POST OPERATIONS ANALYSIS REPORT

January, 2020

CENTRAL COMMAND CENTER, C-ATFM, DELHI

Contents

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Monthly Post Operations Analysis

A. Introduction

Analysis Period   1st – 31st Jan'20

Back Ground   ATFM operations commenced in India w.e.f. 27/04/2017 vide AIP supplement 25/2017, to resolve Demand Capacity imbalance at six (06) major Airports in phase-I i.e. Delhi, Mumbai, Bengaluru, Kolkata, Chennai & Hyderabad. At present, ATFM measures are applied to Domestic arrivals only at constrained Airports.
During the above mentioned period, ATFM measures were applied twice (2) for Bengaluru, two (2) times for Mumbai and eight (8) times for Delhi Airport due to the following reasons as illustrated in the bar chart below:–
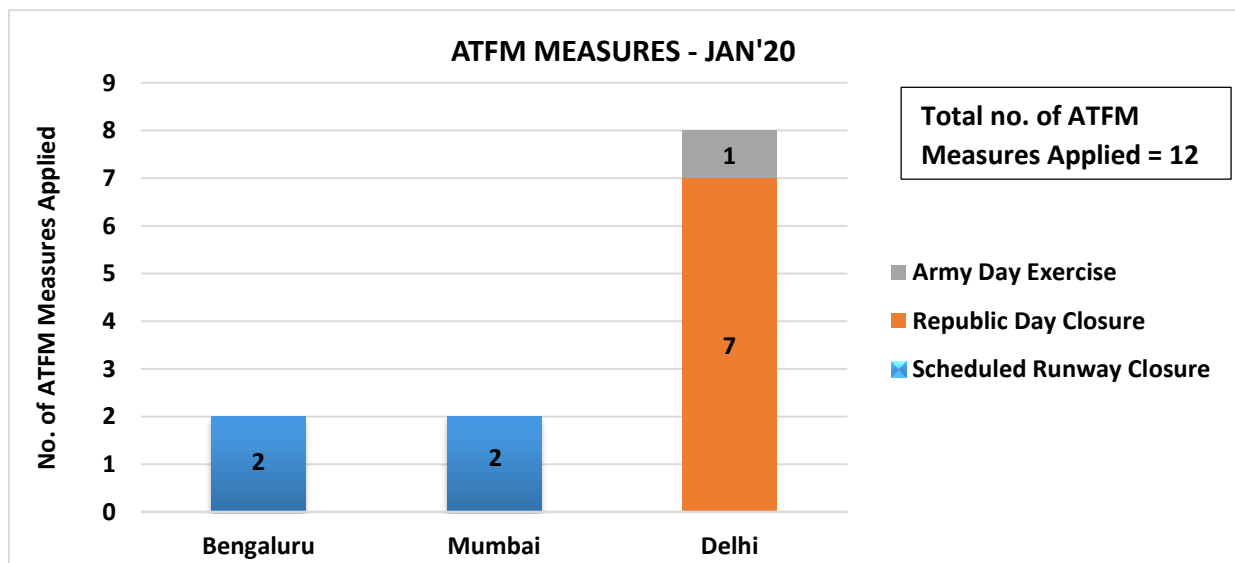
Figure 1: ATFM Measures- Jan'20

Data source   Flights with complete data i.e. ATOT(actual take off time) and ALDT(actual landing time) are only taken into consideration. Out of the total domestic arrivals for which CTOTs (calculated take off time) were issued, 96% data has been considered for Compliance measurement. Rest 4% data include domestic arrivals that did not operate and flights with incomplete required information.

ATFM Parameters

1.   ATFM Program Impact

-   *ATFM Scenario*
    (An overview of traffic within the CDM scenarios for the month, representing ratio of International traffic & domestic traffic.).

-   *Affected Flight statistics*
    [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.]

