

February 2023

# 100 KNOTS

India's  
Aviation  
Ecosystem

## Technology

Space Based ADS-B

## Innovation

Simplifying NOTAMs

## Safety

Airport Rescue  
& Fire Fighting

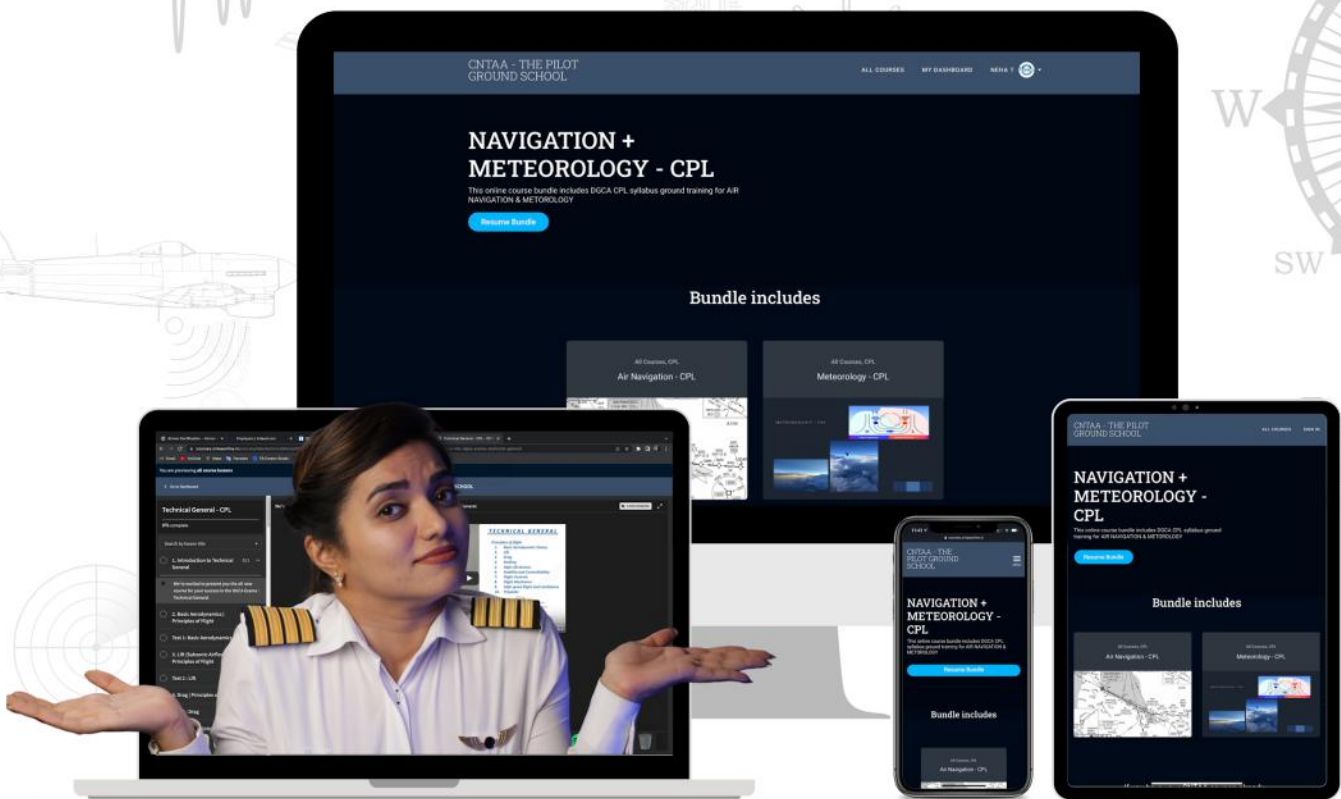
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# EDITORIAL DESK



**Preet Palash**  
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Dear Colleagues,

Welcome to the February 2023 issue of the 100 Knots Magazine.

In this issue, Arun Kumar Singh, the founding CEO & Accountable Manager of India's newest airline, IndiaOne Air talks about how RCS UDAN scheme is transforming domestic connectivity and what to expect in the coming years. K G Suresh Kumar, Fire Chief at Kannur International Airport talks about the importance of Airport Rescue and Fire Fighting (ARFF), and briefly takes us through their organization, duties and structure. Air India Captain Ghani Khan takes us through his beautiful journey of Masai Mara and explains why it needs to be there on everyone's bucket list. 100 Knots correspondent, Sakshi Jain talks about the recently launched Space-based ADS-B technology and the future of air surveillance. And lastly we have Air Traffic Management expert, Leon Prusak, from CGH technologies taking us through their latest product Falcon vNOTAM and explains how it can enhance situational awareness and enable more effective decision making.

As always, Contributions, comments, and feedback are always welcome. All papers are received with a high degree of enthusiasm and will find a home in future issues.

Our sincere thanks to all the contributors for their support and interest.

We hope to hear from you soon!

Happy Reading and Happy New Year

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# Table of Contents

08

**Airport Rescue and Fire Fighting**

*K G Suresh Kumar*

18

**Space Based ADS-B**

*Sakshi Jain*

24

**Regional Connectivity Scheme**

**RCS UDAN**

*Arun Kumar Singh*

30

**Masai Mara**

*Ghani Khan*

42

**Simplifying NOTAMs**

*Leon Prusak*

# Airport Rescue & Fire Fighting

ARFF



**K G Suresh Kumar**  
Fire Chief  
Kannur International Airport







© Matt C

Rescue and Fire Fighting Services (RFFS) also commonly referred to as Aircraft Rescue and Fire Fighting (ARFF), is a rescue and firefighting services provided at an aerodrome, specifically dedicated to support the safety in aircraft operation. This special category of fire-fighting involves incident response, hazard mitigation, evacuation and possible rescue of passengers and crew of an aircraft involved in an aerodrome (or potentially off aerodrome) ground emergency.

An aircraft fire presents unique challenges. The major hazard in a crashed aircraft is the fuel. The Jet A1 fuel used by almost all aircrafts is highly volatile in its vapor stage. With a Flashpoint of just 38 C and flame spread of 30mts/minute means it will take just few seconds for a small onboard fire to develop into a raging inferno with mass casualty potential. This calls for a Fire service which can not only reach the crash site in a jiffy but also bring with it an effective and sufficient extinguishing media operated by highly trained personnel. Their arrival and initial mission to secure the aircraft against all hazards, particularly fire, increases the survivability of the passengers and crew on board.

Airport firefighters have advanced training in the application of firefighting foams, dry chemical and clean agents used to extinguish burning aviation fuel in order to maintain a path for evacuating passengers to exit the fire hazard area. Further, should fire either be encountered in the cabin or extend there from an external fire, the ARFF responders must work to control/extinguish these fires as well. Subsequent to the emergency being declared under control, the ARFF function reverts to one of protecting the scene, eliminating any peripheral or slowly evolving hazards and assisting to preserve the scene for investigators.

Airports with scheduled passenger flights are obliged to have firefighters and firefighting apparatus on location ready for duty any time aircraft operate. In India, Airport Rescue and Fire Fighting (ARFF) services are provided at all 100 domestic and 24 international airports as per DGCA.

## Regulations

The International Civil Aviation Organization (ICAO) defines the requirements for RFFS in Annex 14, Volume 1 - Aerodrome Design and Operations. ICAO Document 9137-AN/898, Airport Services Manual, Part 1, Rescue and Fire Fighting provides guidance in the implementation of the Annex 14 requirements thereby helping to ensure uniform application amongst the Member States. The DGCA in India also publishes the corresponding regulations in CAR section-4, Aerodrome Standards & Licensing, Series 'B', Part 1.

## Response Time

As mentioned earlier, an aircraft fire to develop into a fully involved fire takes about 2 to 3 minutes. Study of past incidents have found that a human, sitting inside a fully involved aircraft fire would survive only for about 138 seconds, exceeding which would lead to death due to smoke inhalation containing toxic elements. So, the speed at which the responding CFTs reach the crash site is of paramount importance. ICAO has formulated a response time for the first responding CFT to reach the crash site and start fighting fire within 2 minutes but not exceeding 3 minutes. At large aerodromes, this often means that more than one fire station will be necessary.

This is met easily by the modern firefighting vehicles available now at almost all airports, in fact most of the modern vehicles exceed the requirement. All these vehicles weigh in the range of 40 to 45 tons fully loaded and attain 0-80KMs in under 30 seconds.





**Fire Fighting**

ARFF team provides requisite Level of Fire Protection for aircraft operations, as well as fire prevention & protection for Airport terminal building and other vital Installations. Regular full scale, partial and tabletop practice emergency exercise and building evacuation drill are also conducted to maintain proficiency.

## Responsibilities

### Emergency Medical Services



The number one call that airport rescue services handle is for Emergency Medical Services (EMS). This is when an aircraft makes an unscheduled landing due to a medical emergency on board. Airport ambulance crews also typically depart from the airside fire stations, and on the site, they follow the orders of the ARFF incident commander. Many airport firefighters have also cross-trained as paramedics.

### Celebratory Salutes



Meanwhile, airport firefighters also have more celebratory tasks. When a new aircraft arrives with an airline, it is often greeted with a water cannon salute. That is done by one or two firefighting vehicles lined up on either side of the aircraft, expelling plumes of water over the plane.

Airport firefighters, not surprisingly, also deal with potential fires in the airport's structure itself. They deal with hazardous spills that may occur throughout operations, as well as monitor refueling. They are also assigned to conduct routine runway checks at some airports

### Airport Inspection



© Terence Burke

# Classification

The methodology for setting up rescue and firefighting service at an aerodrome is based on the critical area concept, where, in a crashed aircraft the critical area i.e., the fuselage has to be protected in any post-accident fire situation with the objective of creating and maintaining survivable conditions, providing escape routes for the occupants and to initiate the rescue of those occupants who are trapped inside the aircraft. To meet the requirements, it is necessary for the aerodrome to have a declared minimum firefighting capacity measured on the basis of the number of available vehicles and their foam production capability.

The setting up of ARFF services is guided by the level of protection to be provided at an airport which is based on the dimensions of the aircraft normally using the airport. This is expressed in terms of Airport category from 1 to 10. ICAO defines ten airport categories and specifies the minimum amount of water, dry chemical powders (or “other complementary agents having equivalent firefighting capability”) and discharge rates of the crash tenders for each case.

