In late September, Aireon announced its intention to provide a free global aircraft tracking service to the aviation industry. Using its new space based ADS-B surveillance system, the company will provide location data for aircraft in emergency situations. Starting in late 2017 when the full constellation of satellites is complete, Aireon Aircraft Locating and Emergency Response Tracking (Aireon ALERT) service, will allow rescue agencies anywhere in the world to request the location and last flight track of any 1090 MHz ADS-B equipped aircraft. The Aireon ALERT service will be available soon after Aireon’s full deployment and will be provided through a 24/7 application and emergency call center. Track data will be available to pre-authorized users, including ANSPs, airlines and search and rescue authorities, soon after controller communications are lost with an aircraft, and the system can also provide real-time tracking of aircraft in distress, provided ADS-B transmissions are still operational.

“Airlines already stand to gain over $125 million per year in fuel savings in the North Atlantic alone by using Aireon’s space-based surveillance service. The Aireon ALERT public service offers an additional benefit, free of charge, ensuring that ADS-B equipped aircraft can be tracked anywhere in the world, even in airspace managed by ANSPs that have not subscribed to the Aireon service,” said John Crichton, President and CEO. Aireon is a joint venture among Iridium Communications Inc., NAV CANADA, ENAV, IAA, and Naviair. The company was established to provide global aircraft surveillance by hosting ADS-B receiver payloads on Iridium NEXT, Iridium’s second-generation satellite constellation. This new capability will extend air traffic surveillance to the entire planet and offers significant opportunity to increase the safety and efficiency of air travel over oceanic and remote regions.

For more information about the Aireon ALERT service, please go to http://www.aireon.com/Solutions/AlertServices
President’s Point of View

In September 2014, NAV CANADA marked an important milestone, quietly celebrating our 10th year without a general increase in charges for air navigation services. In fact, from 2004-2014, NAV CANADA charges were actually reduced twice (see chart).

Today, our charges are only five percentage points higher than when they were introduced in March 1999. Over that longer 15-year period, they have tracked below the compounded rate of inflation by 33 per cent - delivering significant value to our customers in a business where margins remain tight and the cost picture often volatile.

This is a significant accomplishment, one for which all our employees deserve the credit.

What’s more, we have achieved this while transforming air navigation services provision for the better:

› realizing material improvements in key safety benchmarks;
› modernizing virtually every aspect of the Canadian civil air navigation system, with new equipment, facilities and world-leading air traffic management technology;
› expanding important services that deliver value to customers, from 4 million kilometers of new radar and ADS-B surveillance coverage with resulting fuel and GHG emission savings, to a major upgrade in the provision of aviation weather services and information; and

› pushing the boundaries of technology, procedures and service delivery, from fuel-efficient polar routes, to GAATS+ and many other new capabilities in the North Atlantic, to our Aireon project that promises to deliver a quantum leap in flight efficiency through space-based ADS-B.

While NAV CANADA was holding the line on rates, the economies of the western world were experiencing a difficult recession from which many have yet to emerge. Not only did we experience this directly in reduced traffic levels, and revenue, but our customers also continued to deal with global uncertainty and volatility which included dealing with price increases from many other service providers in the aviation industry.

When it comes to service charges, our commitment is to stay the course. And now that traffic is growing at a pace we haven’t seen since before the recession, we will continue to invest in technology that allows us to safely handle increasing volumes without increasing costs, while making targeted investments in those things that improve operational efficiency for our customers.

We will also continue seeking out alternative sources of revenue, such as in the success we have found selling technology solutions to other ANS organizations around the world, most recently in Italy, and in the business prospects associated with the Aireon project, for ourselves and our customers.

In a word, achieving 10 years without a service charge increase is only the beginning. There’s much more that can and will be done to add value for our customers in the months and years ahead.
NAV CANADA recently released its annual report outlining progress in the effort to reduce the aviation industry's impact on the environment through improved air navigation services. The 2014 edition of CIFER profiles numerous measures designed to reduce fuel burn and lessen associated greenhouse gas (GHG) emissions.

"Working co-operatively with our airline customers and other industry partners, our efforts resulted in fuel cost savings of over $500 million and an associated GHG emissions reduction of 1.3 million metric tons in 2013 alone," said John Crichton, NAV CANADA President & CEO.

"The reduction and projected reductions in GHG emissions from 1997 to 2020 is an estimated 21 million tonnes with the attendant fuel cost savings of $7.4 billion achieved and forecast."

This year’s Report spotlights several initiatives that are making a significant impact.

