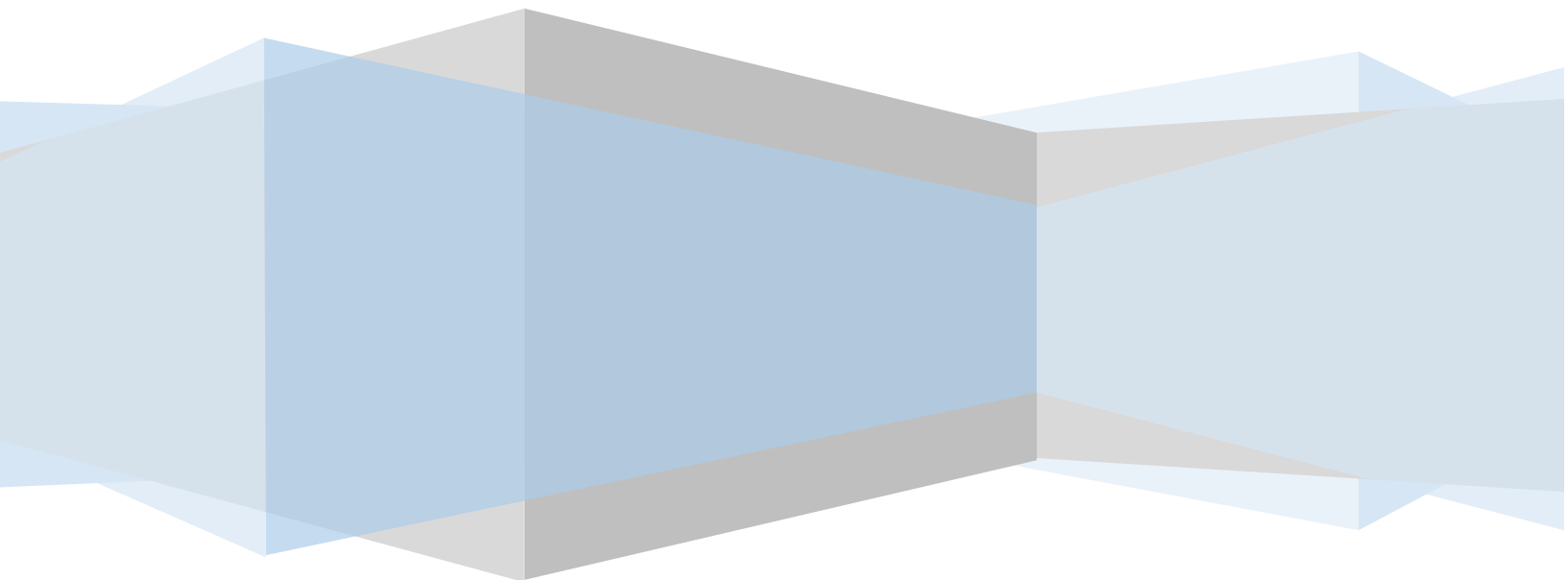


# POST OPERATIONS ANALYSIS REPORT

January, 2025

CENTRAL COMMAND CENTER, C-ATFM, DELHI







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## A. Executive Summary

Average Domestic air traffic has recorded a decrease of 4.01% whereas the average international air traffic has increased by 0.8 % in the month of January 2025 as compared to December '24.

On average, the Indian Airports in the ATFCM area saw 4931 IFR flights per day in the month of January 2025. The peak days were on 31<sup>st</sup> January 2025 (5291 IFR flights). Wednesday's were the busiest days throughout this month with an average of 5092 IFR flights per day.

Total Fifty Five (55) ATFM measures were applied this month during periods of congestion at Bengaluru, Chennai, Delhi and Mumbai Airport.

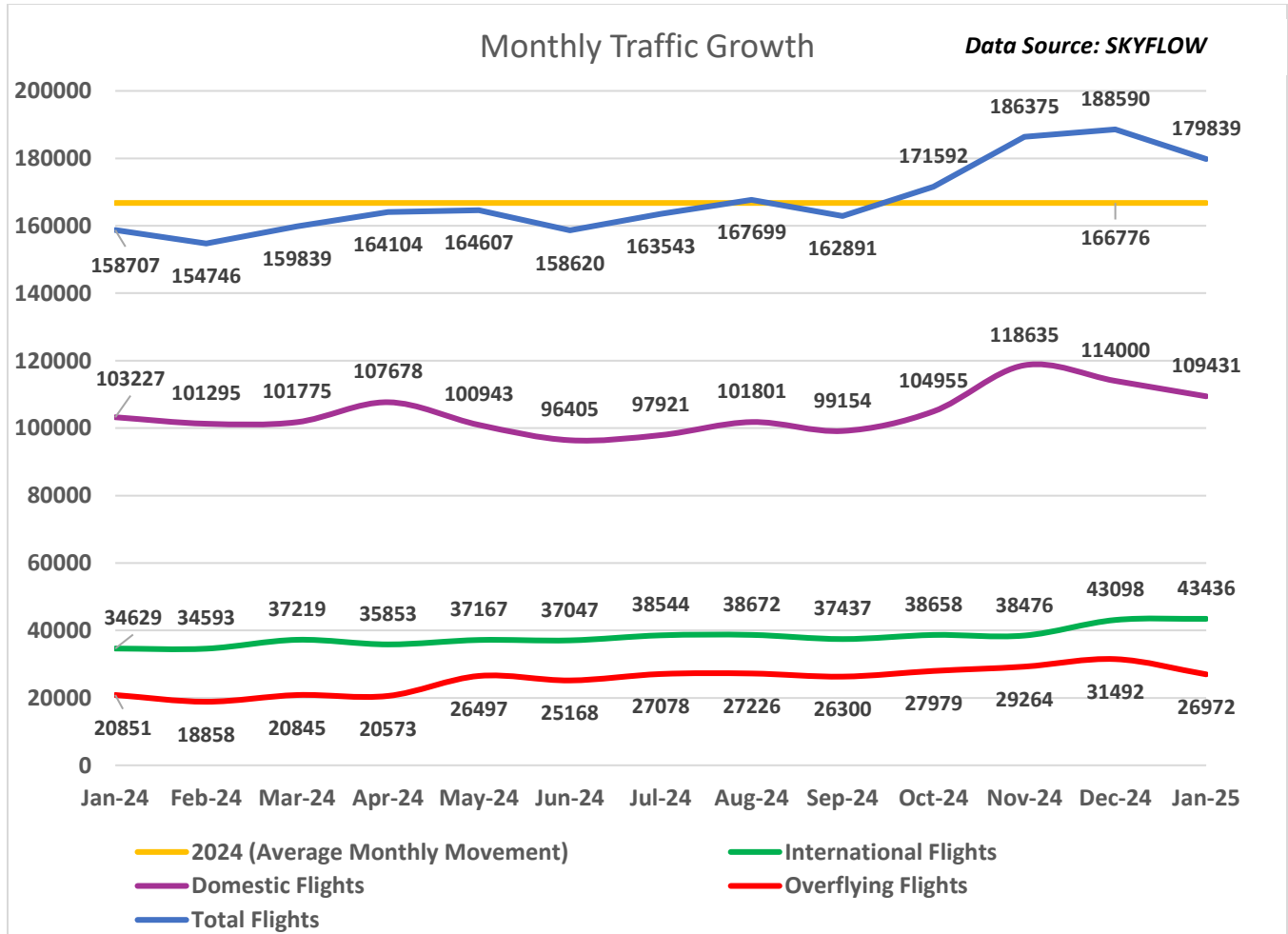


Figure 1: Monthly Traffic Growth

The graph above depicts the Domestic, International, Overflying and total Air traffic in Indian ATFCM Area during the last 13 months (January'24 to January'25).



## B. Traffic Analysis

### I. Air Traffic Movement at Major Airports in India

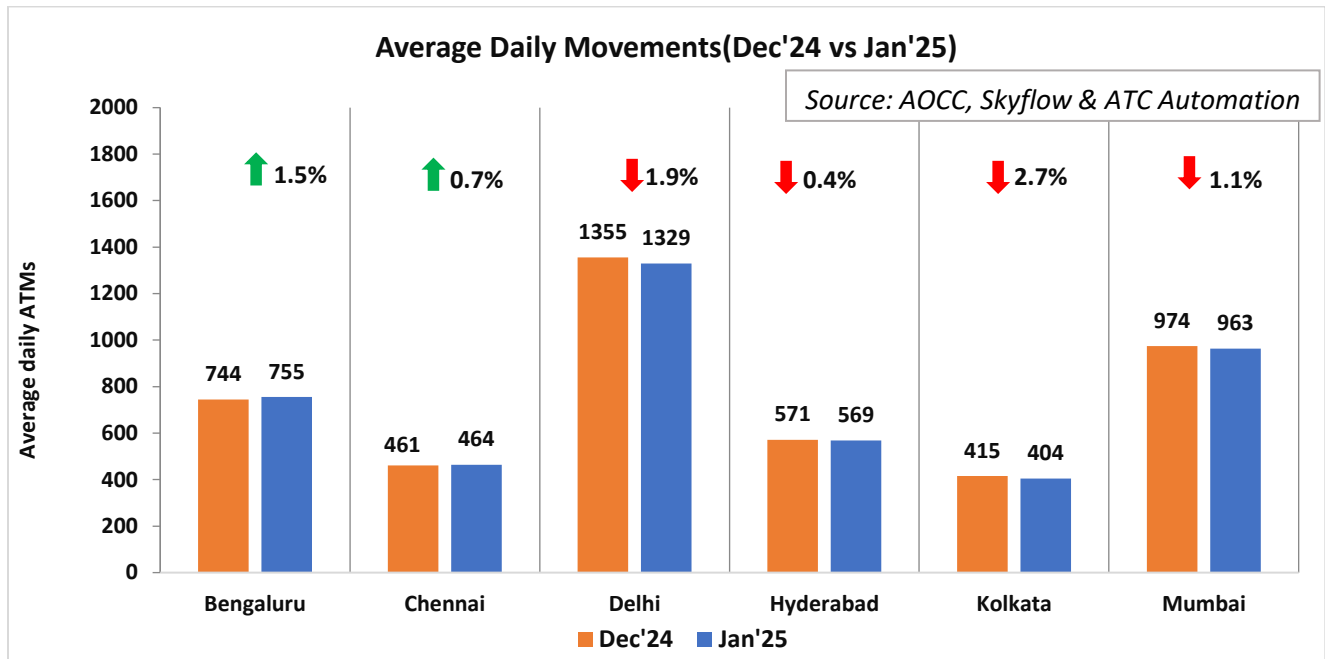


Figure 2: Average Daily Movements ( Dec '24 vs Jan '25 )

The above chart depicts the percentage change in average daily ATMs at six major Airports in January 2025 as compared to the previous month December 2024.

Airports\Year	Avg. Daily ATMs (YoY) for six major airports				
	Jan'21	Jan'22	Jan'23	Jan'24	Jan'25
Bengaluru	493	394	689	687	755
Chennai	301	278	390	401	464
Delhi	921	921	1255	1239	1329
Hyderabad	364	327	460	497	569
Kolkata	315	286	391	371	404
Mumbai	558	569	919	953	963



Air Traffic Movement for each day in January 2025 is plotted for Delhi, Mumbai, Bengaluru and Hyderabad Airport along with the percentage change w.r.t. Avg. Daily Movements for the same month.