Aerodrome Category (ICAO Index)	Min Number of Rescue and Fire Fighting Vehicles	Airplane Length [m]	Max Fuselage Width [m]	Water [L]			Foam Solution Discharge Rate [L/min]			Complementary Agents [kg]
				Performance Level A	Performance Level B	Performance Level C	Performance Level A	Performance Level B	Performance Level C	
				1	1	0 < L < 9	<2	350	230	
2	1	9 ≤ L < 12	<2	1,000	670	460	800	550	360	90
3	1	12 ≤ L < 18	<3	1,800	1,200	820	1,300	900	630	135
4	1	18 ≤ L < 24	<4	3,600	2,400	1,700	2,600	1,800	1,100	135
5	1	24 ≤ L < 28	<4	8,100	5,400	3,900	4,500	3,000	2,200	180
6	2	28 ≤ L < 39	<5	11,800	7,900	5,800	6,000	4,000	2,900	225
7	2	39 ≤ L < 49	<5	18,200	12,100	8,800	7,900	5,300	3,800	225
8	3	49 ≤ L < 61	<7	27,300	18,200	12,800	10,800	7,200	5,100	450
9	3	61 ≤ L < 76	<7	36,400	24,300	17,100	13,500	9,000	6,300	450
10	3	76 ≤ L < 90	<8	48,200	32,300	22,800	16,600	11,200	7,900	450

The FAA calculates the ARFF index (five possible indexes) by considering the length of aircraft and the average daily departures of aircraft. “If there are five or more average daily departures of aircraft in a single index group serving that airport, the

longest aircraft with an average of five or more daily departures determines the Index required for the airport. When there are fewer than five average daily departures of the longest air carrier aircraft serving the airport, the Index required will be the next lower Index group than the Index group prescribed for the longest aircraft”. In other words, it says that at least five departures a day are needed for the biggest aircraft to affect the index category.

Aerodrome Category (ICAO)	Airport Index (FAA)	Airplane Length [m]	Min Number of Vehicles
1	A	0 < L < 9	1
2		9 ≤ L < 12	
3		12 ≤ L < 18	
4		18 ≤ L < 24	
5		24 ≤ L < 28	
6	B	28 ≤ L < 39	2 (FAA 1-2)
7	C	39 ≤ L < 49	2 (FAA 2-3)
8	D	49 ≤ L < 61	3
9	E	61 ≤ L < 76	3
10		76 ≤ L < 90	

## Downgrade

Prior to 2005 the number of aircraft movements was considered and the airport’s RFFS category could be downgraded to two categories below if there were not many movements of

the largest aircraft during the three busiest consecutive months. Nowadays “during anticipated periods of reduced activity, the level of protection available shall be no less than that needed for the highest category of airplane planned to use the aerodrome during that time, irrespective of the number of movements”. After all, it would be possible to downgrade the category just one level.

# Fire Fighting Apparatus

## Fleet

Specialized fire apparatus is required for the ARFF function, the design of which is predicated on many factors but primarily: speed, water-carrying capacity, off-road performance and agent discharge rates. Since an accident could occur anywhere on or off airport property, sufficient water and other agents must be carried to contain the fire to allow for the best possibility of extinguishment, maximum possibility for evacuation and/or until additional resources arrive on the scene. The vehicles operated by airport rescue services are usually a fleet (numbers depending on the airport's ARFF category) of large high-volume pumping vehicles.

Most airport fire vehicles are equipped with a roof-mounted cannon or nozzle which can shoot fire extinguishing agent's large distances. Newer vehicles often are equipped with the nozzle mounted on an extendable boom and are also often fitted with a spike that can pierce the fuselage of an aircraft. This allows delivery of water or foam to the interior of an aircraft. It also has an infrared camera attached. This way, the airport firefighters can fight the flames without having to set foot inside the plane.

Minimum number of vehicles required (The actual number of vehicles deployed may be higher to meet the 3-minute response time to the furthest runway end point)

ICAO/NFPA Airport Category	FAA Airport Index	Vehicles			Example Aircraft
		ICAO	FAA	NFPA	
4	A	1	1	1	DHC-8-100
5	A	1	1	2	ATR-72
6	B	2	1 - 2	2	B-737-300; Emb-145
7	C	2	2 - 3	3	B-757
8	D	3	3	3	A300; B-767-300
9	E	3	3	4	B-747-200; A340-400
10	E	3		4	AN-225; A380

## Firefighting Agent

To extinguish a jet fuel fire, the primary extinguishing agent used is the Foam which cools the fire and coats the fuel, preventing its contact with oxygen, thus achieving suppression of the combustion. Foam is made of foam compound containing surfactants, foam stabilizers (e.g., lauryl alcohol), corrosion inhibitors and water. The Foam used to extinguish Jet Fuel fire is the Aqueous Film Forming Foam (AFFF) which constitutes a major part of extinguishing media carried in a Crash Fire Tender (CFT).

Other firefighting agents are:

- Sodium-based dry chemical
- Potassium-based dry chemical
- Halogenated (gaseous clean agents)
- Water/AFFF






## Personal Protective Equipment (PPE)

Burning fuels generate intense radiant heat. Firefighters wear a protective ensemble referred to as a 'fire proximity suit' that is coated with a silvered material designed to reflect heat away from their bodies. They must also wear self-contained breathing apparatus to provide a source of breathable air allowing them to work in an environment of smoke and other super-heated gases.

# Training

Airport fire services go through extensive training in applying firefighting foams and chemicals, especially suitable for extinguishing burning aviation fuels.

ICAO Annex 14 directs that “All rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and type of firefighting equipment in use at their aerodrome, including pressure-fed fuel fires”. It further states that the training curriculum should include initial and recurrent instruction in at least the following areas:

 <p>Airport and Aircraft familiarization</p>	 <p>Personnel safety</p>	 <p>Emergency communication systems</p>	 <p>Use of the fire hoses, nozzles, turrets, etc</p>
 <p>Application of extinguishing agents</p>	 <p>Emergency aircraft evacuation</p>	 <p>Firefighting operations</p>	 <p>Dangerous goods</p>
 <p>Aerodrome emergency plan</p>	 <p>Protective clothing and respiratory protection</p>	<p>The Firefighters have to be medically and physically fit throughout their career to perform strenuous tasks over a period of extended operations in case of an accident. This is achieved by a daily training schedule consisting of both aerobic and anaerobic exercises. Apart from the physical training, firefighters undergo technical training, operation of the CFT and the rescue equipment onboard the CFTs.</p>	

## Airport Emergency Plan (AEP)

To deal with an incident involving mass casualties ARFF has to work closely with other agencies within the airport and the civil administration as laid out in the Airport Emergency Plan. As mandated by ICAO, to test the efficacy of the Airport Emergency plan, a well-organized exercise is carried out once in two years in the airport involving all agencies in the airport, the civil administration and other agencies. This emergency plan is closely associated with the state’s Disaster Management Plan.



# ARFF Structure in India



Airport Crash Fire Tender



Ambulance



Mobile Command Post



Rescue Stairs

In India, ARFF is set up by the Company operating the airport. The team is led by an experienced Fire chief who is generally supported by a training manager, Operations manager and Administration manager. The Fire chief has two wings, the Operations and Fire Prevention under him.

## Fire Prevention Wing

Responsible for the Preventive plan and protection of all buildings in the airport. They ensure the Fire protection system in the buildings are serviceable and also educate the occupants in Basic Fire Safety.

## Training

The Firefighters are initially trained in ICAO recognized Airport Authority of India run fire training centers and further training (CPD) is imparted throughout their career at station level to maintain their competencies.

AAI Fire Services is managing two fire training establishments:  
 Fire Training Centre (FTC), New Delhi and  
 Fire Service Training Centre (FSTC), Kolkata

## Operation Wing

Manned as per the operational hours of the airport. It is led by the Duty Manager and has Driver Operators and Firefighters reporting to him. He has under him number of CFTs as per the Airport RFFS category, Fire jeep or Rapid Intervention Vehicle (RIV), Mobile Command Post (MCP) and ambulances.

## Ambulance

The ambulance is generally outsourced but positioned along with the CFTs. The Ambulances have recommended medicines and trained Doctors and Paramedic to meet any eventuality.



# About the Author

K G Suresh Kumar is the Fire Chief at Kannur International Airport, Kerala since 2021. An Aviation Firefighting and Rescue professional with over 30 years of rich experience in military and civil airports, he has trained from premier training centers like the International Fire Training Centre, United Kingdom and Fire Training Centre, India. Having worked in Afghanistan in the NATO base of Kandahar and Mazar-E-Sherif he brings with him international best practices in aviation firefighting. He is also an ICAO certified Trainer and Auditor for Health and Safety. Suresh started his career in the Indian Air Force serving the country for 20 years followed by stints in Bangalore International Airport and Afghanistan for G3 systems, UK. At present he is leading the ARFF team at Kannur International Airport.







