development plan.

### 2.1 Overview

The 17.3-17.8 GHz band is the most promising frequency band for future capacity growth in the DTH industry. This significant allocation of spectrum resources, which is available across the North American arc, has the potential to support capacity expansion of incumbent service providers, and perhaps more importantly, to facilitate the entry of new participants seeking to offer competitive video services or other direct-to-consumer services. 17 GHz BSS is one of the only remaining "green field" spectrum bands that will be able to support the future growth requirements of Canadian satellite users on a long-term basis; the 12 GHz BSS and Ku FSS frequency bands in the North American arc are now substantially at full capacity.

In developing applications for the 2006 Satellite Licensing Initiative, Ciel worked closely with Nordicity, an Ottawa-based research firm, to assess future DTH capacity needs for Canada. That assessment assumed that there were potentially four additional satellites needed over the medium-term – defined in the Nordicity report as five years. However, since that research was completed, the incumbent Canadian DTH providers have not moved as quickly as expected to grow their available capacity. Bell TV has deployed Nimiq-4 with replacement 12 GHz BSS capacity and a modest amount of Ka FSS, and is under contract to use a portion of the future Nimiq-5 satellite at the 72.7° W 12 GHz BSS orbital position. Star Choice has not announced

expansion plans, but is on record as having a preference for using Extended Ku FSS.<sup>1</sup> Neither Canadian DTH service provider has publicly expressed any significant interest in developing new 17 GHz BSS facilities in the near term.

The DTH industry in the United States has expanded its capacity over the last three years with additional 12 GHz BSS and Ka FSS spacecraft. DISH Network has added 12 GHz BSS replacement capacity, as well as the expansion capacity provided by Ciel-2, and DIRECTV has deployed Ka FSS expansion capacity at the 103°W and 99°W orbital positions. However, neither American DTH service provider has made a material commitment to deploy commercial 17 GHz BSS capacity.<sup>2</sup>

Although the incumbent DTH industry has not moved quickly to induct 17 GHz BSS into their systems, many new entrants have been considering the frequency band and its capabilities. Ciel has had many discussions with Canadian and international parties that are considering new DTH services (niche and mass market) as well as new applications, such as broadcast service to mobile antennas. These new concepts and entrants are exciting, but are facing difficult capital markets and none have yet made a firm commitment to develop 17 GHz BSS capacity.

The slow pace of commercial adoption of 17 GHz BSS by established North American DTH operators means that these spectrum resources are at risk of losing ITU priority before they can be brought into use. The difficult question facing the Department is how best to protect Canada's 17 GHz BSS filings in this environment?

In Ciel's view, the Department should adopt a strategy of Measured Deployment – favour those plans that preserve and enhance Canada's orbital resources during the medium term using contracted interim facilities and other proven spectrum development techniques. Canada should not gamble with these resources. A strategy of Measured Deployment will ensure that 17 GHz BSS spectrum is available when the market is truly ready to use it.

---

<sup>1</sup> *Canada Gazette* Notice DGTP-003-08 - *Consultation Paper on the Possible Use of the Extended-Ku Spectrum Bands for Direct-to-Home (DTH) Satellite Broadcasting Services.*

<sup>2</sup> DIRECTV has deployed an experimental 17 GHz BSS payload on its DIRECTV-11 Ka FSS satellite to assess the potential for space path interference between Appendix 30A Planned BSS feeder links and 17 GHz satellites at close orbital spacing.

## 2.2 Regulatory Assessment

The International Telecommunications Union (ITU) coordination request underlying 113°W 17 GHz BSS is CAN-BSS13, published in IFIC 2570 on May 30, 2006. According to Ciel's research, and the ITU notification status on the Department's website, CAN-BSS13 is currently the sole ITU filing at 113°W and has an expiry date of May 2012.

As the Department is aware, ITU WARC92 allocated the 17GHz BSS band for satellite use on a primary basis effective April 2007. In April 2002, the Canadian and American administrations both filed ITU applications at multiple orbital positions across the North American arc. These initial filings expire in April 2009. Unlike the American administration, Industry Canada submitted back-up filings behind the initial filings at many established Canadian orbital positions to ensure continuous ITU priority beyond the April 2009 expiry of the initial filings.<sup>3</sup> The Department issued Approvals in Principle in 2008 for many of the Canadian 17 GHz BSS orbital positions having continuous ITU priority until 2012-13.

In late 2007, the FCC conducted a Rule Making process which resulted in the American administration establishing an orbital spacing grid and power limits (maximum Power Flux Densities), among other things, for the use of 17 GHz BSS. Even though the United States will have only a few orbital positions on its grid with ITU priority, it will nonetheless require that foreign operators seeking to serve the United States comply with the FCC 17 GHz BSS rules (Part 25, Title 47 CFR). In its plans to develop 17 GHz BSS capacity for Canada, Ciel will have to coordinate operations with operators serving the United States who have ITU priority.

... Ciel's business plan for 113°W is aimed solely at serving the Canadian marketplace and Ciel's priority is to develop and protect 113°W for Canadian interests by executing on the solution outlined below.

If Ciel is awarded the available spectrum as a result of this Application, Ciel's plan will allow a Canadian satellite network at the 113°W orbital position to deliver services to small dish receivers ...

---

<sup>3</sup> Not including 17GHz BSS at 111.1°W.

## **2.3 Ciel's Solution at 113°W**

Ciel's proposed solution has three elements: an agreement ... to coordinate the use of 113°W in Canada; interim satellite facilities to bring the 17GHz orbital resources at 113°W into use; and Measured Deployment of capacity on a new satellite, Ciel-8, to Canadian DTH providers and other customers.