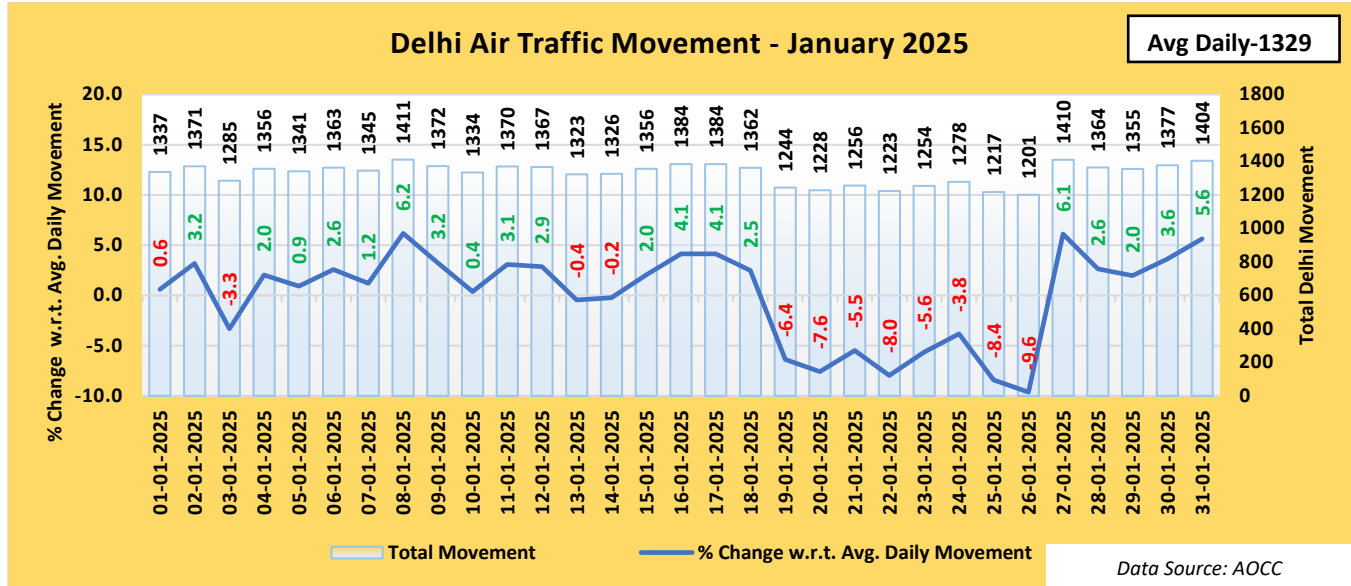


Figure 3: Air Traffic Movement for Delhi –Jan’25

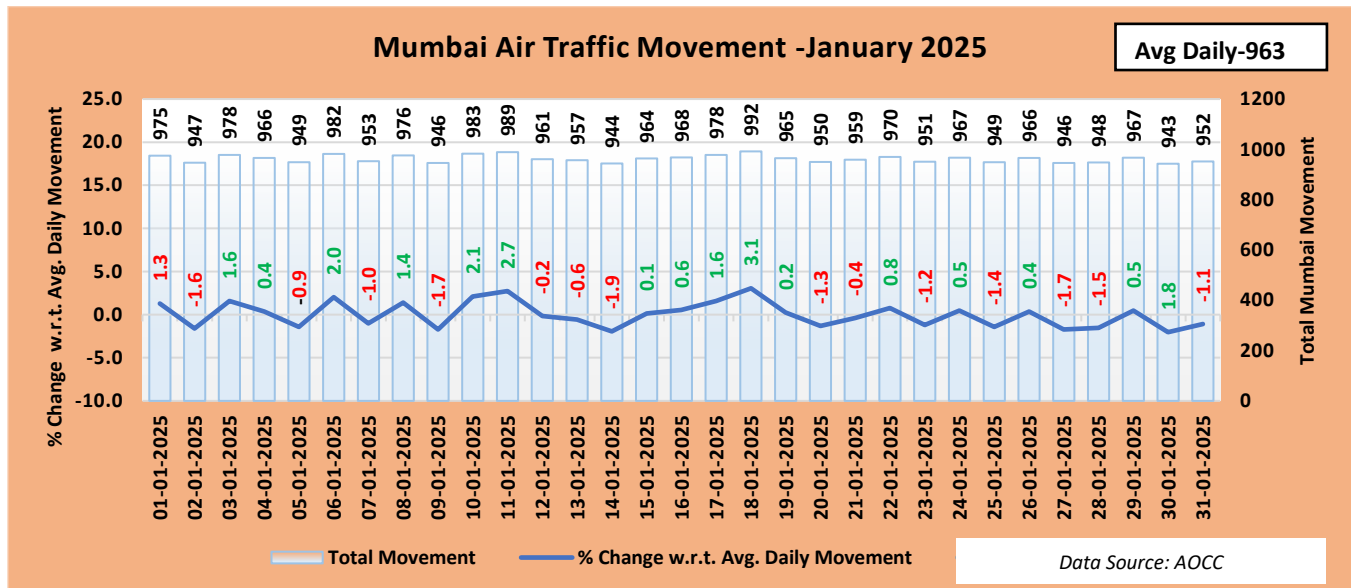


Figure 4: Air Traffic Movement for Mumbai – Jan’25

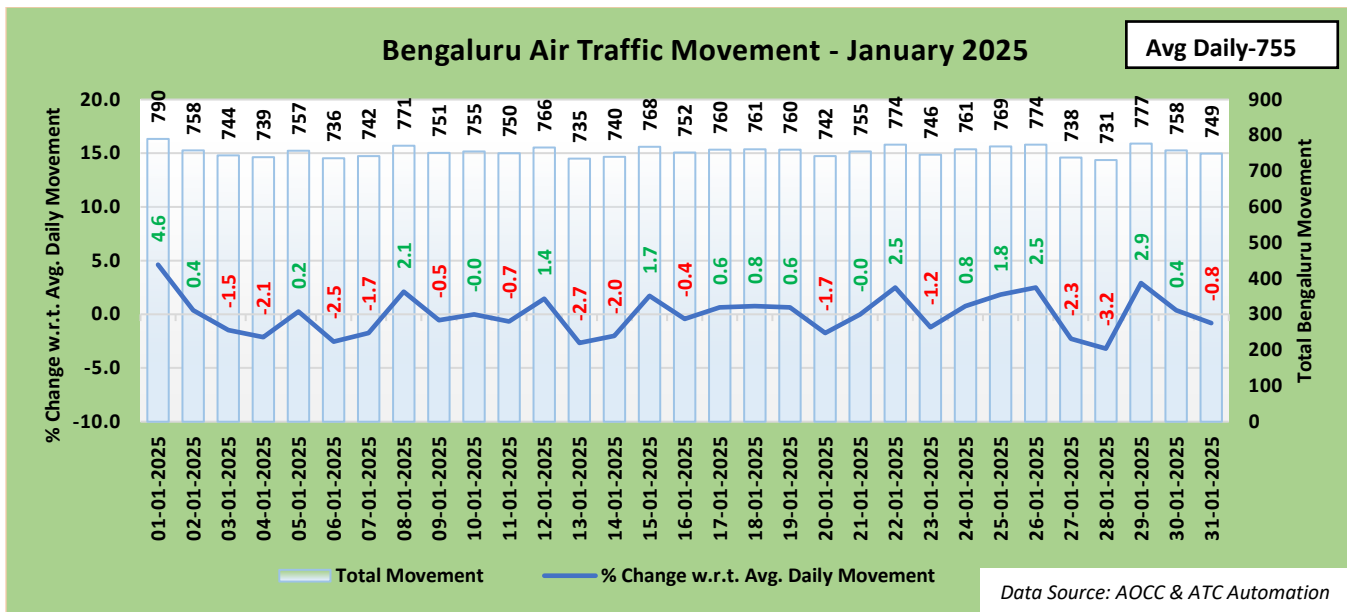


Figure 5: Air Traffic Movement for Bengaluru – Jan’25

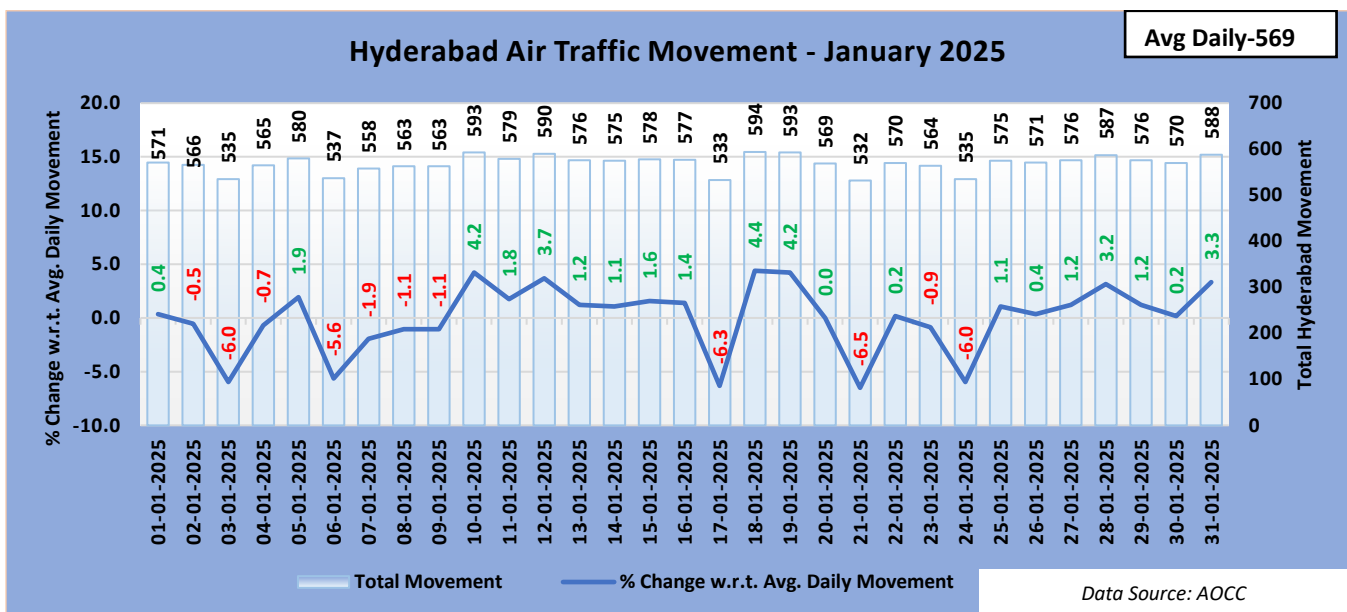


Figure 6: Air Traffic Movement for Hyderabad – Jan’25

It can be concluded from the above charts that the ATM at Delhi, Mumbai, Bengaluru and Hyderabad exceeds the average daily movement for 19days, 16 days, 17 days and 20 days respectively in the month of January 2025.





## II. Comparison of total ATMs (YoY) and Monthwise

The total Air traffic movement(ATMs) including Passenger and other flights such as Cargo flights, International scheduled, International non-scheduled, Domestic scheduled, Domestic non-scheduled, Air taxi & commercial business flights at six major Indian Airports namely Delhi, Mumbai, Bengaluru, Hyderabad, Kolkata and Chennai is plotted for the month of January for two consecutive years 2024 and 2025 respectively.