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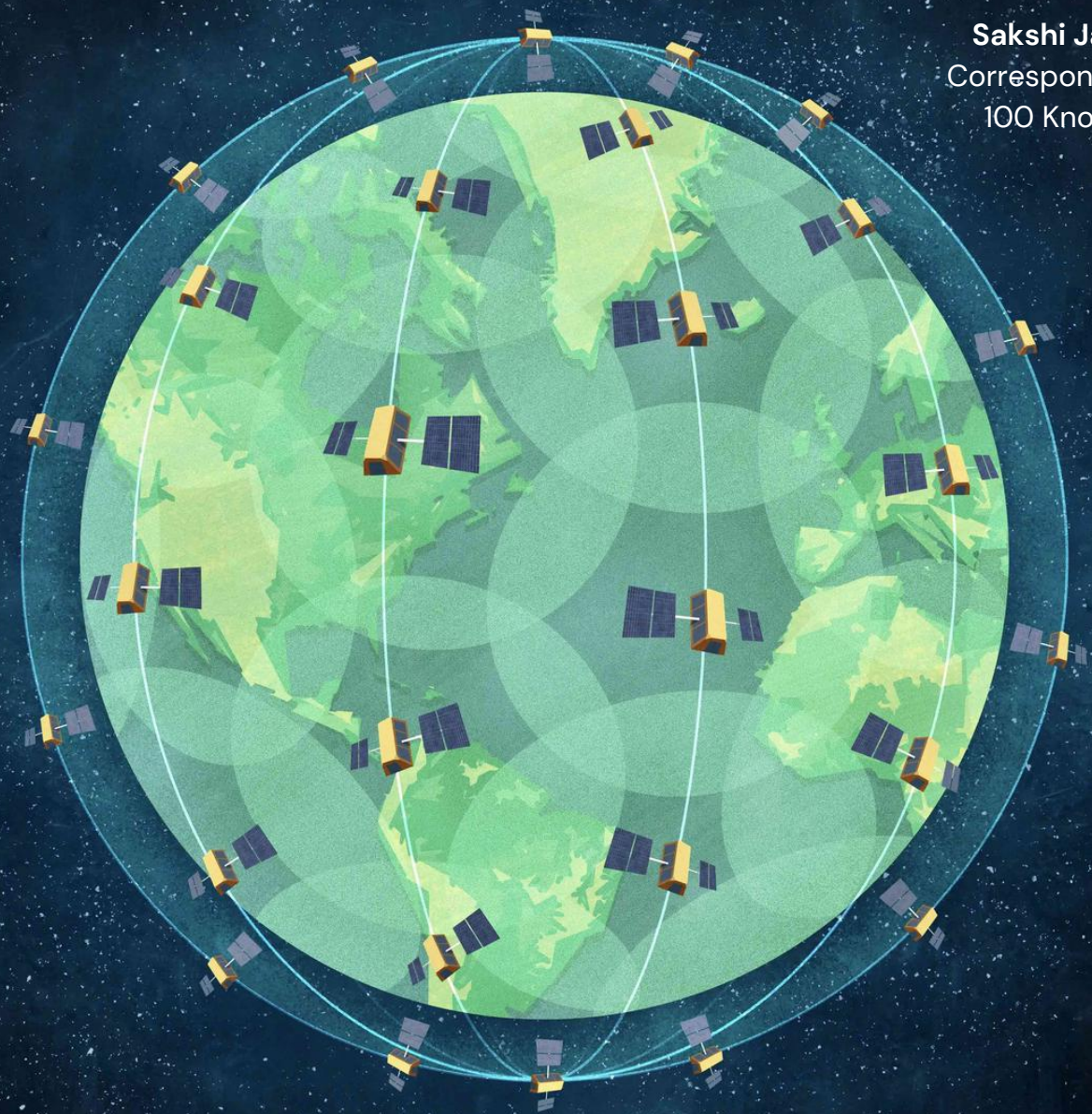


# Space-Based ADS-B

Enhanced Air Traffic Surveillance, Innovation & Analytics



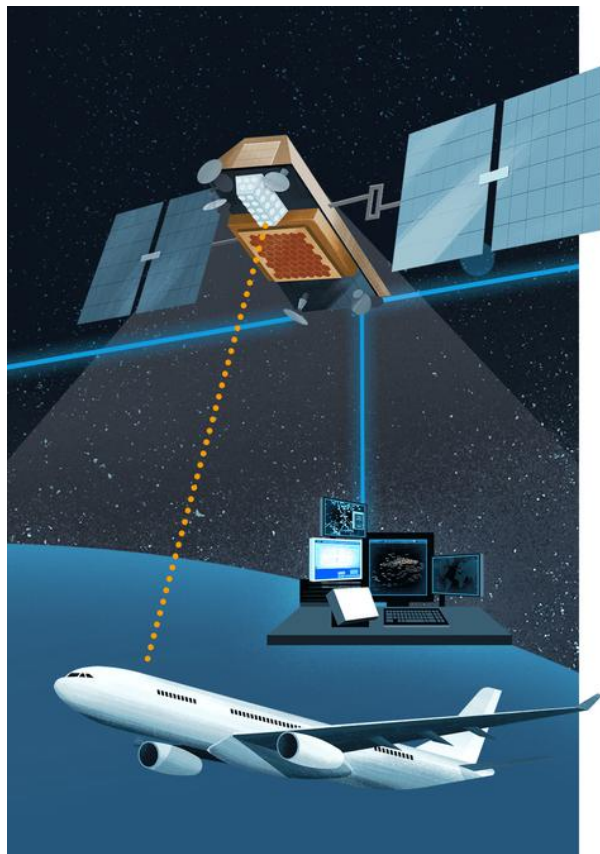
**Sakshi Jain**  
Correspondent  
100 Knots



© Aireon

Do you believe yourself to be an Avgeek and are you the one who frequently runs to the top of your terrace to catch a glimpse of passing aircraft? Your phone's "FlightRadar24" software, particularly its AR (Augmented Reality) component, is probably your accomplice in your crazy. We may play around for hours on the app, tracking various aircraft and looking at the data that each flight displays. We may be aware of what the app shows us, but we may not be entirely familiar with how it functions.

The primary technology that Flightradar24 uses to receive flight information is called Automatic Dependent Surveillance–Broadcast (ADS–B), MLAT (Multilateration), and Radar Data. This data is combined with schedule and flight status data from airlines and airports to offer a distinctive flight monitoring experience. Let's attempt to comprehend deeper into the inner workings of ADS–B, in this article.



## What is ADS–B?

Automatic Dependent Surveillance–Broadcast (ADS–B) is an air traffic surveillance technology that relies on aircraft broadcasting their identity, a precise GPS position and other information derived from on-board systems. The data is broadcasted every half-second from the aircraft and is used by Air Traffic Controllers (ATCs) to identify and separate aircraft in near-real time.

ADS–B is “Automatic” because no outside stimulus (such as pilot’s input) is needed; nevertheless, it is “Dependent” because it depends on onboard devices to transmit “Surveillance” data to outside parties. In the end, there is no questioning or two-way contract, the data is “Broadcast”, and the source from which it originated is unaware of the recipient. This surveillance method relies on aircraft or other airport vehicles to broadcast their identity, position and other data obtained from onboard equipment (GNSS, etc.). This signal (ADS–B Out) can be picked up for surveillance on the ground (ADS–B In) or inside other aircraft to help with situational awareness, spacing, separation, and self-separation for airborne traffic (ADS–B In).

### EACH ADS-B POSITION REPORT INCLUDES:

- **Flight Identification**  
(flight number, registration, tail number)
- **ICAO 24-bit Aircraft Address**  
(globally unique aircraft code)
- **Position** (latitude/longitude)
- **Position integrity/accuracy**  
(GPS horizontal protection limit)
- **Barometric and Geometric Altitudes**
- **Vertical Rate** (rate of climb/descent)
- **Track Angle and Ground Speed**  
(velocity)
- **Emergency indication**  
(when emergency code selected)

# ADS-B Applications

ATC and other aircraft can utilize the information to show the position and altitude of the aircraft on display screens without the need of radar. The transmitted information is channeled through the ATC automation systems and - VOILA! - a "blip" shows on the controller's display; the aircraft is now a part of the next-gen airspace modernization movement.