Among these is the Gander Oceanic Flight Level Initiative (GO-FLI), where controllers are proactively offering customers access to higher, more fuel efficient altitudes over the North Atlantic.

Some initiatives have been around for a few more years but are still delivering significant opportunities for fuel savings and reductions in GHGs. For example, the publishing of new RNAV procedures – which provides better point-to-point operations, increased opportunity for more efficient enroute and airport operations, and reduced fuel burn - will result in a cumulative savings of $598 million in fuel costs and a reduction of 2.1 million tonnes of GHGs between program start and 2020.

There are currently more than 900 RNAV instrument procedures published in Canada, with a further 300 currently in development.

To learn more about initiatives that NAV CANADA is undertaking to reduce fuel burn and the industry’s environmental footprint, access the full CIFER report at www.navcanada.ca/cifer.

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**Above and Beyond:**

**Edmonton Route Optimization**

One of the programs described in CIFER would be possible without the combination of a sincere desire to collaborate with customers and an employee culture that encourages constant improvement. The Edmonton Route Optimization initiative is a case in point.

In northern Canadian airspace there remain large areas without air traffic control surveillance. Until recently, customers exiting the North Atlantic for destinations in western North America were required to file flight plans on pre-established tracks called the NOR OTS when overflying this area. In December 2013, NAV CANADA stopped publishing the NOR OTS, instead allowing customers to file individualized User Preferred Routes (UPR).

Operational personnel in the Edmonton Area Control Centre noticed inefficiencies in many of the routes filed by customers in its airspace once the NOR OTS were removed. Operational staff undertook the initiative to work proactively with customers that were regularly flying Europe-North American as well as Asia-North American routes to help build UPR that were more optimized.

These new routes, built collaboratively with customers, reduce flight distances and flight times, resulting in lower greenhouse gas emissions. For some Asian-U.S. routes, customers report reductions of over 25 miles and up to 5 minutes of flying time.
Enhancing aviation weather services

NAV CANADA is increasing the availability of aviation weather information across Canada, but particularly at small airports. A program that began in 2008 has seen the installation of new, more reliable automated weather observation system (AWOS), the expansion of weather cameras and, recently, the addition of a Limited Weather Information System (LWIS) feature to the existing Human Weather Observation System (HWOS).

Expanded availability of key weather information
NAV CANADA was in the process of replacing the weather observation systems used where we have a staffed weather observation program, (either an FSS, CARS or contract weather office), when the company began to explore the potential of adding a LWIS feature to make key weather data available 24/7.

The LWIS feature provides wind, temperature, dew point and altimeter collected automatically at any site that has part-time staffed weather observation program outside of published hours and in the case a weather observer is not available.

“This is a significant, cost effective enhancement to the level of service at many aerodromes, including many that are located in the North,” says Rudy Kellar, Executive Vice President, Service Delivery. “The increased availability of essential weather information will allow customers to use an IFR approach procedure – which requires an altimeter reading – over a VFR procedure.”

By leveraging the Observation Data Exchange system (ODEX) – which collects and processes meteorological data from a suite of weather sensors at the airport and then outputs it to other systems – NAV CANADA is able to make this information available to NAV CANADA personnel at Flight Information Centres and Area Control.

Managing the Unexpected: Traffic Management Units work to reduce delays and the domino effect of weather, outages

NAV CANADA air traffic controllers keep aircraft moving safely and efficiently, sequencing traffic to keep it all moving smoothly.

But what happens when the plan for the day gets thrown off course by uncontrollable events such as a snowstorm, power outage or equipment failure?

It’s the work of NAV CANADA’s two Traffic Management Units (TMUs) – a western unit in Vancouver and an eastern unit in Toronto – to minimize delays and impacts on customers.

“On a daily basis, we work to keep traffic flows moving as optimally as possible by managing the parts of the air navigation system we can control against those aspects we can’t,” says Dawn Whyte, Manager of TMU West. “It can be both strategic and tactical depending on the nature of the event, the number of customers involved or the size of the geography affected.”

Simple to complex solutions
A relatively simple and common example would be when weather conditions require an increase in snow clearing work by airport crews, making sure that runway surfaces are safe to land on but potentially impacting capacity.

“A small reduction in capacity – say a decrease in the landing rate from 44 to 36 per hour during peak time at a busy airport such as Vancouver International – can be managed by providing relatively subtle air traffic control instructions,” says Whyte.

It can be as simple as asking a few aircraft to reduce their speed by 20 or 30 knots for the last 30 minutes of their flight prior to entering
terminal airspace, allowing for better sequencing.