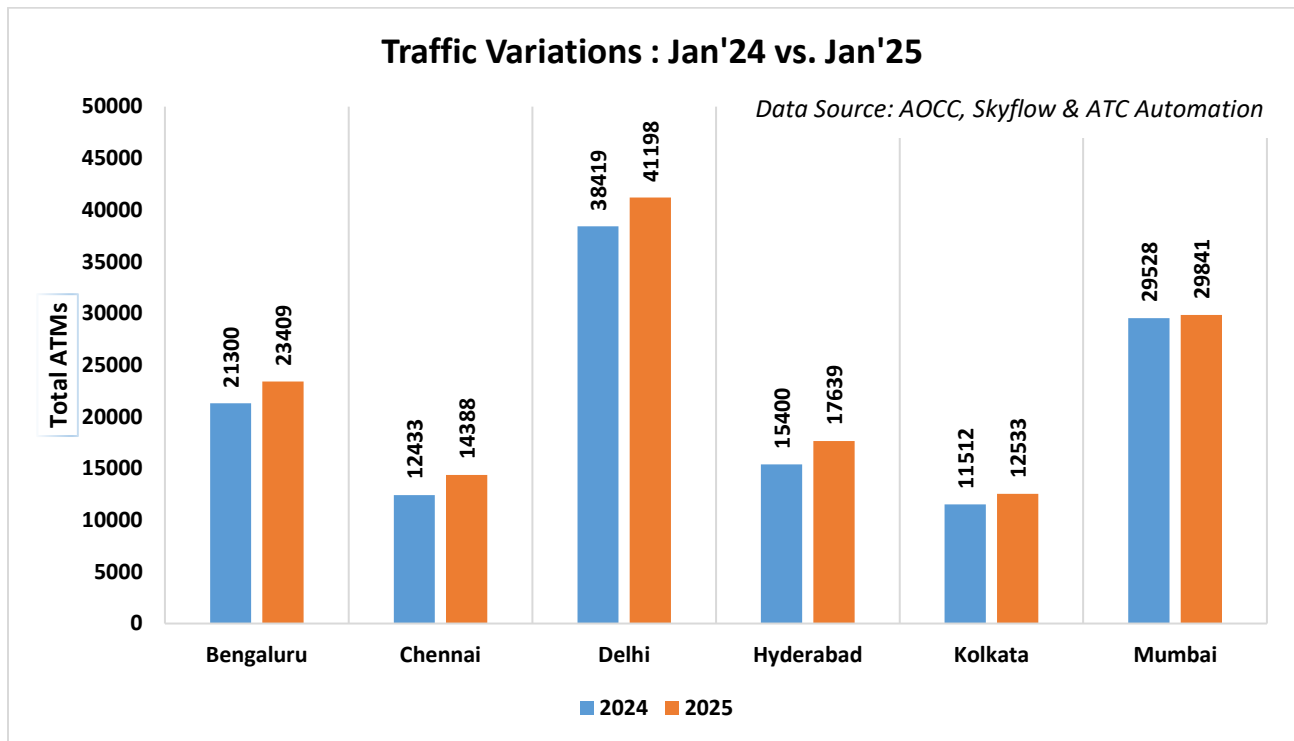


Figure 7: Traffic Variation (YoY)



### III. Flight Operations – Airlinewise

Air Traffic movement is also plotted Airline wise for the last six months for the major Scheduled Operators.

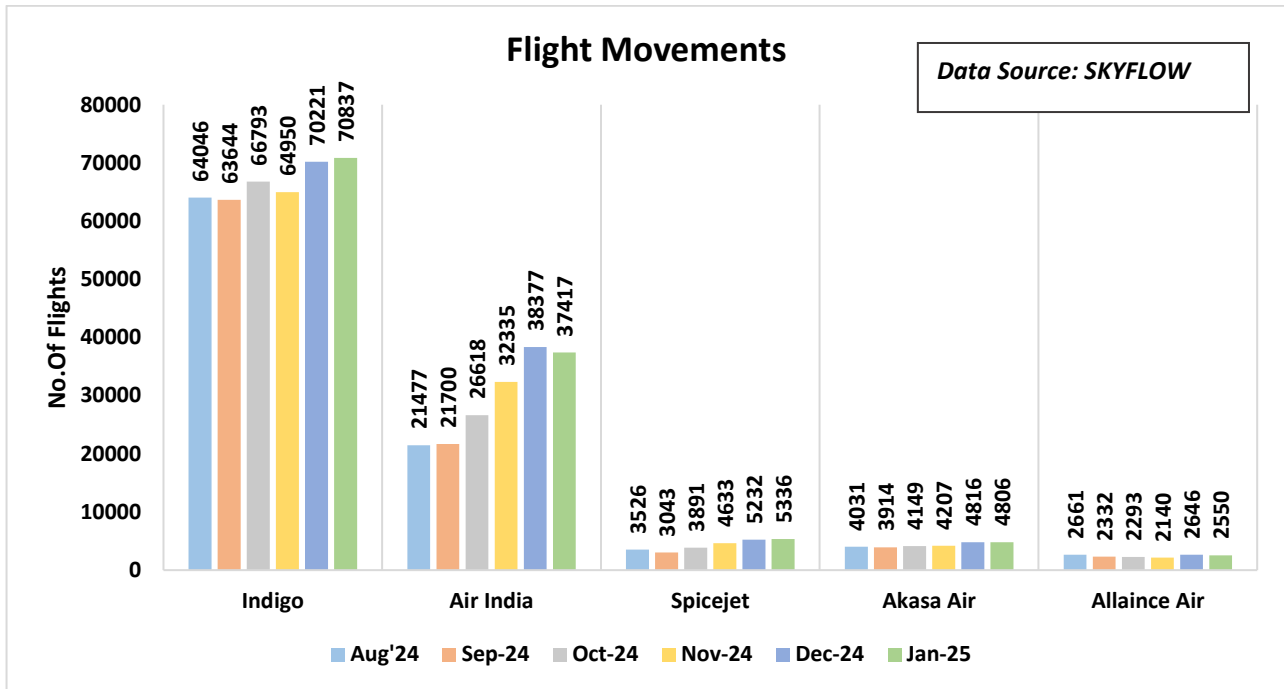


Figure 8: Flight Movements –Airlinewise

#### Inference:

1. Indigo and Spicejet airlines have recorded an increase in the monthly average( 31 days) Flight movement in January'25 as compared to December'24 while Air India, Akasa and Allaince air airline have recorded a decline during the same period.



## C. ATFM Post Operations – CDM Analysis

### I. Introduction

**Analysis Period** 1<sup>st</sup> – 31<sup>st</sup> January 25

**Back Ground** During the above mentioned period, **Four (04)** ATFM measure was applied for **Bengaluru Airport**, **Five (05)** ATFM measures were applied for **Chennai Airport**, **Ten (10)** ATFM measures were applied for **Delhi Airport** and **Thirty Six (36)** ATFM measures were applied for **Mumbai Airport** due to the following reasons as illustrated in the bar chart below:-

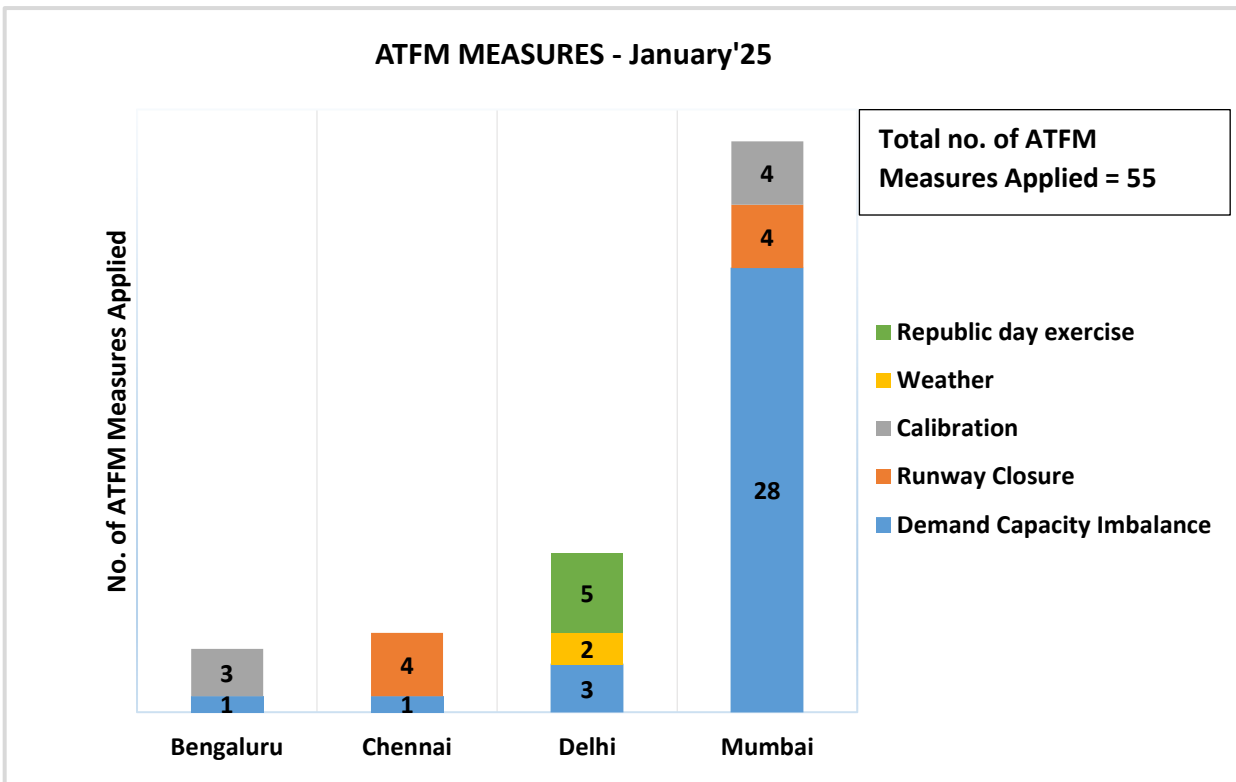


Figure 9: ATFM Measures –Jan’25



## II. ATFM Measures Overview

Constrained Airport	Bengaluru	Chennai	Delhi	Mumbai
Number of ATFM measures applied	4	5	10	36
Average ATFM Ground delay(in min) due to measures*	29.4	23.7	30.8	26
Maximum ATFM Ground delay(in min) due to measures	63	43	70	101
% Compliance	94	91.5	95.1	97.3

Note: \* *Average ATFM Delay* =  $\frac{\text{Total ATFM Delay}}{\text{Total Domestic Arrivals}}$

Total Arrivals	4126
Total International Arrivals(exempted)	929
Total affected flights in scenario (Domestic Arrivals)	3197
Total Domestic Arrivals with zero ATFM delay	162
Total Domestic Arrivals with ATFM delay	3035