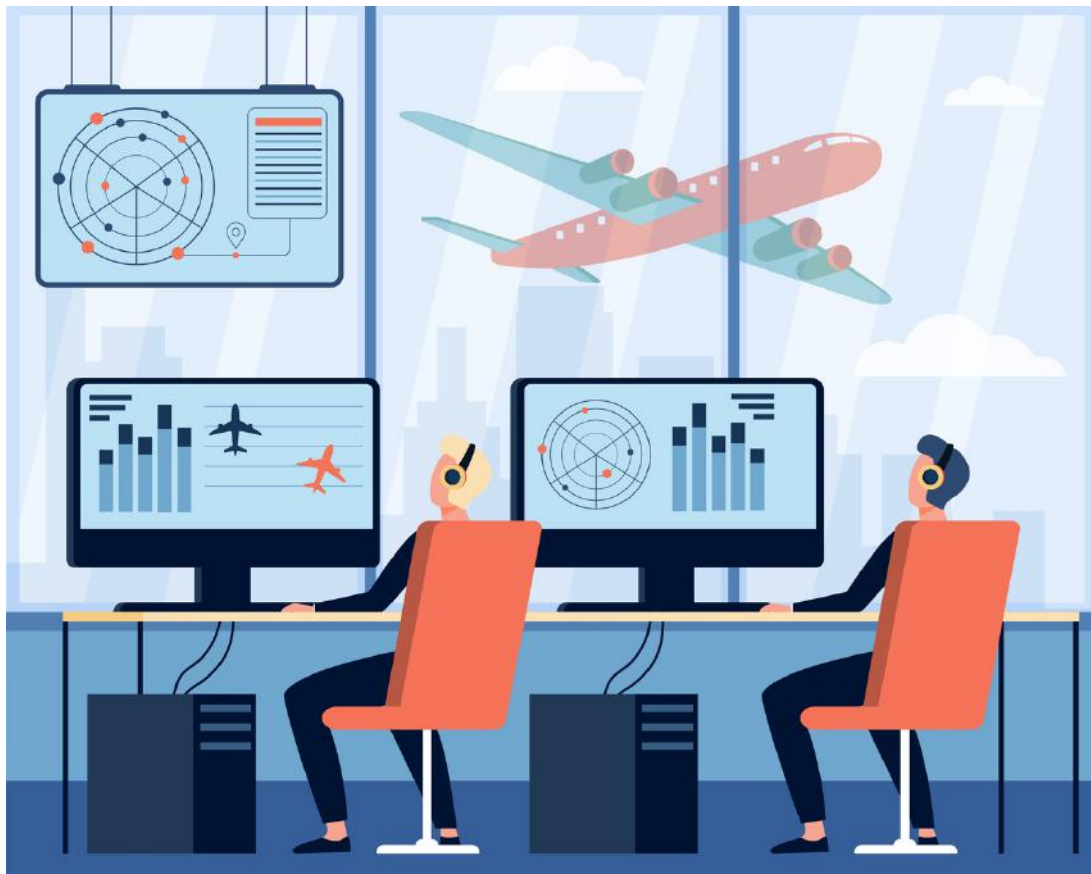
## ADS-B Mandate in India

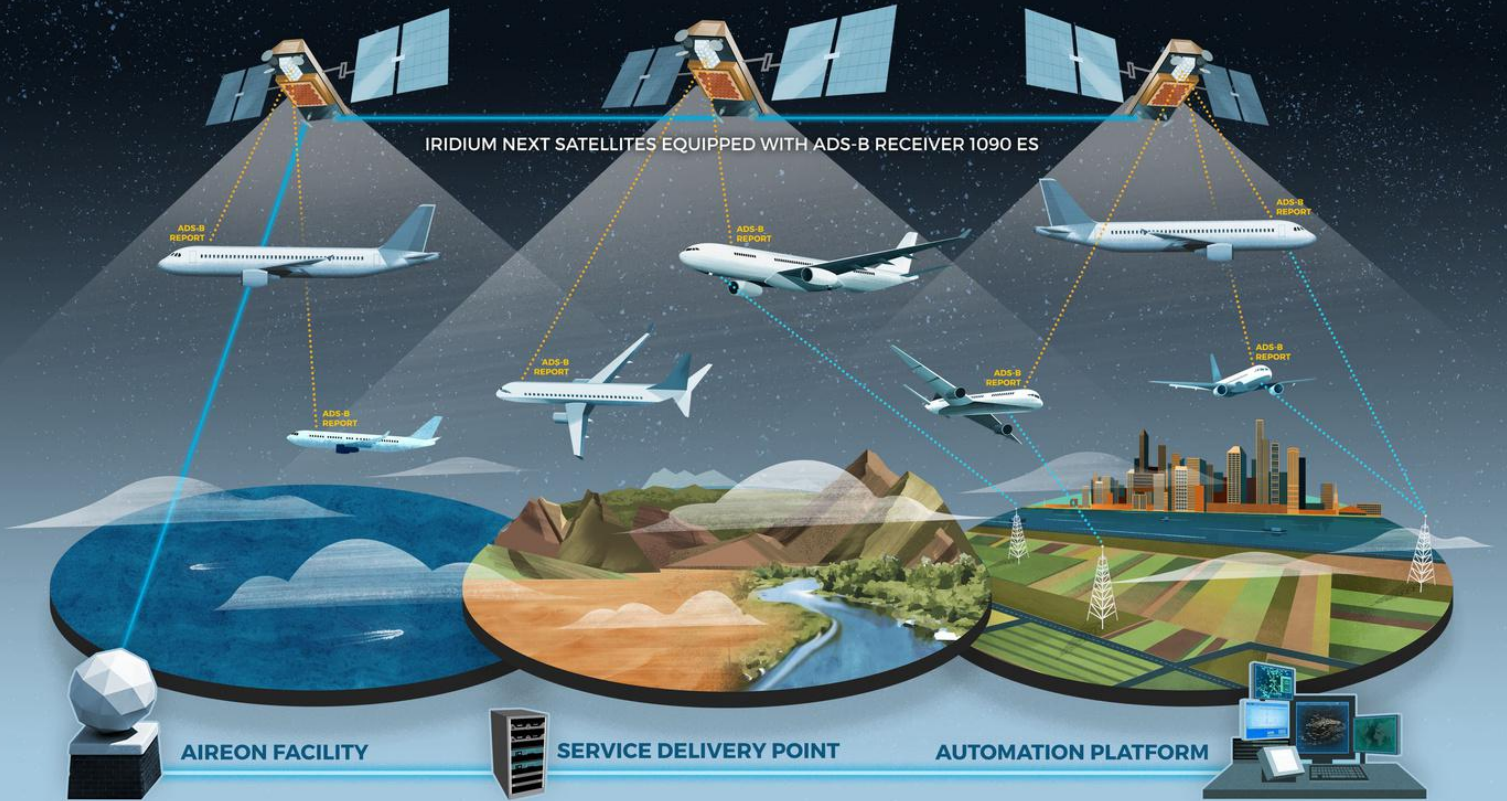
With effect from 1st January 2019, all aircraft flying on PBN Routes in Indian continental airspace with Designators L, M, N, P, Q, T and routes A201, A347, A465, A474, A791, B211, B466, G450, R457, R460, R461, W15, W19, W20, W29, W41, W43, W45, W47, W56S/N, W67, W111, W112, W114, W115, W118, W153, at or above Flight Level 290 must carry serviceable 1090 MHz ES ADS-B transmitting equipment.

## Limitations

ADS-B uses the high frequency of 1090 MHz which means the coverage from each receiver is limited to about 250-450 km (150-250 miles) in all directions depending on location. The farther away from the receiver an aircraft is flying, the higher it must fly to be covered by the receiver.

This is a logistical nightmare and even with endless number of stations, there is a significant amount of airspace that cannot be covered. Analysis has shown that only 30 percent of the world's airspace can be covered by ground stations due to abundant presence of oceans, polar regions, mountainous regions, jungles, and deserts where installation cannot be possible. This lack of coverage opened up the potential for a system like Space-based ADS-B.





© Aireon

# Space-based ADS-B

Space-based ADS-B is just ADS-B on a satellite. Instead of utilizing traditional radio receiver towers on the ground, signals are received by receivers on a satellite constellation. This allows for global, real-time air traffic surveillance using the same ADS-B signal that aircraft already transmit, but without the limitations ground-based receivers have.

This technique of Space-based ADS-B has been created by Aireon, a Canadian aerospace organization that has deployed the first global air traffic surveillance system using a space-based ADS-B network that meets the strict, real-time Air Traffic Service (ATS) surveillance requirements for separation services, anywhere in the world. This implementation has completely transformed the current radar coverage into complete global air traffic surveillance that covers the entire planet, pole-to-pole, providing the granular level of aircraft position information previously only found over densely populated terrestrial areas, and extends that visibility throughout the world.

## The Technology

The backbone of Aireon’s technology resides on Iridium NEXT constellation of satellites, a 66 cross-linked Low Earth Orbit (LEO) satellites with low-latency that makes it uniquely suited to meet the technical demands of global air traffic surveillance and tracking. Iridium is hosting Aireon’s specially designed receivers on each Iridium satellite, covering 100 percent of the globe.

## Operational Benefits

ATC and other aircraft can utilize the information to show the position and altitude of the aircraft on display screens without the need of radar. The transmitted information is channeled through the ATC automation systems and – VOILA! – a "blip" shows on the controller's display; the aircraft is now a part of the next-gen airspace modernization movement.

### Global coverage



Aireon's HPLs on the Iridium satellites provide full, overlapping coverage of the entire globe.

### Airspace Efficiency



Improved airspace capacity and reduction of unnecessary delays. Increase in flights being granted requested flight level, speed and point of entry into airspace.

### Workload Reduction



Reduction in crew and controller workload by reducing the reliance on ad-hoc position reporting.

### Increased Accuracy



Improved accuracy of position data during events. The position update rate given by the space-based system is approximately six times faster than that of conventional radar.

### No line-of-sight obstructions



Unlike ground stations there are no terrain impacts to SBA; it can see to the ground at any location.

### Surveillance outside Jurisdiction



Gathering information on flights outside of their current surveillance capabilities.

### Proactive Surveillance



Early warnings when aircraft deviations take place or are about to take place.



## A Global Solution

With the goal of enhancing tactical flow management throughout its 4.4 million square miles of airspace, Aireon and EuroControl inked a ten-year partnership in 2020. The company collaborates with a wide range of organizations, including the Airports Authority of India (AAI), where it has been integrating its technologies in the oceanic airspace over Mumbai, Chennai, and Kolkata.

Air navigation service providers (ANSPs) NAV CANADA and NATS are currently using space-based ADS-B, enabling a trial period of lower separation that started earlier this year over the North Atlantic. About 12,000 planes were able to fly at their best speeds during the trial's first month, according to Aireon, which saved time and/or fuel.

In November 2015, the International Telecommunications Union (ITU) World Radio communication Conference (WRC-15) allocated the frequency band 1,087.7 to 1,092.3MHz for reception of aircraft broadcast ADS-B messages

by space stations. There are also several other vendors expressing interest to provide similar space-based ADS-B services. Space-based ADS-B is expected to work like terrestrial ADS-B sensors without any need for avionic modification. As ADS-B is becoming a de facto installation in aircraft, these developments mean that surveillance for aircraft can be available virtually worldwide, including oceanic and remote areas. The quest to advance, create, and develop in space is on, and it will eventually usher in the next stage of aviation.

### About the Author

Sakshi Jain is an Aspiring Pilot, with a deep interest in Space, Technology and Sports. She is an articulate writer, intrigued by the offbeat ideas and seeks a creative solution in writing and other situations in life. Sakshi comes from Hazaribag, a small town in Jharkhand.