Ciel has secured an agreement ... to facilitate coordination of 113°W for use in Canada, thereby ensuring future Canadian access to the available spectrum. Ciel has also contracted for interim satellite facilities to bring the Canadian 17 GHz ITU filings at 113°W into use prior to their expiry in May 2012. The use of interim facilities preserves Canadian ITU priority at 113°W while maximizing decision-making flexibility for Canadian satellite users. Construction of Ciel-8, a new dedicated 17 GHz BSS spacecraft, is projected to start in early 2012, and Ciel anticipates an in-service milestone for Ciel-8 no later than Q1 2015.

### **2.3.1 Coordination**

Ciel has executed a Spectrum Development Agreement (the "SDA") ... which provides for coordination of the use of the 113°W spectrum-orbital resources ... A copy of the SDA is attached as Appendix A to this Application. ...

As the Department points out in the Call for Applications, the ability of an operator to frequency coordinate a Ka BSS spacecraft for high power applications ... depends heavily on several factors, but one of the major factors is the willingness of neighbouring satellite operators to agree on coordination criteria that are acceptable to both parties. ... coordination is often contentious and can result in lengthy discussions to establish mutually acceptable criteria and characteristics.

If the satellite operators involved are cooperative and have common goals to design the EIRP coverage of all three satellites to minimize the mutual interference so that the aggregate C/I from and into each of the systems achieves a mutually acceptable degradation on the link budgets, frequency coordination can be attained without any significant compromise of system performance on any of the affected networks.

Coordination can be assisted at the 113°W orbital position by ...

In Ciel's technical solution, the parties to the SDA have developed mutually beneficial contours and link budgets for each respective market ...

... The coordination proposal described in the SDA offers a solution that allows 113°W to prosper for Canada by ... All affected parties will benefit from the Ciel solution.

### 2.3.2 Interim Facilities

The SDA provides for access to an interim satellite that would allow Ciel to bring the 17 GHz BSS frequencies into use at the 113°W orbital position prior to May 2012, when Canada's ITU priority ends, and could periodically revisit the orbital position as required.

... Placing one of these interim satellites at the 113°W orbital position allows Ciel to bring the spectrum into use prior to the ITU deadline while a dedicated satellite is being manufactured. Further detail with respect to the interim satellites is provided in the SDA, and in Section 6.1 below.

...

### 2.3.3 Measured Deployment

Use of an interim satellite at the 113°W orbital position also allows Canadian customers some much needed flexibility — the decision to begin manufacturing the dedicated satellite can be delayed until customers are ready to commit. Potential customers, such as Star Choice or new entrants to the Canadian DTH market, currently face a challenging investment climate in which to move forward with expansion or launch plans. It is important that once the financial markets begin to recover, Canada is still able to offer these potential customers suitable spectrum-orbital resources.

Ciel does not propose to begin the system definition process for Ciel-8 until mid-2011, leading to a contract award for construction of the new satellite in Q1 2012, and an in-service date of Q1 2015. Further details of this strategy are set out ...

...



### 3. Benefits to Canada

Ciel's proposal for the development of the 113°W orbital position will provide significant and lasting benefits to Canada. The value of the spectrum-orbital resources to Canada will be preserved through the use of an interim satellite and then fully utilized with the timely development and operation of the proposed Ciel-8 satellite. The capacity made available on Ciel-8 will satisfy the general expansion requirements of the broadcasting sector in Canada and the need for additional HDTV capacity in particular.

As noted by Finance Minister Jim Flaherty in his recent 2009 Budget Speech, the global economic deterioration has occurred faster and with more force than anyone expected. As part of the Government's response to challenging economic conditions, the Minister emphasized the need to invest in new infrastructure:

*Since Sir John A. Macdonald laid a railway across a continent, infrastructure has been both an immediate response to an urgent need and a hopeful act of nation building. When chosen carefully, infrastructure projects can provide a much-needed, short-term stimulus to our economy. Most important, infrastructure creates new, good jobs—in construction, engineering, science and technology and manufacturing. And this in turn creates new opportunities in other industries<sup>4</sup>*

Ciel proposes to support these goals through preservation of an asset, the spectrum resources at 113°W, which will lead to significant new infrastructure investment ... In particular, Ciel's proposal is targeted at increasing capacity to enable the addition of new and more technologically advanced broadcasting services for Canadians.

---

<sup>4</sup> <http://www.budget.gc.ca/2009/speech-discours/speech-discours-eng.asp>

Ciel's plan to serve Canada at the 113°W orbital position will provide the following significant benefits:

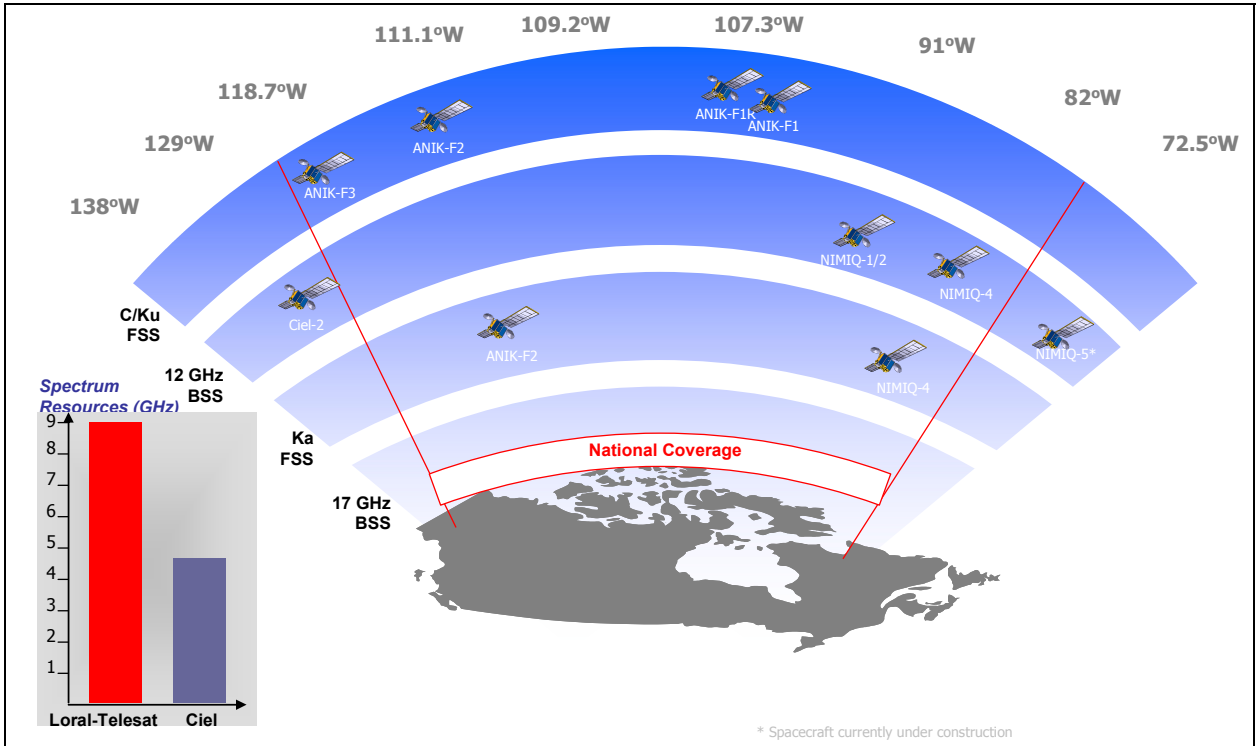
- Spectrum Development – Ciel is committed to (and has made contractual arrangements for) the timely deployment of an interim satellite at 113°W, thereby securing access to an important Canadian orbital position;
- Favourable Coordination – Ciel has contracted with ... to ensure that full Canadian coverage capable of delivering services to small dish receivers will be available from 113°W, ...;
- HDTV Capacity for Canadian Broadcasters and BDUs – Ciel-8 will offer Canadian broadcasters and BDUs expansion capacity to supply the quickly growing market for additional HDTV programming;
- New and Innovative Services – Ciel-8 is an innovative satellite that will be one of the world's first 17 GHz BSS satellites. This satellite will augment existing platforms with core services like HDTV or new programming (international, specialty or user-generated) bringing a new level and scope of service experience to Canadian satellite users;
- Choice of Suppliers – Ciel-8 will provide Canadian satellite users an important element of quality, redundancy and diversity that is currently incomplete in the Canadian satellite communications infrastructure;
- Solely Canadian Payload – Ciel will reserve all (i.e. 100%) of the capacity on the 17GHz BSS payload on Ciel-8 for the exclusive use of Canadian customers;
- \$ ... million in New Canadian Infrastructure Investment – Implementation of the Ciel-8 proposals as outlined will bring almost \$ ... million of new investment to the Canadian telecommunications infrastructure over the next five years;
- New Highly Skilled Canadian Jobs – Ciel will have a greater need to train and employ personnel in highly skilled management, administrative and technical positions as a result of the Ciel-8 program; and

- Contribution – Working closely with Industry Canada, Ciel will dedicate 2 percent of adjusted gross revenue (or a service-in-kind equivalent) of Ciel-8 towards special initiatives aimed at supporting the development of broadband access in (or providing other benefits to) underserved communities.

Satellite platform customers seek choice, quality, and innovative services that are provided in a timely manner. These fundamentals define Ciel's approach to the Canadian marketplace. Ciel's presence as a relatively new Canadian satellite operator enhances the level of competition in the Canadian (and North American) market and provides customers a choice among potential suppliers that was previously unavailable. Ciel has a clear plan to increase its competitive edge across all stages of the wholesale satellite operators' value chain, as described throughout this Application.

As a result of the 2006 Satellite Licensing Initiative, Ciel was awarded assignments in three of the four frequency bands made available (Ku BSS, Ka FSS and 17 GHz BSS). These licenses laid the foundation for Ciel to begin developing a satellite fleet that can provide Canadian satellite users with a breadth of competitive satellite services. Nonetheless, the Canadian DTH market for satellite capacity remains a *de facto* monopoly, as illustrated in Figure 3 below – 100% of currently operating and contracted Canadian DTH space segment is still supplied by Telesat. The spectrum-orbital resources available at 113°W, being located in an existing Canadian DTH neighbourhood, are an important element of the competitive landscape. Ciel's opportunity to compete in the Canadian DTH market will be enhanced if Ciel is given access to the 113°W resources, and Canadian satellite users and consumers will benefit from an increase in the overall competitiveness of the market.

**Figure 3 – Canadian Spectrum Resources**



In the 129°W Ku BSS program, Ciel took an orbital position that was essentially fallow and developed a robust technical and commercial solution. In this Application, Ciel is again proposing a creative and innovative solution to maximize the value of the available Canadian orbital positions – a solution that has the promise of delivering another Canadian success story.