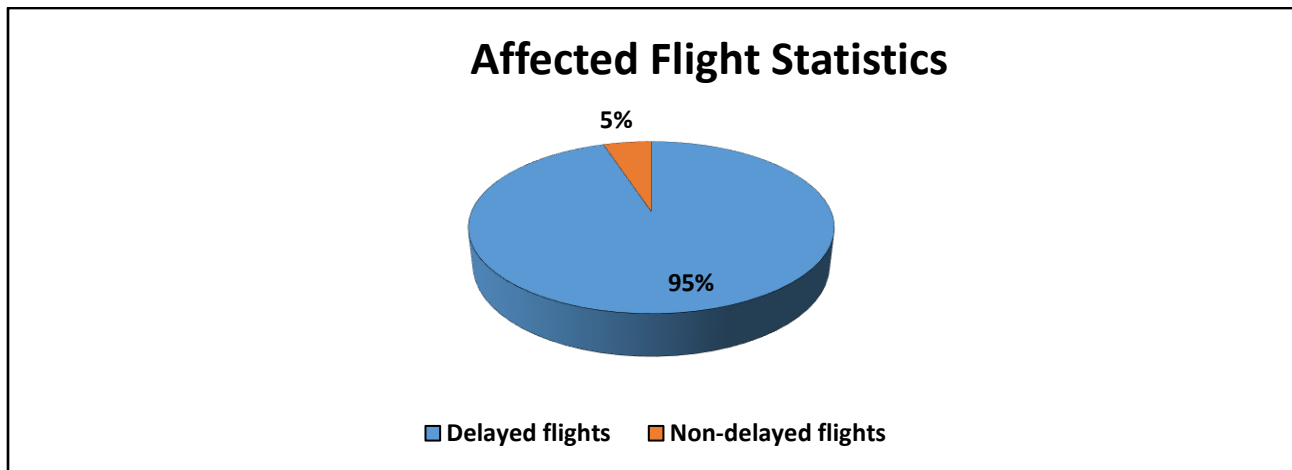
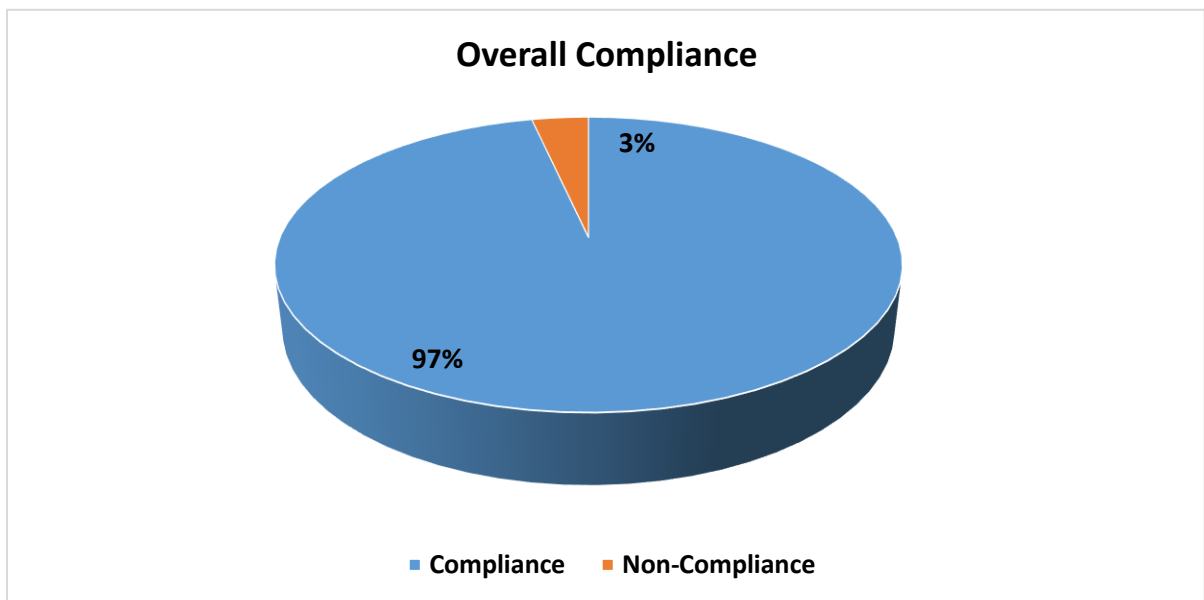


Figure 10: Affected Flight Statistics –Jan'25

### III. Overall Compliance

<b>Total arrivals</b>	4126
<b>Domestic arrivals</b>	3197
<b>Flights with complete data (ATOT)</b>	3131
<b>Flights with incomplete data</b>	12
<b>Flights Not Operated</b>	54
<b>Compliant*</b>	3022
<b>Non-Compliant</b>	109

\*Total No. of Revised CTOTs issued = 1036 (Compliance calculation for flights which were issued revised CTOT is w.r.t. new CTOT issued)



**Figure 11: Overall Compliance – Jan'25**

*NOTE: Flights with required data (i.e. ATOT) are only considered for compliance measurement*

**Out of the total domestic arrivals with complete data in the CDM scenario, 97% arrivals are compliant for the month of January 2025.**

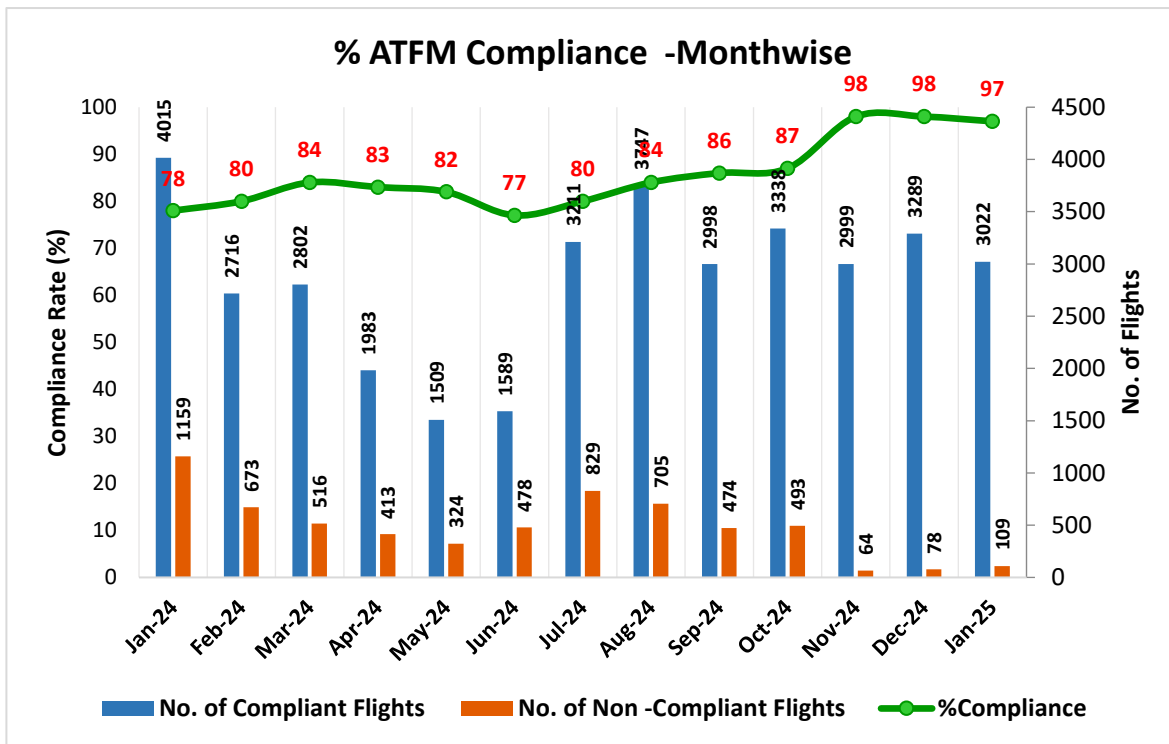


Figure 12: Compliance(Monthwise)

### Inference

1. Out of the total arrivals captured(4126 flights) during the CDM scenario for the constrained Airports, 77.5% of flights i.e. domestic arrivals(3197 flights) were candidates for ground delay(participating).
2. Out of these Domestic Arrivals(3197), 95% (3035 flights) are assigned ATFM ground delay.
3. Out of the total arrivals captured(4126 flights) to the constrained Airport during the ATFM scenario, 73.6% of flights(3035 flights) were assigned ATFM Ground Delay.



## IV. CTOT Compliance rate – Airportwise

MUMBAI FIR (98%)*	Compliant	Non Compliant	% Compliant
Ahmedabad	148	0	100%
Aurangabad	16	0	100%
<b>Mumbai</b>	<b>82</b>	<b>5</b>	<b>94%</b>
Bhuj	1	0	100%
Vadodara	23	0	100%
Bhopal	28	0	100%
Bhavnagar	2	0	100%
Diu	2	0	100%
<b>Hirasar, rajkot</b>	<b>25</b>	<b>2</b>	<b>93%</b>
Indore	63	1	98%
Jabalpur	12	0	100%
Jalgaon	4	0	100%
<b>Jamnagar</b>	<b>18</b>	<b>3</b>	<b>86%</b>
<b>Kandla</b>	<b>6</b>	<b>1</b>	<b>86%</b>
Kolhapur	8	0	100%
Keshod	3	0	100%
Nagpur	49	0	100%
Nasik	2	0	100%
Pune	27	0	100%
<b>Ratnagiri</b>	<b>0</b>	<b>1</b>	<b>0%</b>
Shirdi	11	0	100%
Surat	6	0	100%
Udaipur	38	1	97%
KOLKATA FIR (97%)*	Compliant	Non Compliant	% Compliant
Prayagraj	28	0	100%
Agartala	1	0	100%
<b>Ayodhya</b>	<b>25</b>	<b>1</b>	<b>96%</b>
Siliguri	35	1	97%
Shillong	1	0	100%
Varanasi	68	0	100%
Bhubaneswar	58	1	98%
<b>Chabua,Dibrugarh</b>	<b>0</b>	<b>1</b>	<b>0%</b>



Kolkata	171	7	96%
Chakeri	7	1	88%
Durgapur	8	0	100%
Darbhanga	14	0	100%
Deoghar	2	1	67%
Gorakhpur	31	0	100%
Guwahati	40	4	91%
Gaya	4	0	100%
Imphal	6	0	100%
Jharsuguda	4	0	100%
Khajuraho	3	0	100%
Aizawl	1	0	100%
Dibrugarh	5	1	83%
Patna	48	1	98%
Ranchi	15	1	94%
Raipur	30	0	100%
<b>DELHI FIR (92%)*</b>	<b>Compliant</b>	<b>Non Compliant</b>	<b>% Compliant</b>
Agra	3	1	75%
Amritsar	19	1	95%
Awantipur Air Force Station	1	0	100%
Bikaner	1	0	100%
Bhuntar	2	0	100%
Bathinda	1	0	100%
Bareilly	4	0	100%
Chandigarh	49	5	91%
Dehradun	22	1	96%
Delhi	368	31	92%
Hindon	1	0	100%
Kangra	6	0	100%
Gwalior	6	1	86%
Jodhpur	14	4	78%
Jaipur	80	1	99%
Jaisalmer	1	0	100%
Jammu	14	3	82%
Leh	10	3	77%
Lucknow	69	1	99%
Suratgarh	1	0	100%
Shimla	5	0	100%





Srinagar	21	5	81%
Uttarlai	0	1	0%
CHENNAI FIR (98%)*	Compliant	Non Compliant	% Compliant
Agatti	2	1	67%
Hal Bangalore	5	2	71%
Bangalore	263	5	98%
Belgaum	1	0	100%
Vijayawada	27	0	100%
Coimbatore	64	0	100%
Kochi	95	1	99%
Calicut	12	1	92%
MOPA Goa	71	0	100%
Goa	123	3	98%
Hubli	4	0	100%
Shamsabad, Hyderabad	169	0	100%
Begumpet Hyderabad	3	0	100%
Vijaynagar	0	1	0%
Kannur	10	0	100%
Madurai	23	0	100%
Mangalore	37	0	100%
Chennai	127	0	100%
Nanded	1	0	100%
Port Blair	15	3	83%
Pondicherry	2	0	100%
Rajahmundry	15	0	100%
Shivamogga	2	0	100%
Salem	1	0	100%
Tuticorin	6	0	100%
Tirupati	6	0	100%
Tiruchirappally	7	0	100%
Thiruvananthapuram	32	0	100%
Visakhapatnam	18	3	86%

\*FIR wise compliance rate (decimals rounded off to nearest integer value).