100 KNOTS

# Regional Connectivity Scheme

RCS UDAN



**Arun Kumar Singh**  
Founding CEO & Accountable Manager  
IndiaOne Air

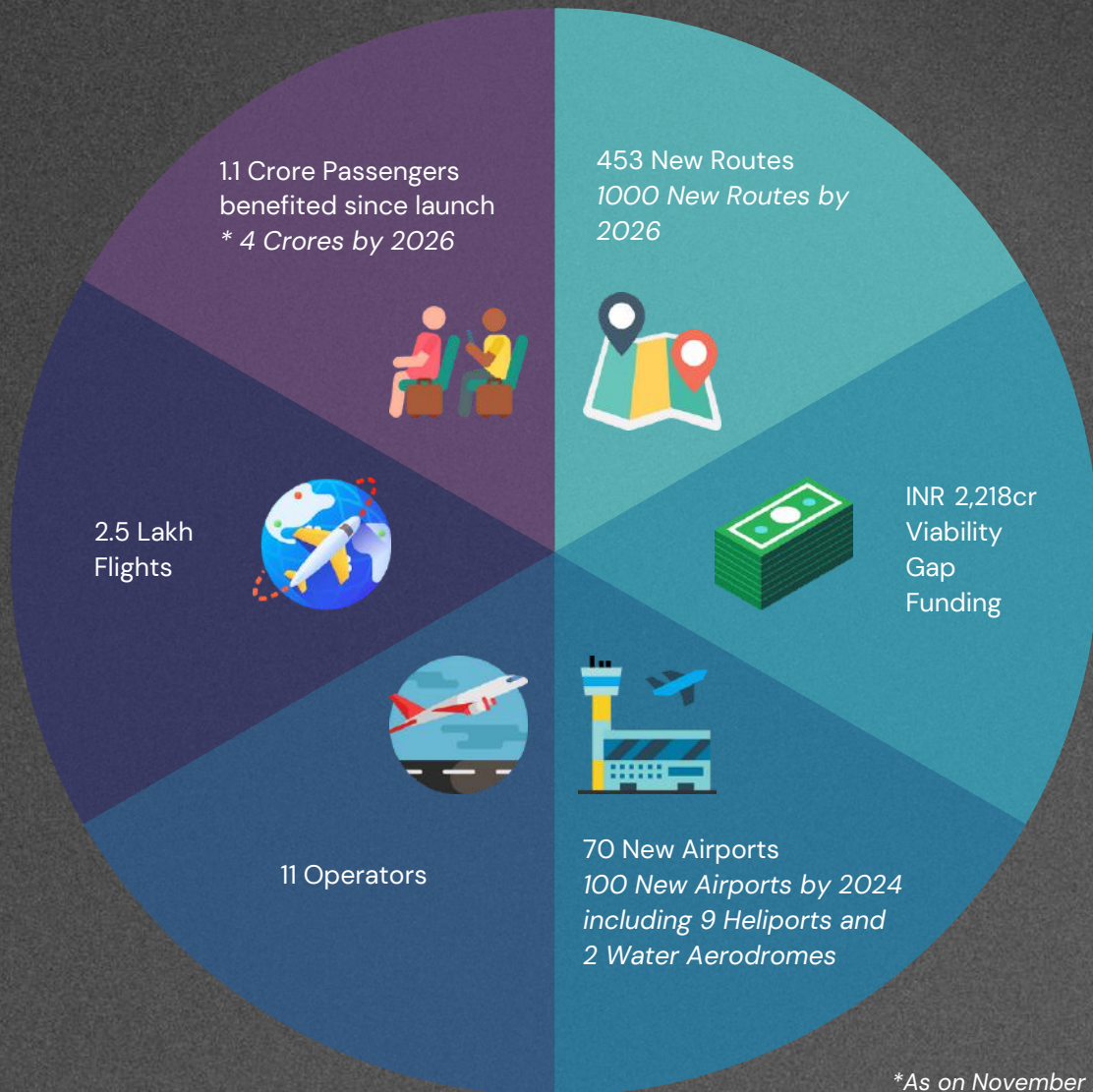




# 100 KNOTS

As part of National Civil Aviation Policy (in 2016, promoted by Honourable Prime Minister Narendra Modi), scheme was implemented in 2016-17 with vision to create an eco-system to make flying affordable for the masses through fiscal support, creating support structure, policy reforms and airport infrastructure development. The scheme aimed for increasing annual domestic passengers to 30 crore by 2022 (versus 9.9 crore domestic passengers in 2016).

Through RCS scheme, air traffic at underserved & unserved airports is intended to be boosted by reviving non-operational airports, offering tax concessions (VAT & excise on ATF), concession and / or waiver on landing, parking, TNLC & RNFC charges and by providing VGF (viability gap funding) to the airline. RCS was intended to be implemented only in those States which reduce VAT on ATF to 1% or less for a period of 10 years. Cost effective security solutions by Bureau of Civil Aviation Security (BCAS) was to be suggested.



\*As on November 2022



# Revenue Model

Under the scheme, it is understood that the routes earmarked will not have commercial viability, especially in the nascent stage and hence the MoCA “funds” (or bridges) the potential losses of the airline by paying VGF on monthly basis. Selected airline operator (SAO), is permitted to claim VGF per seat (with a ceiling), for all flights operated (regardless of number of passengers). Over and above, the airline is permitted to charge regulated (and capped) fare to traveling passenger; fare is normally offered at heavy discount. The scheme hence helps the airline in recovering costs, offers the passenger highly discounted fares and enhances air connectivity to cities or routes which otherwise did not have the air connectivity.

VGF provided to airline is shared between MoCA and State Government in the ratio of 80:20 (in case of North-East states, the ratio is 90:10). Payments to VGF are made from newly created “Regional Connectivity Fund”; which is funded by levying INR 5,000 RCS charge on all flights with more than 80 seat capacity.

Airports Authority of India was selected as the implementing agency and dedicated RCS cell was created in AAI CHQ (Rajiv Gandhi Bhawan, New Delhi). RCS cell / MoCA invite bids for various routes. All airlines in India can bid for routes by quoting VGF and Airfare per seat. Subject to technical evaluation, normally routes are awarded to lowest bidder (L1), mostly on exclusivity for a period of three years from the date of commencement of flights. VGF and Airfare that can be charged to passengers are reviewed every quarter to adjust for inflation, USD exchange rate and effect of crude oil prices.



# Regional Model in India

Air travel in India has been predominantly and heavily dominated by Tier 1 cities. From Apr 2015 to Nov 2022, total 81.7 crore domestic passenger were carried in India. Out of this, 15.7 crore passengers (19.3%) were carried by Delhi airport alone. Top 10 airports (Delhi, Mumbai, Bengaluru, Kolkata, Hyderabad, Chennai, Ahmedabad, Pune, Goa and Guwahati) carried 58.8 crore passengers, amounting to 72% of Indian traffic (Note: Except Goa & Guwahati, all other top 10 cities are Tier 1 cities).

Further analysis reveals that majority of traffic originating from Tier 2 or 3 city (for example from Goa), flew to another Tier 1 city. Air Traffic exclusively between Tier 2 & 3 cities (for example Bhubaneswar Tier II to Jharsuguda Tier III) has been miniscule historically. In Apr 2015, mere 2.4% domestic passengers travelled exclusively between Tier II & III cities. In Nov 2022, this grew to 5.0% of total domestic passengers.

As of end of 2022, following is the “material prosperity” (by household) and some key indicators;

- Refrigerator: 40% households.
- Television: 87% households.
- Smartphone: 93% households.
- Two-wheeler: 35% households.
- Internet: 45% households.
- Urbanization: 35%
- Electricity: 99% households.
- National Highway: 150,000 kilometre
- Access to train: >90%.
- Access to airport: ~30%.

In 2022, only 113 airport operated for at least one month (or more) during the year, carrying 11.1 crore domestic passengers from Jan to Nov 2022. Majority of Indian population (~70%) does not have an airport in their district or even in the neighbouring district.

From Apr 2015 to Nov 2022, domestic traffic grew at annual rate of 8.4%. Traffic exclusively between Tier 1 cities (ex. Mumbai to Delhi etc) grew at the rate of 4.5% annually whereas traffic between Tier 2 & 3 cities grew at the rate of 21% annually (see table below for passengers per day and growth dates).

	Apr-15	Nov-22	CAGR
Tier 1-1	99,619	134,566	4.5%
Tier 1-2	88,480	179,405	10.2%
Tier 1-3	24,711	56,318	12.0%
Tier 2-1	2,944	10,302	18.5%
Tier 2-2	2,092	7,752	19.4%
Tier 2-3	104	942	34.3%
<b>Total</b>	<b>217,949</b>	<b>389,286</b>	<b>8.4%</b>

In next 2 decades, if the urbanization in India has to rise to 50% and Indian GDP leapfrogging between \$15 to \$20 trillion, aviation sector has to (and will) penetrate down to Tier 2 & 3 cities and air travel has to be made accessible to vast majority of Indian population. Next phase of aviation growth in India needs to be (and will be) from bottom to top (Tier 3, 2 & 1) and regional travel in the next 2 decades will witness substantial, steady state and viable growth.



© Nick Morales



IndiaOne Air obtained AOC on 24th June 2022 with the aim to provide regional connectivity to underserved & unserved brownfield & Greenfield airports. IndiaOne Air worked closely with AAI, DGCA and Government of Odisha for development and licensing of Jeypore aerodrome. The airport serves Koraput district with a population of 1.4 million people; a district rich in natural resources with significant presence of companies like HAL and NALCO. Incidentally Jeypore is the only airport in the neighbouring 4 districts and only the 3rd operational airport in the state of Odisha.

Fleet comprises of two brand new Cessna Grand Caravan 208 Ex aircraft. The aircraft are equipped with modern navigation equipment like G1000 NXi – Integrated Flight Deck and safety oversight equipment like CVDR.

IOA will be expanding the fleet in coming months and will launch operations to Jamshedpur, Utkela (greenfield airport), Raipur, Kolkata, Cooch Behar and Guwahati. IndiaOne Air is also selected as one of the official carriers for the ongoing Hockey World Cup 2023 (held in Odisha).

Since launch of scheduled operations, IndiaOne Air has constantly been amongst the top three airlines in India for Seat Factor (occupancy rate), has maintained ~95% OTP, zero cancellations (only airline in India) and nil complaints (only airline in India). IOA puts lots of emphasis on safe and reliable operations with key focus of providing best customer services.

## About the Author



Arun Kumar Singh is the Founding CEO and Accountable manager of the regional airline IndiaOne Air. Under his leadership, the airline became the first and only airline in the history of Indian civil aviation to obtain AOC (Air Operator Certificate) with a single engine aircraft. He is also a part of the “Airline Advisory Group” (group of airline CEOs, constituted by Honorable Civil Aviation Minister to advice MoCA about Civil Aviation Policy Reforms in India).

Arun has been an integral part of the aviation industry since 1998 and has been associated with airlines like Jet Airways, Kingfisher Airlines, Air Deccan and Bassaka Air (Cambodia) previously. Over the years he has been responsible for various critical functions within airline; ranging from Airport Handling, Frequent Flier, Aircraft Acquisition & Financing, Merger & Acquisition, Revenue Management (first in South Asia to implement automated RM system) and several other critical assignments. Apart from holding key positions in several airlines, he has also acquired and operated several helicopters in 3 different countries, operated Cargo freighter and also headed a Flight School in the past.



© Ifik Ismoedjati

# MASAI MARA

*The Quintessential African Safari Dream*

**Mohd. Ghani Khan**  
B787 Captain  
Air India



Origin of life is construed as of now scientifically. Absolutism of religion and myths have answered it rigidly. Savannahs the "Cradle of Life" always ignite my curiosity. Often my thoughts get choked by the how's and whys. Curiosity of it all pushes me to science whereas the awe of the wild makes me surrender poetically. Life of a wild animal is stringed intrinsically to nature. Nature which is often raw and unpredictable in the savannahs. It is knit into the fabric of the cosmos. Every eye in the wild is sensitive to the stellar light of the sun, every breath transports the oxygen molecule through iron which was born in the core of a dying star. I see and feel 'ONE'.

Wildlife photography is about a predictive eye and a fast shutter speed. I love the spontaneity, adventure and the surprise element it sprinkles on my wild escapades. Fortune doesn't get better when you fly your parents, it is as if one is flying his own "SAVANNAH". We flew in a Cessna Caravan from Wilson Airport to Okiombo airstrip in Mara. Overflying the Great Rift Valley at a humble altitude of 12000 ft was a geological spectacle.