“From a customer perspective, this is more efficient than having them fly in a holding pattern at a lower altitude. For the passenger, it is usually invisible.”

**Managing the Unexpected, Expectations**

Whyte explains that these air delays are generally used first, but that ground delays are also an option. These are less preferable because of their impact on customer and airport operations, but may be used when demand outweighs capacity for an extended period of time in order to maintain safety.

“Collaborative decision making with customers and airports is at the core of TMU’s operation; this becomes even more crucial when implementing a program of this nature,” says Whyte. “We want to make sure that all parties are informed and that they have a chance to provide feedback on their respective operations.

“Significant delays at a major airport can have a domino effect so our joint goal is to minimize the effect on the system, customers and the flying public so that we can get things back to normal as quickly as possible.”

**A day at the TMU**

A typical day at the TMU starts with a conversation with the Area Control Centre (ACC) shift manager to find out what the anticipated arrival rates will be at key airports. It can vary from hour to hour, due to issues such as, but not exclusive to, flight checks, airport construction, weather or unforeseen occurrences (e.g. an aircraft emergency that results in a closed runway).

Once advised of the rate, the TMU is responsible for metering the demand to not exceed that rate.

The team uses a system called the Flight Schedule Monitor to stay on top of traffic flows. The Flight Schedule Monitor (FSM) compiles scheduled flight information and flight plans from the ACCs to calculate and then display graphically the known demand for arrivals/departures at airports.

This allows TMU specialists to see the big picture, looking into traffic volumes over the next several hours while anticipating adjustments in order to respond to changes at a local level.

TMU staff from the East and West units liaise with customers and other stakeholders on three daily teleconferences, with more scheduled if traffic flow conditions are changing rapidly.

While NAV CANADA’s National Operations Centre previously handled some tasks such as Ground Delay and Ground Stop Programs, “the TMU brings traffic flow planning to the right operational level by putting tactical activities under the same roof as collaboration and liaison activities,” says Whyte.

“That means more transparency and better results because customers can plan their operations around the challenges and opportunities as they emerge.”

**TMU West is responsible for:**

- Vancouver FIR
- Edmonton FIR
- Winnipeg FIR

**TMU East is responsible for:**

- Toronto FIR
- Montreal FIR
- Moncton FIR
- Gander FIR

The following table shows the number of Ground Delay Programs planned using the Flight Schedule Monitor at the country’s busiest airports for the past two calendar years:

<table>
<thead>
<tr>
<th>Airport</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montreal</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Toronto</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Calgary</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Vancouver</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: These figures do not include customer requested times and delays using minutes or miles in trail. The most frequent cause of GS and GDP is significant weather phenomena.
The third NAT Operational Forum convened in Montreal in October, with more participants than ever before, a broader range of presenters, and a new format to facilitate discussion and interaction.

Sponsored and organized by NAV CANADA, the two-day event drew close to 90 participants from the full spectrum of stakeholders in North Atlantic (NAT) oceanic airspace: commercial airlines, air cargo operators, air navigation service providers, regulatory authorities, industry associations, aviation suppliers, and – new this year – academic institutions conducting aviation research.

Larry Lachance, Vice President, Operations, commended participants on their “passionate and direct discussions” throughout the two-day event.

“We had the right experts in the room and there was excellent participation,” he said. He also congratulated the steering committee for “being bold enough to change the format” – a move that obviously brought the intended results.

Said Rob Thurgur, Assistant Vice President, Operational Support in his opening remarks:

“Bringing together the operational leaders responsible for the North Atlantic traffic flows promotes a collective appreciation of the best ways to progress the operation – both from a safety and an efficiency perspective. And we share a common interest: 400,000 transatlantic flights a year.”

There are exciting developments taking place in the NAT, with new technologies and initiatives that increase safety, capacity, flexibility and efficiency. But this forum was not – nor was it intended to be – a mere show-and-tell exercise. It was a frank and candid exchange of information, a place in which to raise and debate issues, and to agree on follow-up actions.

With change comes questions – about measuring benefits; equipage rates and timing, modifications to procedures, and whether things are being communicated properly.

To emphasize the importance of communication, this was called the North Atlantic Forum on Communication. In particular, participants looked at:

› the way controllers and pilots communicate with each other;
› how airline operators communicate to the ANSPs about what they want to do;
› how the ANSPs communicate with operators about what it is possible to do; and
› what gets communicated, when and how.