Note: The above list contains only those airports which had flights to the Constrained Airport and are affected by ATFM measures.

**Airports with % compliance less than the average compliance(97%) for the month are highlighted in red.**



### V. CTOT Compliance rate – Airlinewise

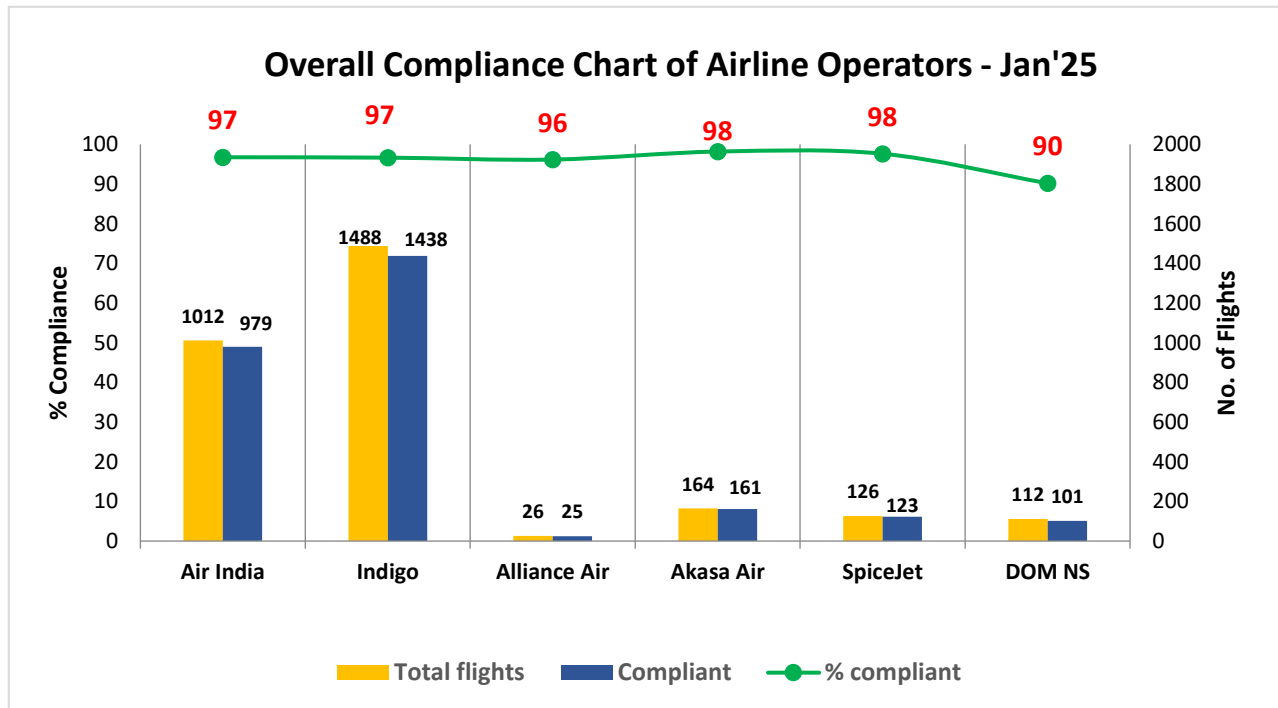


Figure 13: Airline wise Compliance –Jan’25

#### Inference

1. Chennai and Mumbai region record the highest compliance of 98% whereas Delhi region has the lowest percentage compliance of 92%.
2. Air India, Akasa, Indigo and Spicejet Airlines have a CTOT compliance higher than the average recorded compliance for the month of January’25.

## VI. Reason For Non Compliance

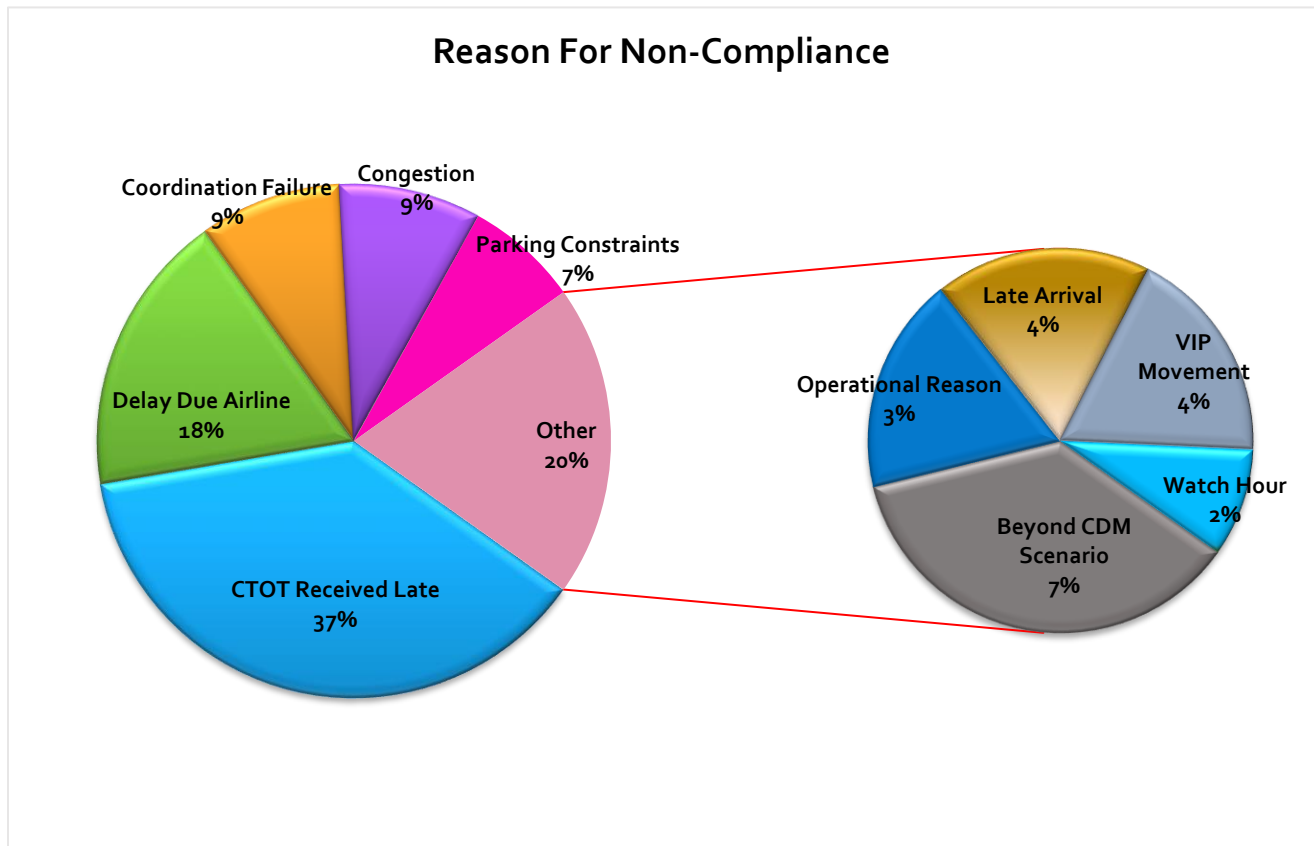


Figure 14: Reason for Non-Compliance as provided by FMPs

### Inference:

1. 37 % of the CTOT Non- compliance was reported by concerned FMPs to be due to late receipt of CTOTs and by the time the aircraft had already initiated pushed back or startup.
2. 18 % of the CTOT Non- compliance was due to airline delay. Updated EOBTs of such flights was not available to ATFM unit leading to wastage of unused slots.
3. 9 % of CTOT Non- Compliance was reported by concerned FMPs to be due to coordination failure at various airports.

## VII. Air Delay during the CDM Scenario period

Average Air Delay to domestic arrivals\* within the CDM Scenario period for Bengaluru, Chennai, Delhi and Mumbai was 8.9, 6.0, 9.6 and 8.9 minutes respectively.

\*Note: Only calculated for domestic arrivals with both ATOT and ALDT information

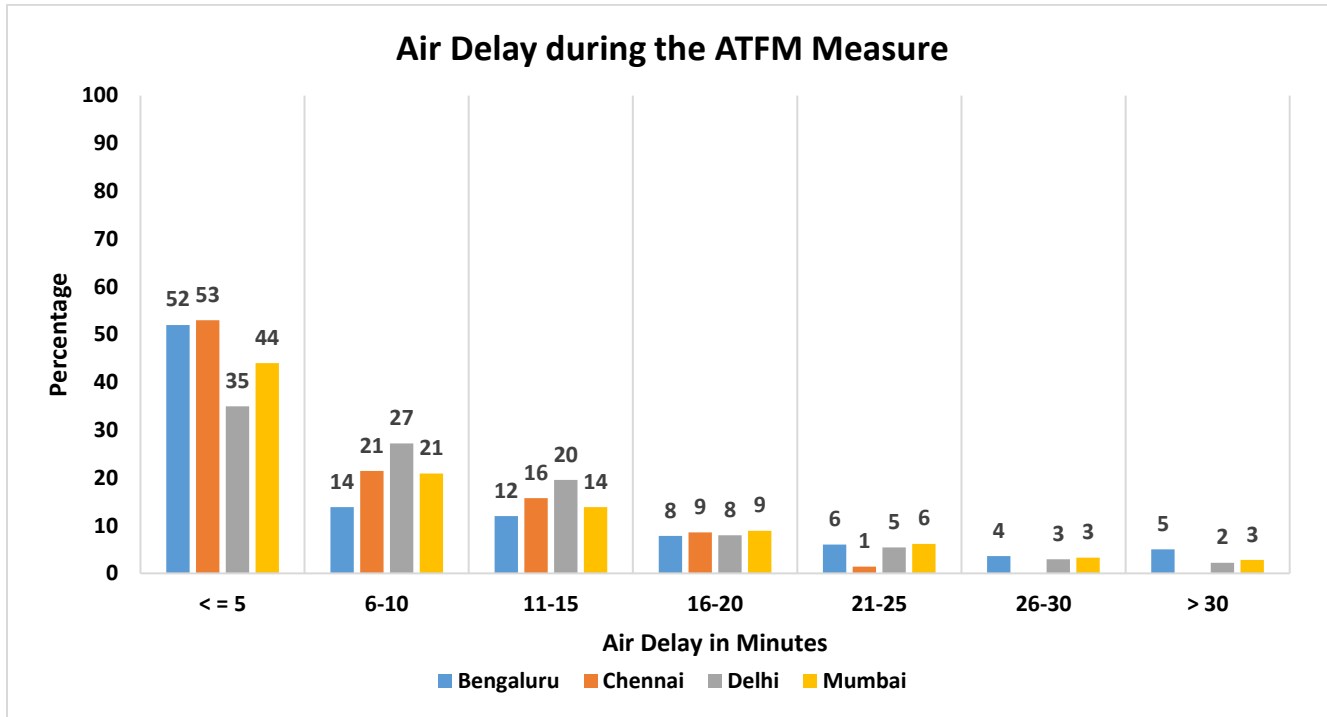


Figure 15: Air Delay distribution during the CDM period

### Inference

1. 66% of domestic arriving flights to Bengaluru had an Air delay of equal to or less than 10 minutes during the CDM period.
2. 74% of domestic arriving flights to Chennai had an Air delay of equal to or less than 10 minutes during the CDM period.
3. 62% of domestic arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period.
4. 65% of domestic arriving flights to Mumbai had an Air delay of equal to or less than 10 minutes during the CDM period.