Imagine not been able to land due to herd of Impalas invading the airstrip. We went around and due to the engine roar Impalas sprinted back into the wild.

The skillful pilot pulled a tight flying pattern around and while in a bank being pressed into our seats, we saw a herd of giant elephants grazing. It was a

jaw dropping experience. That is what randomness of life does to us. If every forthcoming life experience is deterministic, we would not have evolved into raising our eyebrows or blooming a smile.

Post touchdown we were greeted by the Swahili word "JAMBO", it has its own way to transmit a cheerful welcome to which reciprocated with zeal and impatience of the upcoming adventures. We stayed in Fig Tree resort which is next to a river. Location of the resort is such that the entrance can be graced by tall presence of a giraffe or the mischief of a baboon. It is a serene and picturesque abode but by night the hippos invade the nearby river. Their vocal cords generate an acoustics which sound technology can never compete with. It got a while to get assured that they are not going to invade the rooms.

Memorable moments were the posing of a leopard on a tree and the persistent chase of a massive herd of buffaloes by a pride of lions.

Climax was the lioness's ambush and the grunt of the buffalo. Travel unravels some hidden random moments of excitement and awe that briefly transcends us from our identities, attachments and the usual mental clutter to absolute zenith and present. The hunt and the grunt spiked our experience to zenith maybe triggered our hippocampus. The land cruiser's engine bay was used as a sun shade by one of the pride members.



© Harshil Gudka

Savannah inhabitants have no waist line issues. Millions of antelopes, pride of lions, flocks of ostriches seem to be in the prime of health. I wonder why a natural body form is a massive struggle in our lives. Survival of the carnivore has more of a random element in comparison to that of an herbivore.

I was witness to an unending graze of a huge group of African Buffalo and the unending gaze of a pride of lions with the intention of an ambush. Skill set to ambush is both natured and nurtured into a cub. Vector of a wild is to survive and procreate. Their cognitive skill is apt for it.

Keeping fit is not a life long struggle in the savannahs. Every animal, bird or reptile seems to be in rhythm with it. They live in harmony with nature. Carnivores live more probabilistically in terms of getting the next prey. Antelopes seem to be standing on the stage of determinism but are always avoiding the probability of being eaten. Probability and determinism are knit intricately in the co-existence of savannah life. It withholds the fabric of the 'SURVIVAL OF THE FITTEST' rule. Wildlife photography ignited my interest to understand evolution better and the visit to Nairobi national museum was spent wondering over the fossilized hominid remains. Next flight to London stringed a visit to the Natural history museum.

The crisp of the air and the rustle of the wheels on the savannah trails unlocked the relentless game of survival. Photography can capture an iota of it. Even

words can't fully express the change such places can bring to self. The sponge of subconscious absorbs a subtle vibrance of optimism, it is a desirable side effect of the 'TRAVEL PILL'. Witnessing a black mane lion lazing alone in the tall grass and a huge orange sun going down on the horizon with a silhouette of elephants is something which no adjective can aptly explain.

East Africa is safe to travel to, people are accommodating and warm. I do appreciate the camaraderie between the guides exploring the Mara. They did not keep the majestic sightings to themselves but shared the sites on radio. Just fathom the fact how nature came up with different patterns of Zebra, Giraffe or a Leopard for the purpose of camouflage. It's unfathomable to a curious layman to visualize the working of evolution. How does the rudimentary intention of a life form literally show up on their skins?

Evolution is mysterious, survival is its objective. We habitually impose purpose on it but at its core evolution is incessant and random.

This stringed chain of cause and effect started by a chance where the geology in the form hydro thermal vents on the bottom of sea floor gave rise to biology. Geochemistry brewed biochemistry to have an initiation of continuation. It is a minuscule vector of continuation. The birth of which started 13.8 billion years ago with the Big Bang. Ever since the continuum has manifested itself into varied form. The African wild life is the iota of that atomic reality which has stellar links. The more I travel into nature the more I know my nature.





Located in the south west of Kenya and west of the capital Nairobi, this area has been occupied by Masai people Since the 17th century – of course together with the wildlife, who are the true landlords here. The Greater Masai Mara area is made up of the Masai Mara National Reserve, an unfenced reserve where animals are free to roam, but it also consists of several conservancies. These pieces of land are privately owned by Maasai families. Safari lodges lease the land from the Maasai which gives these Maasai families the chance to invest in their communities by funding education or development initiatives.

The Masai Mara was named in honor of the Maasai people, the ancestral inhabitants of the area. The word 'Mara' means 'spotted' in the Maasai (Maa) language. Stepping back in

time, the Maasai people lived in harmony with the land and its wildlife.

Lions were only hunted during a right of passage for young Maasai warriors. This all changed when the area and its abundant wildlife was discovered by European hunters. The arrival of hunting safaris led to the demise of countless animals until by 1961 there were only nine lions left living in the Mara. Since then, the Masai Mara National Reserve was established to help conserve the land and its wildlife. The rangers patrol regularly which means that there is almost no poaching and therefore excellent game viewing. There is also strict control over vehicle numbers around animal sightings which means a better, more authentic, experience when out on a game drive.

The Masai Mara and the Serengeti are part of the same eco-system. The official perimeter of the Masai Mara National Reserve is bounded by the Serengeti Park of Tanzania to the south, the Siria escarpment (also called Oloololo escarpment) to the west and Masai pastoral ranches to the north, east and west. The Maasai Mara is characterized by four different kinds of topography: Sandy soil and small bushes to the east, Siria Escarpment forming a spectacular plateau as the western boundary of the reserve, Lush grasslands and woodlands around the Mara River and Open plains with scattered bushes making up the largest part of the reserve.



## Best Times to Visit

Maasai Mara is located 4,900–7,100 ft above sea level, which makes the climate slightly milder. Highest temperatures in daytime are 30C (warmest in December and January, coldest in June and July), at night the temperature reaches a bottom of 15C. Masai has two distinct seasons.

### Dry Season – June Through October

#### Pros

- The best time of year to enjoy the Great Migration.
- Less rain means less vegetation, making it easier to spot wildlife.
- Wildlife is more concentrated during the dry season, generally they'll gather near waterholes and rivers.
- Less mosquitoes means less chance of malaria.

#### Cons

- Because of the great Migration, this is the busiest time of the year and you can expect congestion in popular safari areas.
- Travel is more expensive.
- Cold evenings and very chilly early morning game drives.

### Lion Season

The months January through March are known as the 'Lion season'. After a bountiful rainy season, the plains are brimming with life and young wildebeest, zebra and other herbivore calves are seen dashing through the plains, along come the big cats.

### Rainy Season – November Through May

*(There Are Two Distinct Rainy Seasons in April – May (The Long Rains) And in November – December (The Short Rains)*

#### Pros

- Lower rates in comparison to the 'Great Migration months'.
- The best time of year for birdwatching.
- Less crowded.
- The rains bring the plains and other areas to life, the landscape is green, excellent for photography.

#### Cons

- With the rains come poor road conditions.
- Some lodges and camps close.
- Rivers can flood their banks in April and May.

### Green Season

The months March through May mark the arrival of the 'heavy rains' in the Masai Mara. The dusty savannah makes way for swaying grasses and the vast plains are a maternity ward for young impalas, antelopes and other herbivores. This rainy season is also accompanied by lower accommodation rates at safari lodges and tented camps. Since most choose to visit the Masai Mara during the Great Migration, Masai Mara lodges and camps lower their prices significantly during this time of year.



## Get In

There are two ways to travel to the Masai Mara after arriving in Kenya. Flying is a quick and comfortable mode of travel and is made easy through daily flight options to the various airstrips in and around the Masai Mara. The airstrip you fly into depends on which accommodation you plan to stay at. Flying time from Nairobi to the Masai Mara is approximately 40 – 45 minutes.

Alternatively, you can also choose to go by car from Nairobi the drive will take you five to six hours during the dry season, and up to seven hours in the rainy season. Although, remember that the roads in the reserve can become flooded or turned into mud puddles in the rainy seasons in April, May and September to November.

A lot of travel agencies and lodges organize safari trips to Maasai Mara. You can book a package tour, which allows you to put all transportation including flights to and in the park in their hands.

## Activities

### Hot Air Balloon

I highly recommend a hot air balloon safari early in the morning to see the sun rising above the wildlife and the magnificent landscapes.



### Green Season

The main attraction of this game reserve is, not surprisingly, game viewing. Go on morning, afternoon and night drives over several days in order to see as many as possible of the resident animals.

### Additional Activities

In addition to game drives, you may have an opportunity to go on a guided nature walk, to take to the clear blue skies for a hot air balloon safari, to go for a bush picnic, to visit a local Masai manyatta (village) or to take part in other optional activities

# The Great Migration

Know the saying 'the grass is always greener on the other side'? Well, during the great migration, the grass is indeed greener on the other side. Every year from July through October, the Masai Mara becomes the backdrop of one of the most spectacular wildlife shows on earth – the Great Migration. Over two million wildebeest, zebra and other herbivores trek from the southern Serengeti to the lush green grasses of the Masai Mara. Known as one of the seven wonders of the world, the great migration is the most spectacular wildlife shows on earth. The Great Migration is unique to the Serengeti and the Masai Mara. There is nothing else quite like it.

The constant year-long migration is an iconic natural phenomenon, the timing of which depends on environmental factors, the weather and of course, the animals themselves. In short, the biggest mammal trek in the world follows the rains. The herds travel 800 kilometers clockwise in a circle through the Serengeti and Masai Mara ecosystems in search of greener, mineral rich pastures and water. The animals spend most of the cycle in the Serengeti in Tanzania, but also spend

several months trekking the bountiful plains of the Masai Mara.

As the herds of wildebeest, zebras and gazelles enter the Masai Mara they are met by more than their fair share of lethal predators. Aside from the threat of the big cats, the lemming-like herds are also faced with over 3000 crocodiles lurking in the murky waters of the Mara River during their river crossing. Watching the herds blindly jump from riverbank ledges and into the river waters is spectacular to say the least.

The best time to see the Great Migration in the Masai Mara is from July to October.

## Did you know?

Masai Mara is home to quite a few lion prides that have lived in the area for decades. Females are permanent members of the pride; however, the male lions tend to get chased out of the group by other male lions.