## 4. Market Analysis

The global satellite market has seen strong revenue growth of approximately 40% between 2005 and 2007. The services sector remains a primary driver of growth for the satellite industry with worldwide revenues going from US\$53 billion in 2005 to almost US\$74 billion in 2007. Within the services sector, DTH remains the largest segment accounting for 78% of revenues. Worldwide DTH segment revenues rose from US\$41 billion in 2005 to US\$58 billion in 2007.<sup>5</sup>

In Canada, the broadcast sector has continued to experience robust growth with total revenues increasing at a CAGR of 6.5% between 2003 and 2007. Broadcast distribution undertakings (BDU) have outperformed the segment in terms of growth with revenues increasing 7.7% CAGR between 2003 and 2007. DTH and multipoint distribution systems (MDS) in particular have seen robust revenue growth of 11.6% CAGR between 2006 and 2007<sup>6</sup>. The BDU segment consists of companies that distribute broadcasting services via communication networks, such as cable, DTH, and MDS. Cable companies include Rogers Communications and Shaw Communications, while Bell TV and Star Choice provide DTH services. Additionally, there are several MDS providers in Canada, including Look Communications and Image Wireless Communications. Of the approximately 12.5 million Canadian households, the five largest cable and satellite providers combined for over 9.8 million subscribers.<sup>7</sup>

Bell TV and Star Choice are the only operators in the Canadian DTH sector. Bell Canada announced that it had 1,852,000 television customers as of Dec 31<sup>st</sup>, 2008, up 1.6% from 1,822,000 a year earlier, of which the vast majority are satellite customers.<sup>8</sup> Total revenues for Bell TV in 2008 were \$1.45 billion, up 10.1% from 2007 due largely to an increase in the amount spent by customers each month, which resulted from customer upgrades to higher-priced programming packages, rental fees and programming fees.

<sup>5</sup> State of the Satellite Industry Report, Futron Corporation, June 2008

<sup>6</sup> Communications Monitoring Report, CRTC, July 2008

<sup>7</sup> Digital Home <http://www.digitalhome.ca/content/view/3074/279/> (Nov 10, 2008).

<sup>8</sup> BCE Inc., 2008 Annual Report

Star Choice reports that it has approximately 900,000 customers as of November 30, 2008.<sup>9</sup> Shaw Communications, Star Choice's parent company, remains the largest provider of television programming in Canada. Shaw now delivers paid television programming to 3.15 million subscribers through both Shaw Cable and Star Choice, which puts Shaw about 850,000 subscribers ahead of Canada's second largest television service provider - Rogers Cable.

Ciel actively engages many of the participants in the Canadian broadcast distribution segment on a regular basis to gauge customer needs and interest in Ciel's assigned orbital positions. Generally speaking, potential customers in this segment are interested in:

- Substantial new and enhanced HD capacity;
- Diversity of choice and healthy competition in the Canadian wholesale satellite services market;
- Lower distribution costs; and
- Innovative technologies

#### **4.1 Digital Television Trends**

The penetration of digital television in Canada continues to grow as consumers show keen interest in higher quality digital services, HDTV and specialty programming. The bulk of future growth in demand for satellite capacity in the DTH market is expected through the addition of new services and programming to existing subscribers. The goal of most BDUs today is to increase the average revenue per subscriber by offering more feature laden and more expensive digital cable services.

To measure how effective each of the major cable companies has been in converting lower paying analog customers into higher paying digital cable customers, Ciel calculated (based on recent press releases) what percentage of each of the big cable companies' subscribers are now paying for digital cable.

- Rogers - 67%

---

<sup>9</sup> Shaw press release – January 15, 2009

- Videotron - 54%
- Shaw - 43%

The CRTC has set the digital transition date in Canada to August 31, 2011. By that date, Canadian over-the-air television stations will stop broadcasting in analog, using digital signals instead. However, the CRTC has convened a working group made up of broadcasters to discuss the digital television transition. In April of this year, a public hearing will be held for the broadcasters to report on the transition. The outcome of this hearing may determine whether Canadians will receive a subsidy for over-the-air television and how much that subsidy will be. If the CRTC chooses not to offer a valuable subsidy, some Canadians may have to upgrade their televisions. If they choose not to upgrade their televisions, then the consequence will be more subscriptions to DTH and cable companies stemming from the people who get free television in Canada today.

Canada's two DTH platforms are 100 percent digital. After removing analog subscribers, Bell TV becomes the number one digital television provider in Canada followed by Shaw. Shaw's total of roughly 1.8 million digital customers is comprised of 967,037 digital cable and approximately 900,000 Star Choice customers.

#### **4.2 HDTV Trends**

HDTV in particular represents a key theme for the future demand of satellite capacity. The move to HDTV is a strong driver for new services and will continue to spur the need for new satellite capacity. By the end of 2007, approximately 40% of Canadian households were capable of accepting an HD signal and this number is expected to have risen to 58% of households in 2008 according to Consumer Electronics Marketers of Canada. However, only 1.5 million households are estimated to subscribe to, and receive, HD in 2008.<sup>10</sup> As more of these HD ready households upgrade to digital and HD packages, we expect a continued increase in the availability of HD programming. As the number of HDTV channels offered by Canada's two satellite TV providers - Star Choice and Bell TV - increases, demand for satellite capacity will also increase since an HDTV signal contains, at a minimum, five to six times more information than a standard TV signal. Star Choice, for example, launched HDTV programming in January