## VIII. Tangible Benefits due to ATFM Measures

A modest attempt is made to find out the tangible benefit of ATFM measures applied.

### Assumptions:

- When ATFM measures are not in force, all flights take off at their ETOT where Estimated take off time(ETOT)= Estimated off block time(EOBT) + default taxi time
- All flights have an Estimated elapsed time(EET) as calculated by SKYFLOW using the Flight Plan information and Basic Aircraft data.

### Methodology:

**Air delay (with ATFM measures in force)** is calculated during the period when ATFM measures are in force by summing the air delay for all the flights landing at constrained Airport.

i.e. **Total Air Delay =  $\sum$  (Actual Flying time – SKYFLOW calculated EET)**

Air delay (with no ATFM measures) is calculated as the sum of Air delay for all the flights during the above said period with no ATFM measures in place and the air delay for each flight is the difference in its ideal landing time and its ideal estimated landing time.

**Total Air Delay (with no ATFM measures) =  $\sum$  (Ideal LDT - Ideal ELDT)**

\*Ideal LDT is taken by assuming every flight is landing at a specified interval based on the Arrival acceptance rate(AAR) defined,

\*Ideal ELDT = ETOT + SKYFLOW calculated Flying time

### Fuel Saving Calculation :

Great Circle Distance(GCD)\* was calculated for all the arrivals during the ATFM Measure from the point of origin to destination. Assuming Airbus 320 as reference aircraft for flights (flight distance equal to or less than 3000 nm) and B777 for international flights (flight distance more than 3000nm):

Fuel consumption (Kgs / nm) for each affected flight in the scenario was then calculated using the Reference document: ICAO Carbon emissions calculator methodology, version10, Appendix C: ICAO Fuel Consumption Table.

The Fuel consumed per minute(Kg/min) was calculated for each affected flight.



Total Air Delay(with ATFM Measures)= 29127 mins

Total Air Delay (with no ATFM measures) = 72811 mins

Reduction in Air delay due to ATFM measures= (72811-29127) = **43684 mins**

#### **Fuel Saving Calculation:**

Total Fuel saved during the ATFM Measure: **24,96,860.46 Kg**

**Total reduction in CO<sub>2</sub> emission : 3.16(KgCO<sub>2</sub>/kg fuel)\* 24,96,860.46 Kg = 78,90,079.05 Kg**

*\*GCD (Great Circle Distance): The distance between origin and destination airports is derived from latitude and longitude coordinates originally obtained from ICAO Location Indicators database.*

*3.16 = constant representing the number of tonnes of CO<sub>2</sub> produced by burning a tonne of aviation fuel.*



## D. Glossary

<b>ATFM Parameters</b>	<b>Definition</b>
<i>Affected Flight statistics</i>	An insight of participating traffic in the scenario i.e. ratio of the domestic arrivals to the constrained airport affected by ATFM measures (assigned delay by the Ground Delay Program) to the domestic arrivals not affected by ATFM measures (not assigned any delay) within the CDM scenario.
ATFM Ground delay	ATFM ground delay defined as CTOT-ETOT (Calculated take off time – Estimated take off time)
<i>Average ATFM delay</i>	$\frac{\text{Total monthly ATFM delay (in minutes)}}{\text{Total Domestic Arrivals}}$
<i>Maximum ATFM delay</i>	Maximum ATFM delay (in minutes) assigned in the month
<i>Overall compliance rate</i>	Defined as monthly ATFM departure slot adherence rate of regulated flights. Flights having ATOT within the ATFM Slot Tolerance Window (STW) of minus 5 to plus 10 minutes of CTOTs, are considered as compliant flights
<i>CTOT Compliance rate of Airline operators</i>	An overview of CTOT compliance rate of various Airline operators
<i>CTOT Compliance rate of Airports within different Regions</i>	An overview of CTOT compliance rate of Airports within 4 FIRs
Air delay statistics	<p>Air delay defined as difference between AET &amp; EET, where AET (actual elapsed time) can be obtained from (ALDT-ATOT) and estimated elapsed time (EET) can be obtained from FPL/RPL or (CLDT-CTOT). <b>Therefore, Air delay = AET-EET</b></p> <p>Average Air Delay is calculated as:</p> $\text{Average Air Delay} = \frac{\text{Total Air Delay to domestic arrivals (with values greater than zero)}}{\text{Total Domestic Arrivals}}$ <p>CLDT: Calculated Landing Time CTOT: Calculated Take off Time ALDT: Actual Landing Time ATOT: Actual Take off Time</p>



## Annexure-A

Compliance by Airlines with Flight Planning Requirements of Common Business rules(CBR)- January 2025.





**I. Introduction:**

Accurate and timely input in respect of flight intent is paramount to the correct traffic demand projection and eventually effective ATFM implementation. FPLs remain the main source of tactical demand prediction for ATFM systems. Early filing of error free FPL helps in improving the lead time required for ATFM measures and reduces the number of unexpected flights(pop-up). This in turn helps in improving the accuracy of demand-capacity imbalance prediction and optimizes slot utilization.

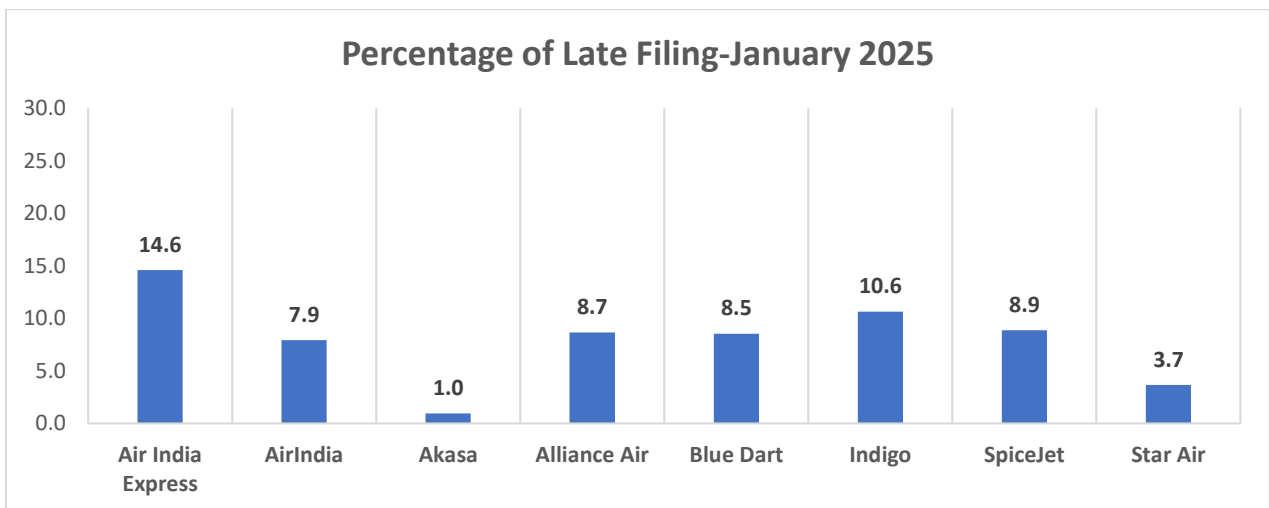
AIP India, ENR 1.9 section 4 on Flight Planning in the context of ATFM recommends Flight Planning requirements for all Airline Operators –

- a) Flight plans shall be submitted at least 3 hours before the estimated off block time (EOBT);
- b) The window for filing FPL is between 3 Hours and 120 Hours (Five days) before the EOBT. Earlier filing of FPL will give a realistic demand data to the CCC and hence the requirement of ATFM measures can be identified early for better planning. Late filing of a flight plan will lead to inaccuracies in predicting the demand and may lead to undesirable delay;”

**II. Analysis**

- A. An analysis has been conducted to find out the difference between the flight plan filing time and filed EOBT for all the FPLs received at ATFM system from 1<sup>st</sup> January 2025 to 31<sup>st</sup> January 2025. The purpose of the analysis is to monitor the compliance with provisions of AIP India, section 4, ENR 1.9 regarding Flight Planning requirements in context of the ATFM.

This flight plan filing requirement has been reiterated through the recently agreed ATFM common business rules (CBR) document and is recognized as a metrics to be monitored regularly for any improvement.





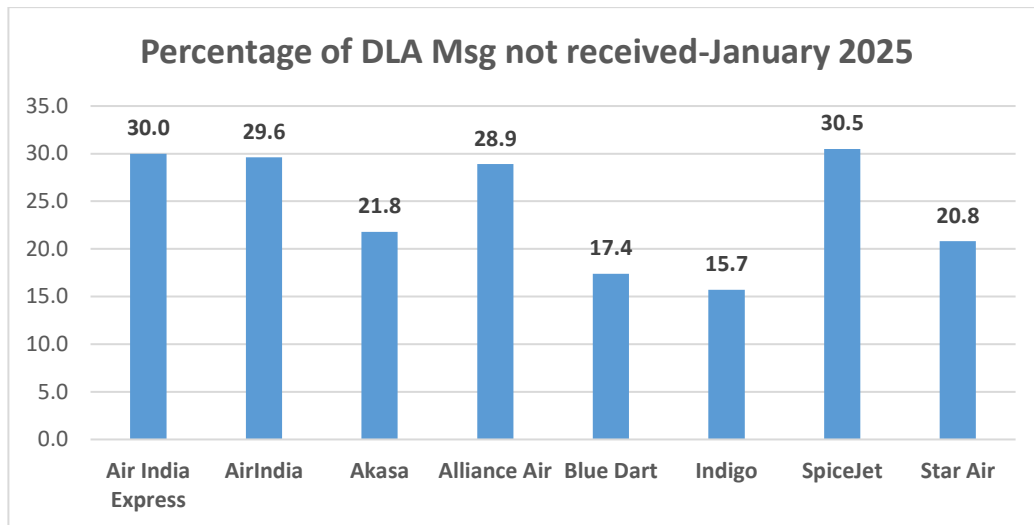
The table below lists number of filed flight plans (FPLs) with less than 3 Hours prior to EOBT:

Name of Airline	Late Filed FPL	Total No. Of FPL	% Delayed Filing
AirIndia Express	2011	13723	14.6
AirIndia	1816	22925	7.9
Akasa	40	4199	0.9
Alliance Air	177	2044	8.6
Blue Dart	56	656	8.5
Indigo	7343	69051	10.6
SpiceJet	421	4741	8.8
Star Air	44	1199	3.6
<b>Total no. of FPLs for Scheduled Airlines</b>	<b>11908</b>	<b>118538</b>	<b>10.0</b>

- B. For the analysis of non-receipt of DLA (Delay) messages for flight plans filed, the EOBT of FPL received has been compared with Actual Take off time (ATOT) received through DEP (Departure) messages. Thus, only those FPLs were considered for analysis for which DEP messages were available and no associated DLA messages was received.