# Wildlife

The reserve is famous for the high number of predators, such as lions and cheetah, and the 1.5 million wildebeest which migrate through the Mara and cross the crocodile infested Mara River. When visiting the Maasai Mara you are likely to see not just the famous Big Five: Lion, Leopard, elephant, rhino and buffalo, but also the "Big Nine". Especially lions are common here, and have grown relatively accustomed to their two-legged visitors, which makes them easier to spot. The Mara Plains are teeming with wildebeest, zebra, giraffe, impala and Thomson's gazelle. Also, cheetahs, hyenas and jackals are seen regularly in the reserve. In the Mara River large amounts of hippos and crocodiles are enjoying their lives – the crocodiles are especially happy in July and November when hundreds of thousands of wildebeest migrate across the river causing a sumptuous feast for the hungry crocodiles. Birdlife in Maasai Mara is abundant and diverse. Species such as eagles, ostriches, storks and vultures are among the more than 50 different birds of prey.

## Lion

Africa's 'king of the jungle', the lion: Approximately 850 to 900 lions live within the Masai Mara National Reserve and surrounding conservancies. Lions are one of the most sociable big cat predators and they generally live in prides of fifteen to twenty lions. A pride can consist of up to three males, several adult female lions (of which one is the dominant female) and several sub-adults and cubs.

Male lions are known to lay claim and defend large pieces of land while the females are known to be the lion pride hunters, male lions only occasionally assist during a hunt. They will generally be called in to take down larger animals. Their favorite meals consist of zebra and wildebeest, but when these are out of season (beyond the great migration season) they also enjoy preying on warthogs and buffalo.

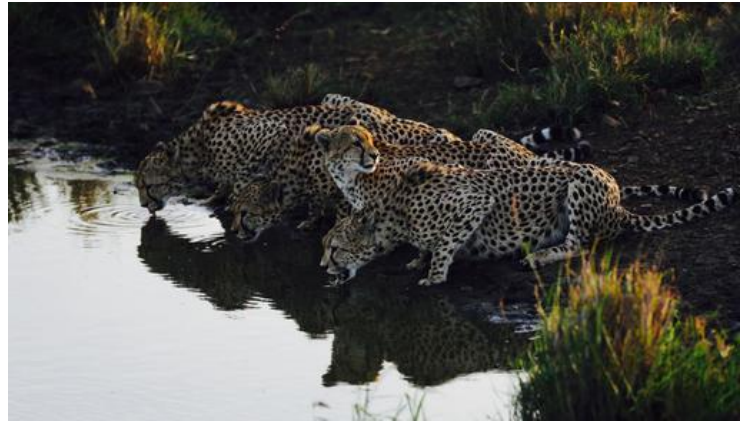


## Elephant

One of the most common sightings, the African elephant is the largest land animal on the planet. They are matriarchal, which means they live in female-led groups.

## Leopard

They are listed on the IUCN Red list due to the loss of their habitat and human encroachment. These big cats are shy night-time hunters and tend to hunt on their own. Adult leopards live a solitary life and only get together with other leopards only during mating.



## Rhino

Kenya is home to both the white and black rhino. Of the two, the black rhino is slightly smaller and more aggressive than the white rhino. In reality there is very little color difference between the two. There are 35 – 50 black rhinos living in the Masai Mara at any given time.

## Cape Buffalo

The Cape Buffalo is one of the most dangerous animals in East Africa. Lone males in particular can be aggressive, unpredictable and weigh approximately 800 kilograms. In the Mara buffalo are generally found in herds of approximately 100 individuals or more.



## Birdlife

There are over 500 bird species living in the region. The Mara-Serengeti ecosystem is an important area for habitat-based bird conservation. The Masai Mara is also known for its impressive collection of raptors. There are 57 different species flying around the area, such as the impressive Bateleur eagle. Bird watching is possible all year round, however it's at its best between November and April. This is when the European migratory birds arrive as well.

### *Did you know?*

The term 'Big Five' actually has a very dark origin. It has little to do with the size of these animals and everything to do with the difficulty in hunting them.

# Masai People



The Masai people make up a community that spans across northern, central and southern Kenya and northern parts of Tanzania. As pastoralists, the community holds the belief that they own all of the cattle in the world. The Maasai rely off their lands to sustain their cattle, as well as themselves and their families. Prior to the establishment of the reserve as a protected area for the conservation of wildlife and wilderness, the Maasai were forced to move out of their native lands.

Tradition continues to play a major role in the lives of modern-day Maasai people, who are known for their tall stature, patterned shukas and beadwork. It is estimated that there are approximately half a million individuals that speak the Maa language.

Although there has been a rise in fencing on private land in recent years, the wildlife roam freely across both the reserve and conservancies. A study funded by WWF and conducted by ILRI between 1989 and 2003 monitored hooved species in the Mara on a monthly basis, and found that losses were as high as 75 percent for giraffes, 80 percent for common warthogs, 76 percent for hartebeest, and 67 percent for impala. The study blames the loss of animals on increased human settlement in and around the reserve. The higher human population density leads to an increased number of livestock grazing in the park and an increase in poaching.

## About the Author

Air India captain Ghani Khan is an adventure and fitness enthusiast at heart. When he is not commanding his Dreamliner, Ghani explores his passion as adventure seeker, traveler, photographer and triathlete. He has clocked north of 10,000 hours in his 18-year career as an Air India Pilot. He has also endured four triathlons and travelled to all seven continents with two of his pictures featured by National Geographic.

Ghani is presently based out of Gurugram where he resides with his wife Subuhi and two children Zayaan and Izná.

### Connect with Ghani

Ghani has authored his book "Sight Thoughts". This book showcases a synchrony between photography and philosophy







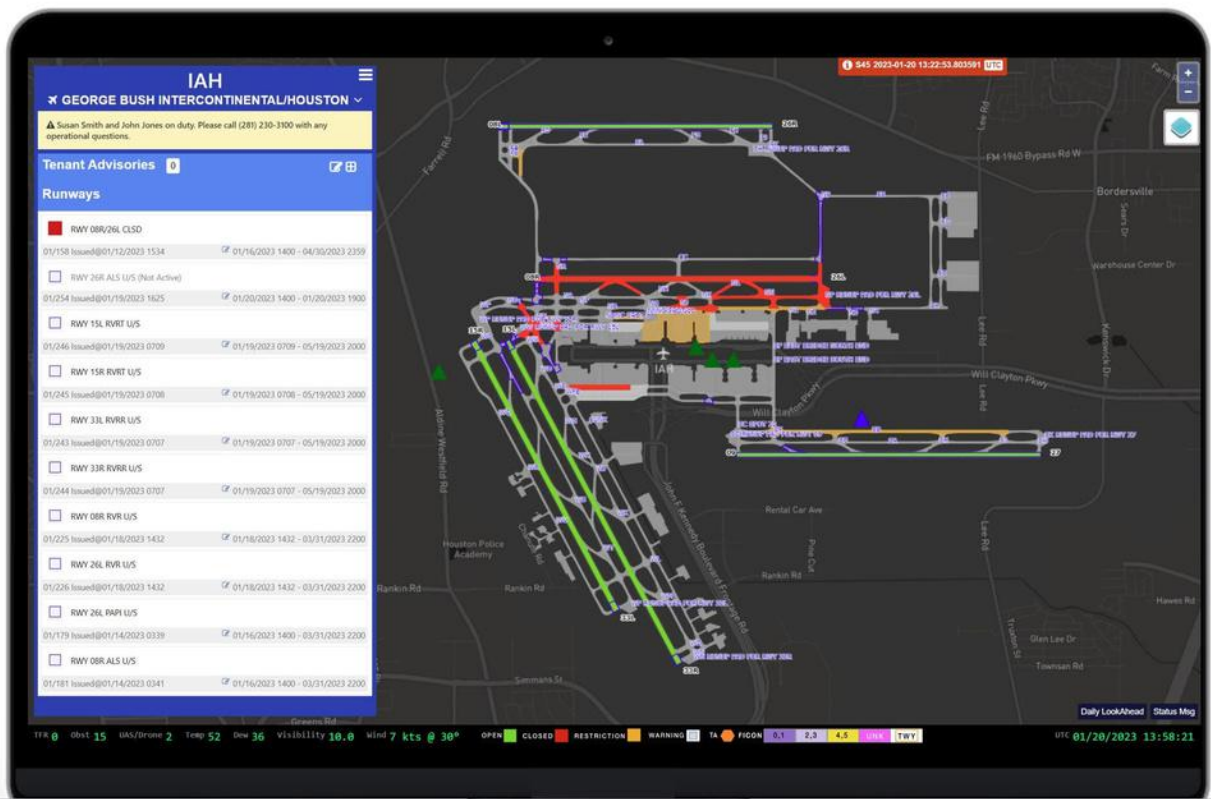


"Now is the time to bridge the gap"

# Simplifying NOTAMs



Leon J. Prusak  
Domain Expert  
CGH Technologies



There is a need for a more effective presentation of digital aeronautical information to assist operational personnel in their review and retention of relevant information. Reading pages of safety-critical Notice to Air Mission (NOTAM) text, presented in a random sequence and ineffective style, creates multiple interpretations of the same information. Now is the time to bridge the gap between text-based NOTAMs and a digital visualization of text with CGH Technologies, Falcon vNOTAM product. A graphical representation of NOTAMs that eliminates ambiguity and is easier to interpret.

On any given day, there may be as many as 35,000 NOTAMs circulating in the global air transport system. In 2020, the total number of NOTAMs issued exceeded 1.7 million. It is not uncommon for a pre-flight briefing package that supports a long-haul international flight to contain more than 100 printed pages of NOTAM information.

## Background

The acronym NOTAM came into everyday use following the ratification of the Convention on International Civil Aviation (CICA) on April 4, 1947. NOTAMs are created and transmitted by government agencies and authorized airport operators under guidelines specified by CICA, Annex 15.

A NOTAM contains time-critical aeronautical information either of a temporary nature or not sufficiently known in advance to permit publication on aeronautical charts or in other publications and receives immediate dissemination via the NOTAM System. Falcon vNOTAM allows users to focus on specific time periods that pertain to their flight, for arrival or departure, without reading through many NOTAMs that are irrelevant to their mission.