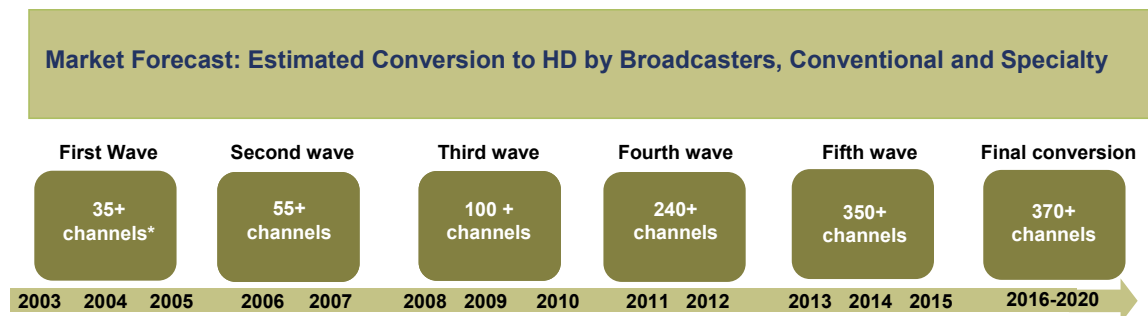
---

<sup>10</sup> Digital Home, January 26, 2009

2000, with the first HD broadcast in Canada (SuperBowl XXXIV). In February 2004, Star Choice launched 2 HD channels. By December 2006, the total number of HD channels was 17. Now, Star Choice boasts over 50 HD channels – a 96% increase since 2004. Bell TV has expanded its HD line-up to over 60 channels, more than any other Canadian TV service. Although both DTH services compete vigorously in the market, the sole source of their current satellite capacity is Telesat.

### 4.3 Revisiting Nordicity’s Research

As part of its submission in the 2006 Satellite Licensing Initiative, Ciel commissioned the Nordicity Group to evaluate the demand for additional broadcasting capacity in Canada. An excerpt from the Nordicity research study below shows their projections:



- The first wave of HD development occurred between 2003 and 2005 in Canada, and saw all of the BDUs launching a number of high definition services.
- In the second wave (2006-2007) there is sufficient capacity available on Star Choice and Bell TV to add a limited number of HDTV channels during this period.
- In the third wave (2008-2010), Star Choice and Bell TV will have to swap out MPEG-2 HDTV set-top boxes for MPEG-4 HDTV set-top boxes to obtain more capacity for additional HDTV services on existing satellites.
- In the fourth and fifth waves (2011-2015), demand for capacity due to the growth of HD services will only be served by new build capacity.
- In the Final Conversion (2016-2020), the capacity added in the fifth wave should be adequate to get both service providers through this phase.

Nordicity's research showed that four additional satellites between 2006 and the year 2020 would be needed to supply the capacity demand of Canada's two DTH operators.

The progression of the "Waves of Capacity" has been slower than projected in the Nordicity report, but assumptions of total amount of additional capacity needed remain valid. Ciel estimates that the actual number of HDTV channels is approximately one "wave" behind Nordicity's predictions. As a result, the 17 GHz BSS awards from the 2006 Call for Applications will be used to provide longer-term resources in the DTH neighbourhoods in Canada. The key message for Canada's broadcast distributors is the need to follow a strategy of Measured Deployment so as not to overwhelm the market with capacity.

#### **4.4 Actual & Potential Market Demand**

Based on general market research, Ciel estimates that core Canadian markets, such as the broadcasting and consumer markets, will continue to grow at a significant rate. The increased demand for new programs, as well as both local and international programming content, will stimulate Canadian demand for 17 GHz BSS capacity in the long-term. The continued transition from standard definition television to HDTV will generate the most significant demand for new BSS capacity, even when taking into consideration the introduction and adoption of more spectrum efficient compression, transmission, and encoding technologies.

##### **4.4.1 Star Choice**

Star Choice is the most obvious potential user of 17GHz BSS spectrum at the 113°W orbital position, due to the proximity of Star Choice's existing operations. ...

Star Choice has stated publicly that it prefers to develop the extended Ku band at 111.1°W and potentially at 107.3°. Revisions to the extended Ku band policy, which currently does not allow use for DTH services, are underway ...

##### **4.4.2 New Entrants**

The Canadian DTH market is dominated by the two incumbent providers. The full Ciel-8 payload, operated using MPEG-4 compression technology, would provide almost 150 full HD television channels, more than sufficient to support the launch of a 3<sup>rd</sup> Canadian DTH provider. It is also possible that an existing Canadian telephone company or cable operator, or even an entirely new entrant, may see an opportunity to launch a competing DTH service using Ciel-8.

#### 4.4.3 IPTV

IPTV continues to play a significant role in the strategic thinking of many existing and potential Canadian satellite users. The 17 GHz BSS spectrum at 113°W is well-suited to IPTV applications.

Canadian telcos continue to experience erosion in their traditional voice markets as new voice technologies become available. The telcos have responded to this dynamic by developing video services, such as IPTV, that allow them to better compete against the cable companies. IPTV is a vital part of the telcos' defensive strategy to retain customers and the Ciel-8 platform could significantly improve the technical performance and reach of telco video offerings in much less time than a terrestrial only approach.

#### 4.4.4 Broadcast Distribution

The opportunities for growth of many Canadian broadcasters are limited by a continuing lack of available distribution capacity. Today, Canadian programmers have three basic channels to market their material - the two DTH service providers and the larger cable systems. Granting the authority for Ciel to operate at 113°W could result in the adoption of new delivery methods or additional capacity for existing distributors, allowing Canadian broadcasters greater choice and flexibility in their future distribution strategies.