Over the two days of the Forum, a number of roundtable and panel discussions were held on topics and trends related to NAT airspace. The agenda included:

› an update on NAT initiatives by NAV CANADA;
› a panel with members from Gander, New York and Prestwick oceanic centres, American Airlines and United Airlines, which examined the issue of NAT track changes and re-routes;
› representatives from Reykjavik Area and Oceanic Control Centre, Delta Air Lines and American Airlines, reviewing Isavia’s new volcanic ash contingency plan;
› a round table discussion on how best to quantify the potential operational benefits of satellite-based ADS-B, led by a representative from MIT;
› an update on phased implementation plans for deploying space-based ADS-B in the NAT;
› a representative from Purdue University, leading a round table discussion on overcoming barriers to adopting and implementing operational improvements;
› representatives from American Airlines, Delta Air Lines, United Airlines, and the International Federation of Airline Pilots’ Associations, leading a discussion on flight crew management of coordinates in the FMS; and
› representatives from the New York ARTCC discussing issues surrounding how airlines convey aircraft capabilities in the flight plan;

All in all, 86 stakeholder representatives participated in the third NAT Operational Forum.
Electronic CFS coming soon

With the increase in demand for electronic aeronautical publications, NAV CANADA has been phasing in various charts and publications to a digital format as well as working with established partners to make them available on popular platforms.

The newest addition to this mix will be the Canada Flight Supplement (CFS) which will be made available in PDF format as of January 8, 2015.

In addition to benefits for customers such as no shipping charges and reduced paper waste compared to printed version, the electronic CFS (eCFS) will be divided into regions similar to the Canada Air Pilot as follows:

- eCFS 1 – Yukon, Northwest Territories and Nunavut
- eCFS 2 – British Columbia
- eCFS 3 – Alberta, Saskatchewan and Manitoba
- eCFS 4 – Ontario
- eCFS 5 – Quebec (English)
- eCFS 6 – Quebec (French)
- eCFS 7 – Atlantic Provinces

The eCFS General section will be included with all regions.

With the eCFS available in volumes, customers will be able to purchase only those volumes they require, which can result in savings for those who do not require the complete CFS. Each volume of the eCFS will be available at a price of $16.50 for a seven-cycle subscription.

WHEN PRECISION COUNTS

By Anthony MacKay, Director, Flight Operations

Note: This article is part of a recurring feature called Pilot’s Corner by NAV CANADA’s Director of Flight Operations Anthony MacKay.

As a Regional Airline pilot prior to coming to NAV CANADA, I always found the economics of technology in our aircraft a challenge.

The aircraft needed to be equipped for flying into the major hubs in Canada and the US as well as the smaller airports at the ends of the spokes. While many of the smaller airports had an ILS to the main runway, some did not and the secondary runways at the smaller airports were usually served with non-precision approaches only.

Shorter runways, minimal required lighting combined with six to eight leg flight days and Canadian winters definitely meant you were earning your money.

We did it safely, and that attention to safety meant that sometimes you didn’t land off the approach, sometimes you could see the runway but the aircraft wasn’t in a position to land, and sometimes you just cancelled the flight and waited for better weather.

This led to irregular operations or IRROPS that took unbudgeted cash away from the bottom line. Schedule integrity suffered, passengers suffered and for smaller communities that relied on air service for food and mail, the entire community suffered. A technological solution that would be effective for regional and general aviation aircraft was needed.

LPV

One technology that has gained traction in recent years is LPV or Localizer Performance with Vertical Guidance. It is a version of RNAV that uses WAAS (Wide Area Augmentation System) corrections to provide higher integrity and continuity values than raw GPS. It brings a level of accuracy into the vertical element of an approach that rivals glideslope information on an ILS.

This technology is readily available today from RNAV/FMS/GPS manufacturers that provide equipment for regional and general aviation aircraft. Garmin, Universal Avionics and Rockwell Collins all have WAAS GPS solutions for retrofit and forward fit across many different aircraft platforms.

Operationally, an LPV approach is very much like an ILS. The lateral track guidance in the final approach segment provides angular displacement sensitivity just like a localizer. The vertical track guidance in the final approach segment provides angular displacement just like the ILS glideslope.

For the pilot, the approach is loaded in the FMS/GPS like any standard GNSS procedure and the guidance is flown from an aircraft-handling prospective just like an ILS. Pilot training is not difficult and for commercial operators that hold a current OPS SPEC 100, no additional ops specs are required from Transport Canada.

Transport Canada’s new OPS SPEC 620, RNP APCH is a replacement for OPS SPEC 100 and includes LNAV, LNAV/VNAV and LPV approach operations. Details on the

Continued on Page 8 ➔
WHEN PRECISION COUNTS (cont. from pg. 7)

new ops spec can be found in Transport Canada AC 700-023.