The Table below lists number of flights for which no DLA message was received in January 2025. **{{EOBT of original FPL}- (ATOT received)} > 30 minutes**

Name of Airline	DLA Message not received	Total No. of flights considered for analysis	% of flights for which no DLA message was received
Air India Express	3037	10108	30.0
AirIndia	5565	18792	29.6
Akasa	760	3481	21.8
Alliance Air	323	1116	29.9
Blue Dart	105	602	17.4
Indigo	8489	53795	15.7
SpiceJet	1026	3360	30.5
Star Air	91	437	20.8



- C. For analysis of non-receipt of CNL (cancel) messages for January 2025, annulled FPLs were considered for which no CNL/DEP/DLA messages were received. A FPL gets annulled in SKYFLOW system, if it doesn't get activated through Dep message /surveillance data/ manual activation by FMP within a defined system parameter.

The table below lists the number of Flights for which no CNL Msg. was received in January 2025:

Name of Airline	CNL message not received	No. of flights annulled
Air India Express	16	180
AirIndia	4	104
Akasa	1	22
Alliance Air	0	240
Blue Dart	0	5
Indigo	11	340
SpiceJet	5	114
Star Air	2	41



## Annexure-B

### CASE STUDY

#### Republic Day Airspace Closure(2025)

##### A. Introduction:

Due to the Republic Day celebrations, Delhi Airport/Airspace was closed as specified vide NOTAM no. A0046/25, A0051/25 & A0052/25. Restrictions were also imposed on domestic non-scheduled movements vide A0053/25

##### **(A0052/25 NOTAMN**

Q) VIDF/QFAXX/IV/BO/A/000/999/2834N07707E005

**A) VIDP B) 2501190450 C) 2501260715**

**D) 0450-0715**

**E) NO LDG AND TKOF PERMITTED AT IGI AP, NEW DELHI (VIDP) DUE REPUBLIC DAY CELEBRATIONS.)**

##### **(A0051/25 NOTAMN**

Q) VIDF/QRACA/IV/NBO/W/000/200/2834N07707E050

**A) VIDF B) 2501190500 C) 2501260715**

**D) 0500-0715**

**E) AIRSPACE WI A RADIUS OF 50NM AROUND DELHI VOR (DPN), EXCLUDING AREAS OF 10NM RADIUS AROUND SIKANDRABAD VOR (SSB) AND 10NM AROUND SAKRAS VOR (SKA), NOT AVBL DUE REPUBLIC DAY CELEBRATIONS.**

**F) GND G) FL200)**

##### **(A0046/25 NOTAMN**

Q) VIDF/QRACA/IV/NBO/W/000/999/2834N07707E162

**A) VIDF B) 2501260300 C) 2501291330**

**D) 26 0300-0730 0930-1230, 29 0930-1330**



E) 1. IN CONNECTION WITH REPUBLIC DAY CELEBRATIONS, NO FLT PERMITTED TO TKOF/LAND, AT INDIRA GANDHI INTERNATIONAL AP (VIDP), NEW DELHI AND SUBSIDIARY AIRPORTS WI A RADIUS OF 300KM AROUND DELHI (WI DELHI FIR), EXC FLW FLT:

I. SKED FLT BY THE SKED FLT OPR.

II. INDIAN AIR FORCE(IAF), BSF AND AVIATION RESEARCH CENTRE(ARC) FLTS.

III. ARMY AVIATION HEL FLT UNDERTAKING AIRBORNE QRT MISSIONS AND CASUALTY/ IMMEDIATE MEDICAL EVACUATION.

IV. STATE OWNED ACFT/ HEL FLYING THE GOVERNOR OR CHIEF MINISTER OF A STATE.

2. SKED FLT BY SKED OPR ON ATS RTE PERMITTED A) TO OVERFLY A ZONE OF 300KM RADIUS AROUND IGI AIRPORT (DELHI) ABOVE F290 EXCEPT OVER VIP89.

B) TO TKOF OR LAND FM/AT A SUBSIDIARY AIRFIELD LOCATED BEYOND 300KM FM DELHI PROVIDED WHILE CMB SHALL ATTAIN F290 BY 200KM TO DELHI AND WHILE DESCENDING SHALL COMMENCE DESCEND FM F290 AT A DIST OF 200KM OR MORE FM DELHI.

3. SAFDARJUNG AP (VIDD) SHALL REMAIN CLSD DRG THE ABV MENTIONED DATES AND TIMINGS EXCEPT FOR IAF HELICOPTERS, WHICH MAY BE DEPLOYED FOR EMERG DUTY OR VVIP DUTY, FLY PAST ACTIVITIES AND FOR BSF/IAF HEL UTILISED BY THE NSG.

4. ROHINI HLP (284507N0770331E) SHALL REMAIN CLSD DRG ABV MENTIONED DATES AND TIMINGS.

F) GND G) UNL)

**(A0053/25** NOTAMN Q) VIDF/QFAXX/IV/NBO/A/000/999/2834N07707E005

**A) VIDP**

**B) 2501190430**

**C) 2501250745**

**D) DLY 0430-0745**



E) IN VIEW OF AIRSPACE CLOSURE AND EXP TFC CONGESTION, DOM NON-SKED FLT NOT PERMITTED TO OPR AT IGI AP.)

## B. Executive Summary

All stakeholders CCC CATFM, ATM IGIA Delhi, Airport operator M/s DIAL (Slot team), All Airlines and IAF at Airport level had undertaken the exercise to review the demand capacity imbalance arisen due to said event and associated closures at strategic/pretactical level.

A virtual meeting was conducted on 17<sup>th</sup> Jan'25 with all stakeholders' including senior officers from Delhi ATC to discuss the modalities for the upcoming Delhi Airspace/Airport closure and review the challenges faced during the last year's Airspace closure to identify bottlenecks and resolve them and incorporate best practices in year 2025.

Revised schedule as approved by DIAL was made available by respective Airlines to the ATFM team on 16<sup>th</sup> Jan'25.

A representative each from Air India & Indigo Airlines was present in CCC for all days of the Republic Day Airspace closure. Their presence helped in timely and effective coordination with the Flight dispatch and operations.

All ATS in-charges/FMPs were informed to be abreast with the latest NOTAM w.r.t. republic day celebration and ensure that FMP position was manned by SKYFLOW trained staff.

CCC apprised all FMPs regarding the availability of CTOTs through the SKYFLOW system through planned Teleconferencing conducted on each day of the exercise.

Exercise was called off on 24<sup>th</sup> Jan'25 by Indian Airforce being a standby day.

## C. Highlights:

1. All stakeholders collaboratively decided to prepare a revised schedule for operation on the days of closures such that demand and capacity were balanced at pre-tactical level. Such revised schedule was smoothened for the whole days by curtailing and/or shifting the schedule appropriately. **Such smoothened schedule for the event has been proven to be effectively planned, as tactically i.e. on the day of operations, pre-closure/s there was no need to apply flow measures whereas after the closure/s the flow measures were required for only one hour and forty-five minutes.**
2. Stakeholder's meeting prior to the closure helped in raising awareness about the applicable NOTAM and proposed ATFM measures.
3. Better coordination with Delhi ATC as per the agreed plan.
4. Presence of Airline representatives from 2 major Airlines helped in communication flow.
5. During pre-closure and post-closure, there was westerly mode of operation at IGIA Delhi. **Air traffic flow before and after the closure was observed to be smooth .**



- 6. The CTOT compliances during these five days of closure were in the range of 95% to 100% whereas accuracy of flow measures was in the range of 92% to 95%.

### D. Challenges:

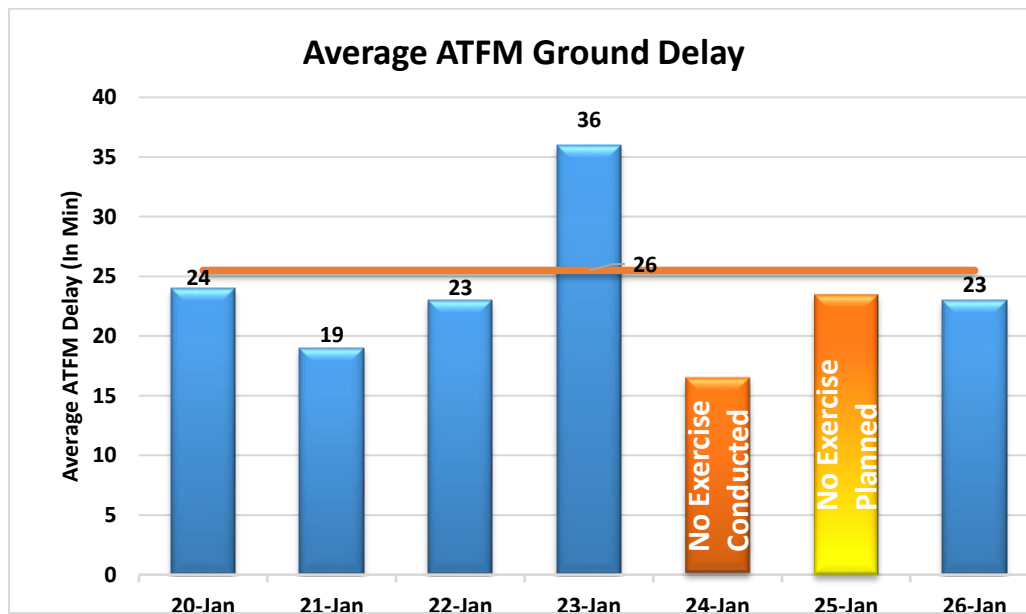
- 1. CTOT dissemination to smaller Airports (under the Regional Connectivity Scheme) still remains a challenge.
- 2. Few domestic non-scheduled operators were not aware of the restriction imposed on them and had to be telephonically advised to revise their EOBTs
- 3. On 23-01-2025, international non-schedule operator and cargo operator were observed to be operating just after the closure, gaining preference over domestic schedule passenger flights. With active intervention of DIAL AOCC, the issue was resolved for the next day onward.

### E. Overview:

The data for the period during which ATFM measures were applied in Delhi on 20<sup>th</sup>,21<sup>st</sup>, 22<sup>nd</sup> , 23<sup>rd</sup> & 26<sup>th</sup> January 2025 was analyzed for following ATFM parameters.