#### 4.4.5 Mobile Video

There are multiple initiatives underway to develop mobile broadcast using geostationary satellites. The 17 GHz BSS spectrum-orbital resources may enable more comprehensive mobile broadcast services in airplanes, automobiles and emergency/military vehicles as well as stimulating greater diversity of service offerings. Mobile broadcast services such as LiveTV on airplanes and AT&T CruiseCast for automobiles and recreational vehicles have traditionally relied on Ku FSS capacity simply because this was the only capacity available. The new dedicated broadcast frequencies enabled by the 17 GHz BSS spectrum could allow services such as these to expand their current offerings from, for example, a limited basic channel line-up to a full channel line-up comparable to what customers would expect to receive at home from their BDU.



## 5. Business Plan

The business plan outlined below highlights the market potential and business economics for Ciel's proposed space station facility located at 113°W. Further details of the business case for the Ciel-8 satellite are outlined in the Financial Model attached as Appendix B.

The business case for 113°W 17 GHz BSS ...

As described throughout this Application, Ciel's proposed solution for the 113°W orbital position has the following elements:

- Ciel entered into a Spectrum Development Agreement that provides for coordination ...;
- The SDA also provides Ciel with flexible access to interim satellite facilities that would allow Ciel to bring the 17 GHz BSS frequencies at 113°W into use prior to May 2012, when Canada's ITU priority ends at this orbital position; and
- Ciel plans to offer capacity within Canada to interested Canadian satellite users as described in Section 4.4 above.

### 5.1 Commercial Strategy and Marketing Plan

...

### 5.2 Human Resources Plan

...

### 5.3 Financial Model

A detailed financial model highlighting the key points in Ciel's business plan for the Ciel-8 satellite at the 113°W orbital location is attached as Appendix B ...

## 5.4 Funding of Capital Expenditures

...



## 6. Technical Plan

Ciel provides a detailed technical description of the proposed Ciel-8 spacecraft in this section, as well as the interim resources secured in the Spectrum Development Agreement.

### 6.1 Interim Ka BSS Payload

The use of a 17 GHz BSS interim payload allows Ciel to follow a strategy of Measured Deployment and maintains spectrum for Canada over a longer term ...

### 6.2 Ciel-8

... The 17/25 GHz BSS payload of the Ciel-8 spacecraft will be designed to implement Canadian frequency assignments at 113°W in the ITU Region 2. The spacecraft's coverage area will include all of Canada. For the purposes of this Application, the design of Ciel-8 is shown as optimized for use by a DTH BDU – as more definitive customer requirements are identified, the design of the network will be refined to offer optimal performance for the customer's specific application.

...

The spacecraft will operate in the 17 GHz BSS band DTH downlink frequencies allocated by Industry Canada, i.e. 24.75 – 25.25 GHz for feeder links and 17.3-17.8 GHz for the downlink.

The transponder bandwidth and frequency plan will most likely be ..., which optimizes the cost and technical performance of the spacecraft, but Ciel will continue to monitor the planned architecture and orbital spacing of other operators in this band to determine if there are advantages to other frequency/bandwidth plans.

The satellite will be built by one of the major satellite manufacturers using a state-of-the-art bus design of the manufacturer chosen. The satellite will be designed for at least 15 years of operation.

### **6.3 Ciel-8 Program Plan**

...

### **6.4 Ciel-8 Procurement and Launch**

...

### **6.5 Ciel-8 Communications Payload**

....

### **6.6 Ciel-8 Bus Description**

...

### **6.7 ITU and Regulatory Matters**

#### **6.7.1 Undertaking to not Cause Harmful Interference**

The operation of the satellite will not cause harmful interference to other satellite networks. Ciel's partners have substantial experience in the operation of satellite networks in similar spacing environments of the North American arc and in the resolution of any interference that may occur.

#### **6.7.2 Undertaking to Conform to Existing Canadian Coordination Agreements**

Ciel will conform to all agreements undertaken by Canada with respect to international and domestic coordination of satellites.

#### **6.7.3 Frequency Coordination Plan**

Ciel will provide the administrative due diligence information required by the ITU. ...

#### **6.7.4 Orbital Debris Mitigation**

Ciel will adhere to the *Space Debris Mitigation Guidelines of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space* and the *IADC Space Debris Mitigation Guidelines from the Inter-Agency Space Debris Coordination Committee*, and

will remove Ciel-8 from orbit at the end of life in a manner consistent with the ITU *Recommendation ITU-R S.1003 Environmental Protection of the Geostationary-Satellite Orbit*.

#### 6.7.5 Conditions of Licence

Ciel will adhere to each of the proposed Conditions of Licence as described in Appendix J. Ciel understands and accepts that other conditions of licence may also be required to reflect operational, regulatory, technical or milestone requirements, or pursuant to ministerial authority as referred to in Section 5.3(e) of the Call for Applications.



## 7. Ciel Satellite

In October 2004 Industry Canada took an unprecedented step in awarding the 129°W BSS orbital position to Ciel. Until the 129° decision, no satellite operator other than Telesat Canada had been entrusted with the development of a Canadian orbital resource. Ciel, at the time, was a relatively unknown and untested venture. However, the Department's early belief and trust in Ciel was validated on 10 December 2008, when the \$300 million Ciel-2 satellite was lifted safely into geostationary orbit on a Proton-Breeze M launcher – within just days of the original schedule envisaged by Ciel in 2004. This achievement also validates the outstanding organizational, technical and regulatory competence of the Ciel team.