The real benefit of LPV, however, is that the approach is designed with different criteria considerations than an LNAV or LNAV/ VNAV procedure by assessing a much smaller lateral area for obstacles and a much smaller vertical area for obstacles in the final approach segment. With the smaller assessment area come lower minima and precise lateral and vertical guidance that deliver the aircraft to a position to land off a stabilized approach.

Exclusive of obstacles, the best possible LPV minima to a precision runway is 200’ AGL; just like an ILS. The best possible minima to a non-precision runway exclusive of obstacles is 250’ AGL.

Using Thompson Manitoba as an example, new approaches were just flight checked (soon to be published) that have the following RNAV minima:

- LPV 06 200’ AGL
- LNAV 06 483’ AGL
- LPV 24 250’ AGL
- LNAV 24 464’ AGL

The LPV 06 has a 283’ minima advantage over the LNAV 06 procedure and the LPV 24 has a 214’ minima advantage over the LNAV 24 procedure.

The difference in minima is due to the increased integrity of the LPV procedure and the difference in the areas assessed for obstacles between procedures.

Figure 1 at right shows the area assessed for the LNAV 06 procedure in Thompson that captures terrain at 910’ to the east of the approach centreline within the primary assessment area. Figure 2 shows the smaller area required to be assessed for the LPV procedure that allows exclusion of the problematic terrain.

With LPV, it is now possible to have ILS-like guidance to many additional runway ends throughout Canada. With this guidance comes better operator schedule integrity, reduced IRRIPs and less dependence on ILS glidepath signals that can become inoperative during snowstorms due to excess snow buildup in the glidepath beam forming area.

An additional benefit to having WAAS incorporated into the FMS/GPS navigation solution is that vertical guidance can be generated on a LNAV procedure. This is different than the BARO-VNAV that is used on larger aircraft.

BARO-VNAV is subject to cold weather temperature effects as the vertical angle to be flown is generated electronically from the barometric altimeter. When the WAAS generates a vertical path on an LNAV procedure, it is displayed to the pilot as an L/V procedure instead of a GPS APCH or LNAV. When the L/V is displayed, the FMS/GPS generates WAAS vertical guidance that is a calculated geometric path, and therefore not affected by temperature. Minima still require temperature correction but the vertical angle on the final approach will not be lowered due to temperature.

LPV procedures offer regional and general aviation aircraft ILS-like approaches to additional runway ends at a fraction of the cost of an ILS. While some aircraft component changes tout safety benefits or operational benefits, the LPV approach capability enabled by WAAS inputs to the FMS/GPS truly generates both.

The pilots on the line get precision-like guidance to runway ends where that capability did not previously exist and, in the case of commercial operations, operators can receive higher schedule integrity and lower operating costs. It is a win for all concerned.

For a video on the benefits of LPV (WAAS) based approaches follow the link below. The video contains comments from smaller American carriers that are directly applicable to Canadian operations.

http://www.faa.gov/tv/?mediaid=730

Enriching aviation weather services (cont. from pg. 5)

Centres, as well as to customers via the Aviation Weather Web Site (AWWS). The LWIS-produced weather information is updated hourly, and in the event that the weather observer is unavailable at a scheduled time, ODEX will continue to produce reports.

“We heard from our customers, industry partners such as the Northern Air Transport Association and territorial governments that there was a need for an increase in the hours of weather observations since, without 24-hour weather, certain aircraft operations were at times restricted due to the inability to utilize an IFR approach,” says Kellar. “LWIS significantly improves access for those customers, many of which are medevac operators, operating outside of the published hours.”

The LWIS feature will provide 24/7 availability of wind, temperature, dew point and altimeter at 63 locations with part-time weather observation programs. To date, 38 of the new systems are operational and either published in aeronautical publications or available via NOTAM. The remaining 25 sites will go operational in early 2015.

WX Cams allow pilots and dispatchers to look for themselves

Weather cameras have become a highly valued tool for pilots flying to smaller airports. They enable a pilot to check a high resolution image that is updated every 10 minutes. With the aid of distance and height reference markers that can be overlaid on the latest image, these pictures can provide valuable information to aid in decision making and flight planning.

What was a small network of cameras at 22 locations in 2008 has spread to over 150 locations today, with plans to do even more in the next three years.

“We understand that weather can be the most challenging aspect of air operations in Canada. While we can’t improve the weather, we are working to ensure that our customers have access to the weather information they need for their own operations” said Rudy.