*(Flights with complete data i.e. ATOT, ALDT etc. are only taken into consideration. ATOT was obtained from all concerned airports for verifying CTOT compliance.)*

#### I. Average ATFM Ground Delay

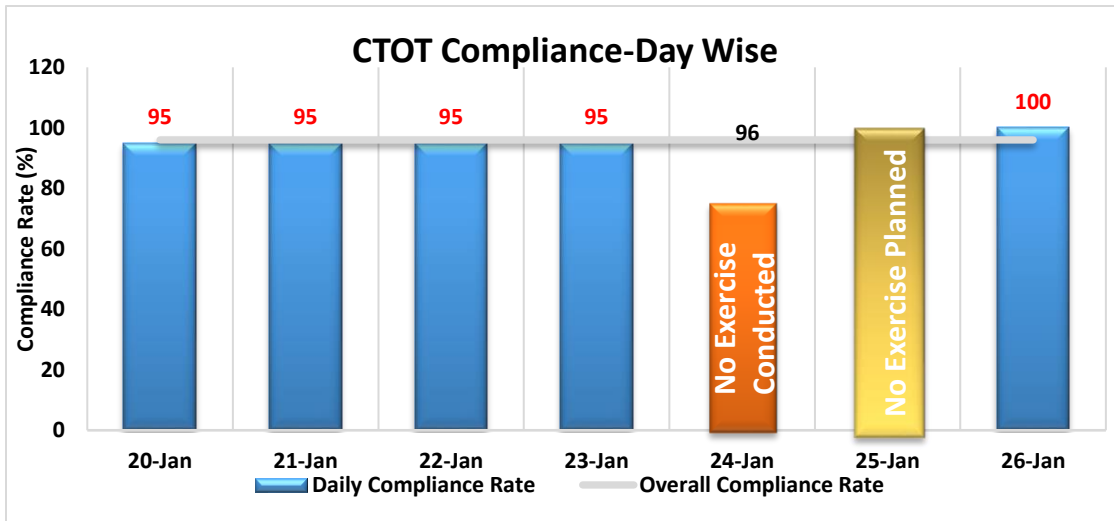


#### Inference



1. Average ATFM ground delay was large on 23<sup>rd</sup> Jan'25 as international non-schedule operator and cargo operator were observed to be operating just after the closure, gaining preference over domestic schedule passenger flights.

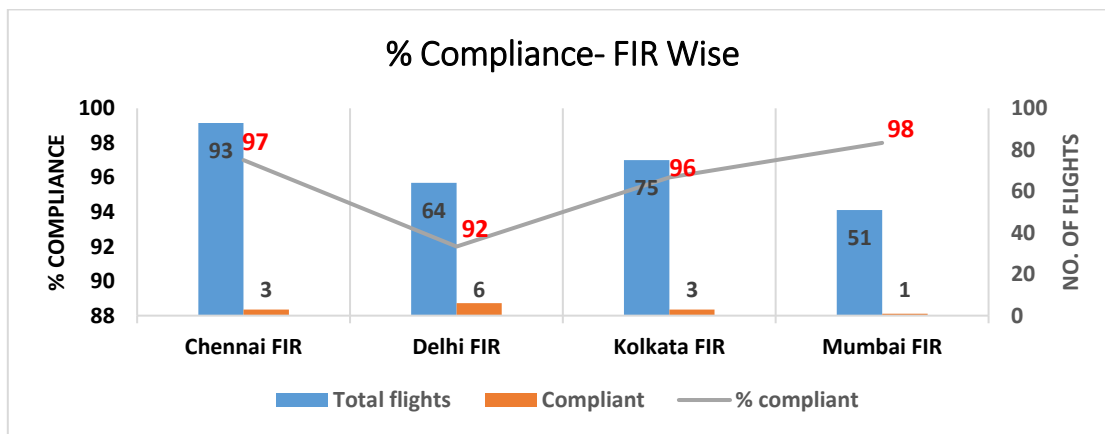
**II. CTOT Compliance – Day wise:**



**Inference:**

1. Some non compliances were observed on the five days of Republic day exercise however, all the stations contributed for successful airspace closure for such days resulting in an average CTOT compliance of 96%.

**III. CTOT Compliance (FIR-wise)**



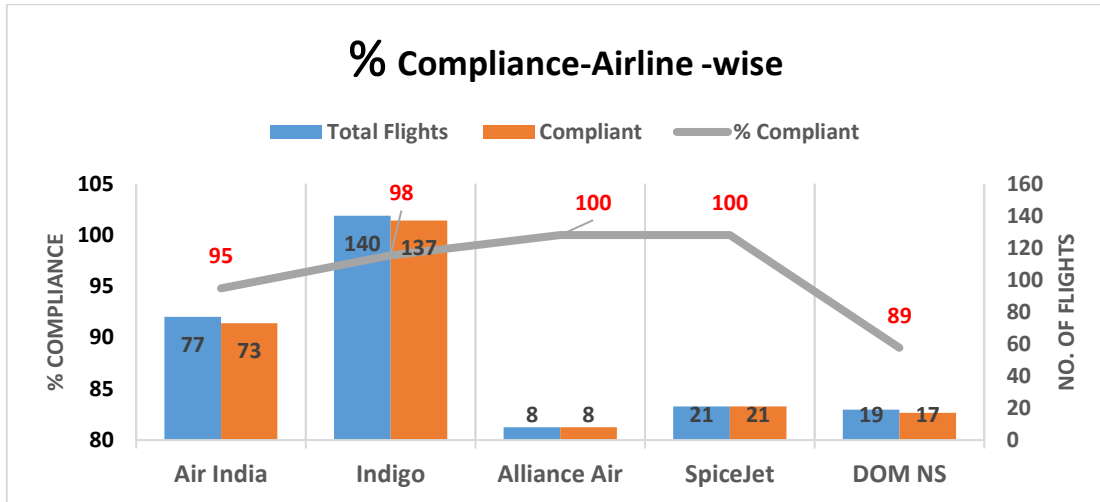




**Inference:**

1. Chennai FIR has the highest Compliance of 97% whereas Delhi FIR has the lowest of 87%.

**IV. CTOT Compliance (Airline-wise)**



**Inference**

1. Alliance Air and Spicejet has the highest compliance of 100% whereas Air India has the lowest compliance of 95% among scheduled operators. Non Scheduled operators have a compliance of 89%.

**Way Forward**

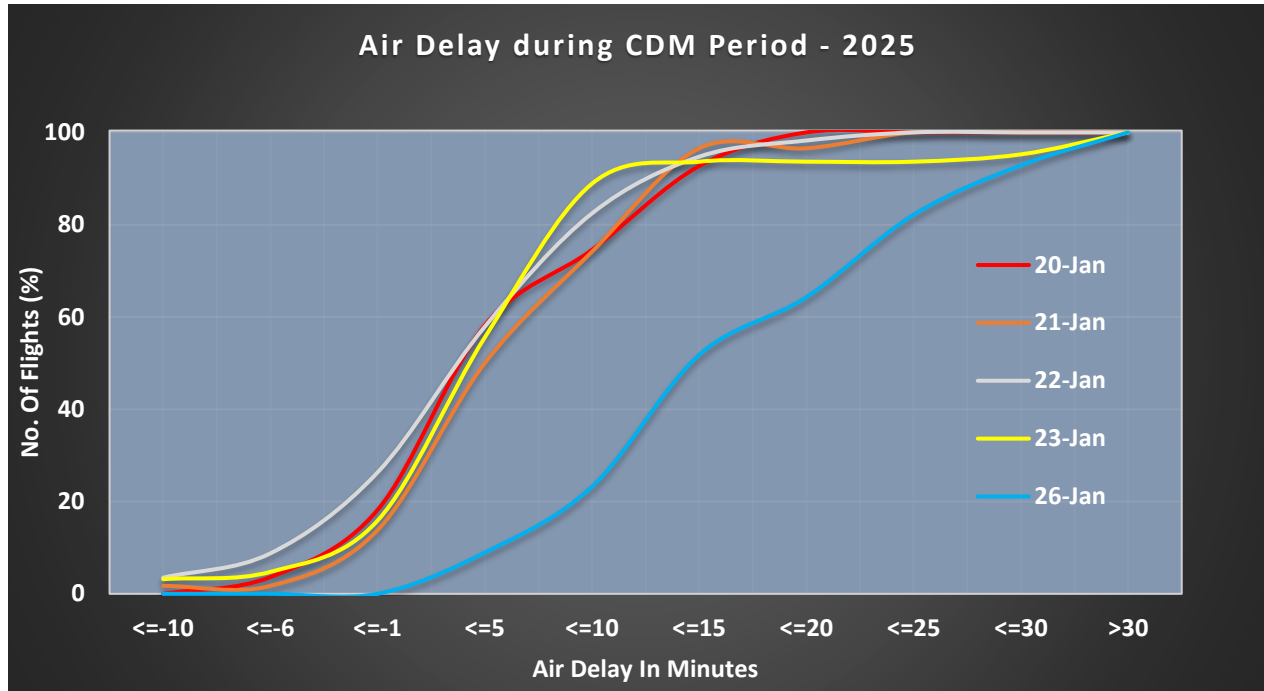
1. One of the NOTAM A0053/25 related to closure, posed restrictions on domestic non-schedule flight operation at IGIA, 30 minutes prior and after the closure. **Stakeholders may consider to discuss the issue by extending such restrictions to one hour before and after the closure with its application on international non- schedule flight also.** Such modification may provide lesser ATFM ground delay to scheduled passenger flight, who have collaborated to change their schedule to meet the situation objective.
2. In respect of all such events necessitating preparation of revised smoothed schedule due to demand capacity imbalance, associated strategic/ pre-tactical exercise should be started further in advance such that **final revised smoothed schedule is sent from airport operator to airlines at-least 10 working days in advance. Subsequently airlines should send such revised schedule to CCC CATFM in the designated format at-least 7 working days in advance.** Availability of such revised schedule at CCC CATFM timely will facilitate such schedule to be fed in the Skyflow automation system, analyse it in detail and develop the strategy to handle such changed scenario. In case of requirement, CCC CATFM can also call meeting of stakeholders to share its analysis, strategies to handle changed scenario and conduct revised negotiations, if any, timely to facilitate efficient air traffic flow at constrained airport.



3. Feedback/comments were sought from all the stakeholders about the challenges faced pertaining to flow measures during such event and associated closure for the continual improvement in the ATFM processes.



**V. Cumulative Air Delay during the period when ATFM measures were inforce.**



**Inference:**

1. 75% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period on 20 Jan'25.
2. 74% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period on 21 Jan'25.
3. 82% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period on 22 Jan'25.
4. 89% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period on 23 Jan'25.
5. 23% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period on 26 Jan'25.

**F. Fuel Saving due to ATFM Measures during the Republic Day closure:**

The Fuel consumed per minute(Kg/min) was calculated for each affected flight.

Total Air delay (with ATFM measures) = **2687 min**

Total Air delay (with no ATFM measures) = **11366 min**

Total amount of Air delay reduced due to ATFM measures=  $11366-2687=$  **8679 min**

**Fuel Saving Calculation:**

Total Fuel saved during the ATFM Measure: **4,93,527.31 Kg**

**Total reduction in CO<sub>2</sub> emission :  $3.16(\text{KgCO}_2/\text{kg fuel}) * 4,93,527.31 \text{ Kgs} = 15,59,546.29 \text{ Kg}$**

*3.16 = constant representing the number of tonnes of CO<sub>2</sub> produced by burning a tonne of aviation fuel.*

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