NOTAMs generally concern the establishment, condition, or change of an aeronautical component in an airspace system. NOTAM information is aeronautical information that could affect an operational person's decision-making and includes runway-taxiway-apron closures, obstructions, communications, airspace, navigational aids, flight procedures, and other information essential to flight operations.

A1546/20	2012311300/PERM ILS RWY 28 IDENT IPLM (LLZ FREQ 110.3MHZ AND GP FREQ 335.0MHZ) AVBL AS CAT III (ROMAN) B . LLZ COVERAGE IS AS FOLLOWS : A) 10 DEG ON EITHER SIDE OF RWY CENTRE LINE UPTO 22 NM. B) FROM 10 TO 35 DEG ON EITHER SIDE OF THE RWY CENTRE LINE UPTO 17 NM. GP COVERAGE IS AS FOLLOWS: A)GP COVERAGE RESTRICTED TO 6 DEG ON 90 SIDE AT 10 NM.
A0955/22	2205030000/2405022359 VALIDITY OF AD LICENSE RENEWED WITH FLW DETAILS: AD NAME : INDIRA GANDHI INTERNATIONAL AIRPORT, NEW DELHI. ICAO LCA INDICATOR: VIDP VALIDITY OF THE LICENSE: 03/05/2022 TO 02/05/2024 LICENSE NR AL/PUB/004.
A2354/22	2211010800/2302012359 PORTION OF TWY C EAST OF LINK-19 NOT AVBL FOR OPS.
A2355/22	2211010805/2302012359 TWY S3 NOT AVBL FOR OPS DUE AERONAUTICAL GND LGT (AGL) WORKS WITH UPCOMING RWY 11L/29R.
A2356/22	2211010805/2302012359 CONST OF NEW RWY UNDERWAY NORTH OF RWY 11R/29L AND BTN TWY Z AND TWY Y EAST-WEST DIRECTION. FLW RWY MARKINGS PROVIDED: 1. RWY MARKINGS PROVIDED AS PER PARAGRAPH 5.2.2-5.2.7 OF ICAO ANNEX 14 VOL 1 ( 8TH EDITION) 2. RWY CLOSURE MARKINGS PROVIDED AS PER PARAGRAPH 7.1 OF ICAO ANNEX 14 VOL 1 (8TH EDITION) PILOTS TO EXER CTN WHILE LDG ON RWY 11R/29L.
A2357/22	2211010807/2302012359 HIGH POWER ENGINE RUNUP LCA FM FRONT APN 1 RELOCATED TO TWY E2. ENGINE RUNUP AT HIGH POWER WILL CARRIED OUT AT TWY E2 FACING WEST UP TO CODE LETTER C ACFT ONLY. ACFT SHALL PUSH BACK FM TWY E2 ON TWY D4 FACING NORTH OR SOUTH. DRG RWY 09/27 IN USE FOR ARR AND DEP HIGH POWER ENGINE RUN RESTRICTED ON TWY E2. TOWING OF ACFT TO/FM TWY E2 WILL BE CARRIED OUT UNDER FLW ME SUPERVISION SINCE CLOSURE OF TWY E2.
A2552/22	2211271915/2302272359EST TWY CENTRE LINE LIGHTS OF TWY N BTN LINK 33 AND LINK 34 (STANDS 252 AND STANDS 255) U/S DUE CABLE FAULT. PILOTS TO EXER CTN.
A2555/22	2211281245/2302230000 TWY D1 AVBL ONLY FOR TOWING THE ACFT TO/FM AIR INDIA (AI) MAINT HANGAR.
A2556/22	2211281245/2302230000 1. PORTION OF TWY D BTN TWY F3 AND TWY D1 NOT AVBL. 2. TWY D2 NOT AVBL.
A2557/22	2211281245/2302231130 ACFT STAND 245 DOWNGRADED UPTO CODE LETTER C ACFT ONLY.
A2560/22	2211281245/2301151130 PORTION OF TWY Z BTN TWY Z2 AND TWY Z3 NOT AVBL. LEFT TURN ON TWY Z FM TWY Z2 NOT AVBL. RIGHT TURN ON TWY Z FM TWY Z3 NOT AVBL.
A2561/22	2211281245/2302281130

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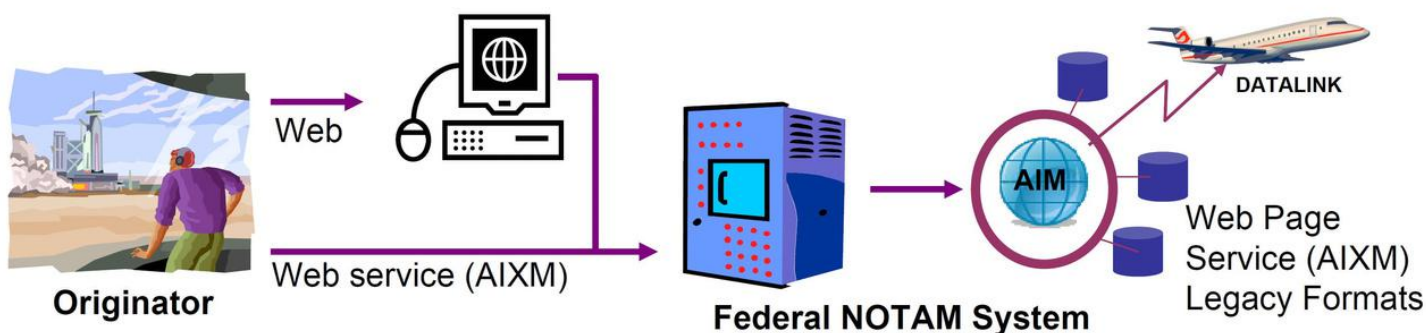
# Modernization

Modernization efforts have been underway for many years by Air Navigation Service Providers (ANSPs) and the International Civil Aviation Organization (ICAO). As a result, ANSPs are changing the format for NOTAMs to align with international standards. The transition enables an end-to-end digital structure and will promote further global harmonization among neighboring ANSPs.

Benefits will provide NOTAM consumers with one consistent format for domestic and international operations. This will allow for enhanced searching, sorting, archiving, and filtering capabilities of NOTAM data and improved accuracy and accessibility for pilots, dispatchers, and NOTAM consumers.

A key feature of modernization is the development of the Aeronautical Information Exchange Model (AIXM). AIXM is designed to provide a structure/data model that enables digital data dissemination and global harmonization through the use of a standard exchange model and was developed by the FAA and EuroControl with support from the international community. The benefits of using AIXM are:

- Achieve neutrality against applications and their local views of data.
- Improved safety by reducing data inconsistencies.
- Represents both static and dynamic data.
- Enable authoritative sources for features through the universally unique identifier process.



# Digital Visual NOTAMs

The Falcon vNOTAM product is a web-based application that graphically displays FAA textual NOTAMs and FICONs (Field Condition Reports) on a digital airfield map to provide an intuitive visual representation of current and future airfield conditions. Falcon vNOTAM provides a safety-enhancing solution that enables more effective decision-making and improves operational performance.



CGH Technologies visual display includes the following:

1. Live tabular and graphical display of all NOTAMs and FICONs on the airfield map.
  - Taxiway closures, restrictions, and warnings
  - Apron closures, restrictions, and warnings
  - Runway closures, restrictions, and warnings
  - FICONs for runways, aprons, and taxiways
2. Web-based access for stakeholders (airlines, pilots, air traffic control, airport operations). The system includes a public-facing website and an administrator's portal. The public-facing site does not require any login and can be linked to a custom URL for the airport. Both access points have the same user interface and views, but the administration page includes edit rights.
3. Integration with existing Air Traffic Management (ATM) solutions, surface management systems, and air traffic displays.
4. Individually curated airport Geographical Information System (GIS) elements ensure accurate visual representation of NOTAMs.
5. The ability for Airport operators to enter "Airport Status" messages to promote collaborative decision-making.
6. A Version Tracking feature to archive NOTAM and FICON data for historical analysis.
7. Multiple map types and individual map layers.
8. A "look-ahead" feature to view all NOTAMs scheduled for the next few days or a specific date and time.
9. The ability to issue Tenant Advisories for peripheral operational information for dissemination to stakeholders. These items don't meet the criteria of a NOTAM but have operational relevance.
10. Location of obstacle, obstruction, and crane NOTAMs within the vicinity of the airport.
11. A graphical display of Temporary Flight Restrictions (TFRs) within 60 NM of the airport.
12. Unmanned Aerial System (UAS) NOTAMs and weather information (METAR).

Accurate GIS elements are the foundation of the Falcon vNOTAM display. Highly curated GIS maps enable vNOTAM to stay up to date with airport construction, signage, lighting, and marking. In many cases, Aeronautical Information Publication (AIP) digital data can fall out of synchronization with 28- and 56-day update cycles. For instance, Falcon vNOTAM enables “day of” changes for airport signage projects to reflect the actual airport geometry. NOTAMs issued for GIS elements near the end of construction projects can be added to reflect NOTAM issuance pre-AIP update.



## Final Words

The Falcon vNOTAM product provides a safety-enhancing solution that enables more effective decision-making and improves operational performance. It promotes safety through shared situational awareness of airport conditions for all stakeholders and enhances strategic and tactical planning through pre- and in-flight knowledge of projected airfield conditions at the time of landing.

The Falcon vNOTAM system is available via annual subscriptions ranging from \$10,000 to \$45,000 USD depending on designated airport type, hub size, and activity level.

Falcon vNOTAM is the only product available today that provides a fully automated graphical display of textual NOTAMs and FICONS from the Federal NOTAM System (FNS) on a specifically curated airfield GIS map to provide an intuitive visual representation of current and future airfield conditions.

# About the Author

Leon J. Prusak is a domain expert with more than 40 years of experience in the fields of air traffic control and air traffic management. He currently works at CGH Technologies, Inc. Previously he worked for 5 years at PASSUR Aerospace and 34 years with the FAA.

His expertise was gained in the FAA managing in the busiest airspace environment in the world. He was responsible for airports that served 10,000 flights per day and 120 million passengers annually.

He specializes in Air Traffic Management, airport demand and capacity modeling and management, use of predictive analytics to manage air traffic, decision support automation and integration, software solution design. Mr. Prusak served from 2017 to 2020 as Chairman on the National Airspace System Operations subcommittee of the FAA Research, Engineering, and Development Advisory Committee. He created the widely used PERTI process for air traffic management (Plan, Execute Review, Train, Improve).





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