Building on this success, Ciel has quickly established itself in the Canadian market as a credible alternative supplier of satellite capacity and has developed strong relationships within the Canadian satellite user community. Ciel has the benefit of the technical, financial and regulatory expertise of an outstanding Canadian management team, burgeoning resources and infrastructure, and the substantial industry experience and financial support of its shareholders. The shareholders of Ciel are fully committed to making the investment needed to grow the business and as a result, Ciel is uniquely well-positioned to fulfill the policy goals set by the Department in issuing this Call for Applications.

The vision for Ciel has been continuously refined and updated in the years since first entering the market in 2004, but the ultimate goal has never changed – to grow over the next decade into a full-service competitive alternative for Canada's satellite users. The continuing development of new spectrum is central to this goal. As the competitive environment evolves and customer priorities change over time, Ciel must react and continue to pursue new spectrum opportunities in order to become and remain a premier Canadian satellite operator providing comprehensive services across all of Canada and North America.

## 7.1 The Ciel-2 Program

Ciel was granted approval in principle from Industry Canada on 1 February 2005 to develop and operate a broadcast satellite at 129°W. Not being at the center of the Canadian orbital arc, nor being able to serve all regions of Canada, this orbital position had remained undeveloped for years, and consequently the Canadian plan modifications were close to expiring. Ciel saw the commercial potential of the 129°W orbital position and developed and executed a plan to make this orbital position commercially viable.

Through a combination of innovative satellite design and orbital resource modifications, Ciel developed this previously fallow orbital position into a vibrant, highly addressed and valuable Canadian asset. Working closely and cooperatively with Industry Canada, Ciel was granted two modifications to the 129°W orbital resources protecting the right to serve small dishes, expanding coverage to include Alaska and Hawaii, and operating spot beams in the continental United States.

To bring the 129°W spectrum-orbital resources into use to preserve Canadian access, it was necessary to place a satellite into the orbital position quickly. Ciel arranged to place an interim satellite, Echo V, at 129°W. The operation by Ciel of Echo V at the orbital position allowed Canada to maintain ITU priority at 129°W while a purpose-built satellite was under construction. Ciel received authority from Industry Canada to begin operations using Echo V on 25 August 2005, thus becoming the first alternative Canadian provider of satellite services in Canadian telecommunications history.

The Ciel-2 procurement was initiated in the fall of 2005. After a rigorous negotiation and down-selection process, the contract for construction of Ciel-2 was awarded to Thales Alenia Space on 9 March 2006. Ciel-2 is a Spacebus 4000 C4 class satellite and is one of the largest BSS satellites ever built. The Canadian manufacturer COMDEV was awarded significant subcontracts on the Ciel-2 program. The innovative design allows Ciel to provide downlink service to all regions of Canada visible from the orbital position (including Northern Canada) as well as to the 50 U.S. states through a combination of two overlapping regional beams (Canada and CONUS), and downlink spot beams (U.S. only). This design uses all 32 BSS frequencies (24 MHz each) in accordance with the standard ITU Region 2 BSS plan.

**Figure 7.1 – Ciel-2 in Flight – 10 December 2008**



*Photo: Ciel*

The construction program was completed on schedule and the satellite was shipped to the launch site on 8 November 2008. Ciel-2 was launched successfully on a Proton Breeze M launch vehicle on 10 December 2008, and entered commercial service at the end of January 2009.

Ciel invested more than \$300 million in the Ciel-2 program. Funding was secured through customer prepayments and shareholder investment. The success of Ciel-2 allows Ciel to fulfill its commitment to provide one transponder to Industry Canada for the life of the satellite free of charge for special initiatives aimed at improving connectivity in under-served areas of Canada. As another benefit to Canada, Ciel-2 has also become a source of licensing fee revenue for the Department.

## **7.2 2006 Satellite Licensing Initiative**

On 15 November 2006, Ciel filed nine applications with Industry Canada for multiple satellite orbital positions across several frequencies. The applications were submitted in response to Industry Canada's 2006 Call for Applications to License Satellite Orbital Positions, the largest in Canadian history. ... Commercial, technical and regulatory development of the six new frequency assignments is now underway.

The Government of Canada has been highly supportive of a dynamic and competitive marketplace for satellite services. Ciel recognizes this leadership in promoting a more competitive and innovative Canadian telecommunications industry through these licensing processes. The award of these licences gives Ciel the opportunity to build and launch satellites that will bring new spectrum into use for DTH, HDTV and broadband services, for the benefit of Canadians.

### **7.3 Resources**

...

### **7.4 Expertise**

The resources outlined above were entirely responsible for the successful Ciel-2 program, and will continue to be the foundation of Ciel as it grows. The core competencies of the team in satellite operations, spectrum coordination, satellite design and procurement, sales and marketing, and financial management are described in greater detail below.

#### **7.4.1 Satellite Operations**

The Ciel-2 Satellite Operations Centre (SOC) was constructed in Saskatoon, Saskatchewan by Ciel and SED Systems, a division of Calian Ltd. The SOC operates 24x7 with three shifts of dedicated staff to support the Ciel-2 requirements, and is inter-networked with other TT&C facilities for redundancy. The SOC has been designed to accommodate some expansion of the Ciel fleet, although Ciel will consider establishing an independent SOC as the economies of scale begin to favour an in-house operation.

**Figure 7.4.1 – Ciel-2 Satellite Operations Centre**



*Photo: SED Systems*

7.4.2 Spectrum Coordination

...

7.4.3 Satellite Design and Procurement

...

Ciel believes that listening closely to end-user requirements, while adhering to the tenets of mission success, will produce creative, flexible, affordable and reliable satellite systems. The Ciel-2 program is proof that Ciel is able to develop unique, creative, and successful satellite systems.

7.4.4 Sales and Marketing

Ciel has aggressively marketed the Ciel-2 capacity and other future services to Canadian users. In 2008, Ciel released a Call for Interest in Ciel Satellite Capacity in a further attempt to reach all possible Canadian Satellite Users, and has engaged in extensive discussions with multiple prospective Canadian customers, including the Canadian Association of Broadcasters (“CAB”),

the Canadian Broadcast Distribution Association (“CDBA”), CHUM Limited, BTV+, Astral Media, Rogers Communications, the Canadian Broadcasting Corporation (“CBC”), Star Choice, Cancom, Bell TV, TELUS, Persona and PointCast. The Canadian broadcast and telecommunications industry at large is well aware of Ciel, and was well-briefed on the available capacity on Ciel-2 (although the impaired coverage of Canada available from 129°W limited the potential utility of these facilities for Canadian customers.)

#### **7.4.5 Financial Management**

Ciel, its partners, shareholders and board of directors are committed to maintaining a financially sound business. Not only are several of Ciel’s board members financially-trained officers of highly regarded Canadian firms, Ciel has drawn on other Canadian expertise to insure the financial well-being of its business. As well, Ciel has drawn on the financial expertise of its shareholder, Borealis, and has engaged two Canadian accounting firms – Ernst & Young for audit purposes and the mid-market accounting specialists Collins Barrow for day-to-day accounting assistance. Furthermore, as described above, Ciel is currently recruiting a Vice President of Finance to supplement its current capabilities.

Financial statements of the Ciel companies for the previous three fiscal years are attached as Appendix H

The Ciel shareholders are committed to funding Ciel’s current business operations as well as future programs based on spectrum-orbital resources that were and may be awarded to Ciel. Borealis and SES are well able to fund the capital investment required, and have provided written confirmation of that commitment in Appendix D and E.

### **7.5 Corporate Structure**

This section describes the Canadian ownership and control of Ciel and confirms that Ciel continues to comply fully with the eligibility criteria contained in the *Radiocommunication Act*, the *Telecommunications Act*, and the associated regulations (the “Radiocommunication Regulations”).

#### **7.5.1 Canadian Ownership and Control**

Ciel, and each of the general and limited partners of Ciel, are Canadian owned and controlled and eligible to hold a licence as a Canadian carrier as defined in the *Telecommunications Act*

and a radiocommunication carrier as defined in the *Radiocommunication Act* and the Radiocommunication Regulations. ... An Attestation in the form required in the Call for Applications is attached to this Application as Appendix F.

## 7.5.2 Shareholders

...

### 7.5.2.1 *Borealis*

...

### 7.5.2.2 *604402 N.B. Ltd.*

...

### 7.5.2.3 *Northern Americas Satellite Ventures, Inc.*

...

## 7.5.3 Board of Directors

Pursuant to Canadian residency requirements for directors and officers contained in the *Canada Business Corporations Act* and in the *Telecommunications Act* or the *Radiocommunication Act*, Ciel is controlled by Canadians and is not in any way subject to foreign control. A majority of the members of the Ciel Holdings Board of Directors are resident Canadians. Full biographies of the current members of the board of Ciel Holdings are attached as Appendix G.



## 8. Synopsis

This Application by Ciel for a radio spectrum licence in the 17 GHz BSS at the 113°W orbital position meets or exceeds all of the criteria and information requirements enumerated in the Call for Applications.

The plan described by Ciel for the implementation of a satellite network at 113°W provides many important benefits to Canadians, particularly by satisfying Canadian requirements for satellite capacity and services, and in securing Canadian access to orbital resources. Ciel has provided information in Section 3 and throughout this Application demonstrating how the implementation of Ciel's plans will deliver these and other benefits, including Ciel's undertaking to dedicate two percent of adjusted gross annual revenues resulting from the operation of Ciel-8 towards special initiatives aimed at improving connectivity in underserved areas of Canada. Ciel has also committed to reserving 100% of the capacity on Ciel-8 for Canadian use.

Ciel's financial commitment to the project, and Ciel's ability to finance implementation of the Ciel proposal is clearly demonstrated by the detailed financial model provided, and the financial support promised by Ciel's shareholders.

The technical plan provided in Section 6 provides detailed information describing the technical aspects of Ciel's proposed operational plan, and clearly demonstrates that the proposed deployment and operation of the interim facilities and Ciel-8 are technically feasible.

The success of the Ciel-2 program shows the technical, operational and institutional competencies that Ciel has built in its first five years of operation.

Canadian satellite users seek choice, quality and innovative services in order to sustain and grow their businesses. These fundamentals define Ciel's approach to the Canadian broadcast sector. Ciel's presence as a Canadian satellite operator enhances the level of competition in the Canadian market and provides customers a choice among potential suppliers. The award to

Ciel of a licence in the 17 GHz BSS at the 113°W orbital position would support the continued sustainable growth of the Canadian satellite industry.

The person who can be contacted regarding this Application is:

Scott Gibson

Vice President & General Counsel

Ciel Satellite Limited Partnership

240 Terence Matthews Crescent,

Kanata, Ontario, Canada

K4M 2C4

tel. (613) 599-4400

[scott.gibson@cielsatellite.ca](mailto:scott.gibson@cielsatellite.ca)