2.   ATFM Ground delay
    (ATFM ground delay defined as CTOT-ETOT)
     Calculated take off time – Estimated take off time

-   *Total monthly ATFM delay*
    (Value in minutes representing total ATFM delay in the month)

-   *Total flights affected*
     (Flight count)

-   *Average ATFM delay*
    [Total monthly ATFM delay (in minutes)/ total number of domestic arrivals]

-   *Maximum ATFM delay*
    [Maximum ATFM delay (in minutes) assigned in the month]

-   *ATFM delay distribution in the band*
    (No delay, 0-5, 6-10; 11-15; 16-20; 21-25; 26-30; >30 minutes)

    (An overview of ground delay distribution in the different time bands constrained Airport wise)

3.   ATFM Compliance Measurement

-   *Overall compliance rate*
    (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)

- *ATFM departure slot adherence distribution*
  [An overview of regulated flight departures within an ATFM slot tolerance window (ASTW), before ASTW & after ASTW]

- *CTOT Compliance rate of Airline operators*
  (An overview of CTOT compliance rate of various Airline operators)

- *CTOT Compliance rate of Regions*
  (An overview of CTOT compliance rate of 4 FIRs)

- *CTOT Compliance rate of Airports within different Regions*
  (An overview of CTOT compliance rate of Airports within 4 FIRs)

4. **Air delay statistics**

   Air delay defined as difference between AET & 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). **Therefore, Air delay = AET-EET**

- Monthly *Distribution of (AET-EET) in different time bands for various Constrained Airports*
   (<=-10; -9 to -6; -5 to -1; 0 to 5; 6-10; 11-15; 16-20; 21-25; 25-30 & >30minutes)
   (An overview of Air delay distribution in the different bands

     CLDT: calculated landing time

     CTOT: calculated take off time

     ALDT: actual landing time

     ATOT: actual take off time

- *Average Air Delay for various constrained Airports*

   Average Air Delay is calculated as:

   $$Average\ Air\ Delay = \frac{Total\ Air\ Delay\ to\ domestic\ arrivals\ (with\ values\ greater\ than\ zero)}{Total\ Domestic\ Arrivals}$$

B. Month Overview

1.   ATFM Program Impact

Data in this section helps to assess the impact of ATFM measure on overall flight operations during the ATFM scenario & the extent of flights involved. Analysis provides:

- Picture of overall traffic mixture in the ATFM scenarios for the month and the percentage of participating flights.
- Percentage of participating flights assigned ATFM delay & its impact on overall flights in ATFM scenario.

1.1   ATFM Scenario

Total Flights	1692
International arrivals	228
International departures	186
Domestic arrivals	644
Domestic departures	634
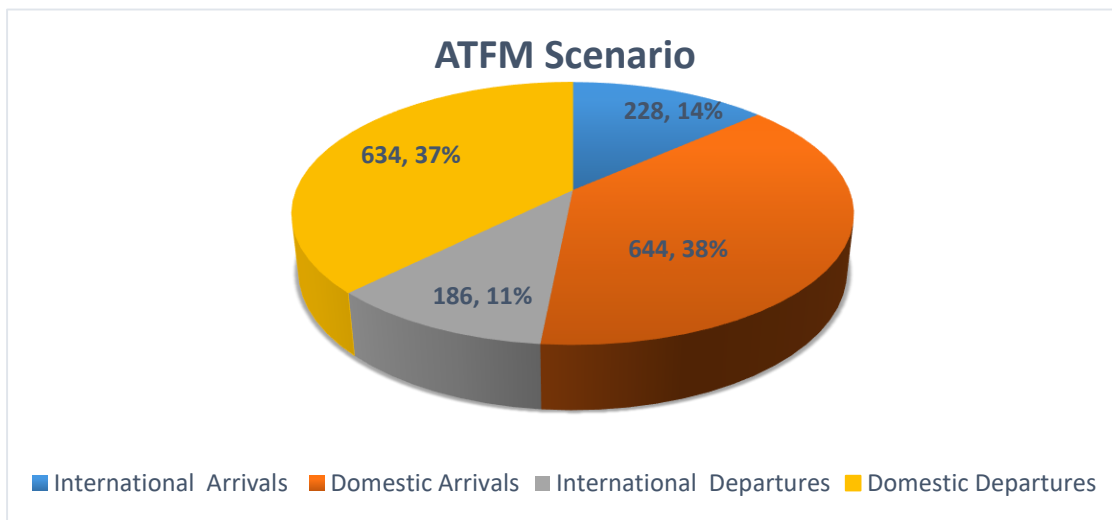
Figure 2: ATFM Scenario

1.2   Affected Flight Statistics

Total affected flights in scenario (Domestic Arrivals)	644
Total Domestic Arrivals with zero ATFM delay	93
Total Domestic Arrivals with ATFM delay	551

Affected Flight Statistics

93, 14%

551, 86%

■ **Delayed flights**   ■ **Non-delayed flights**
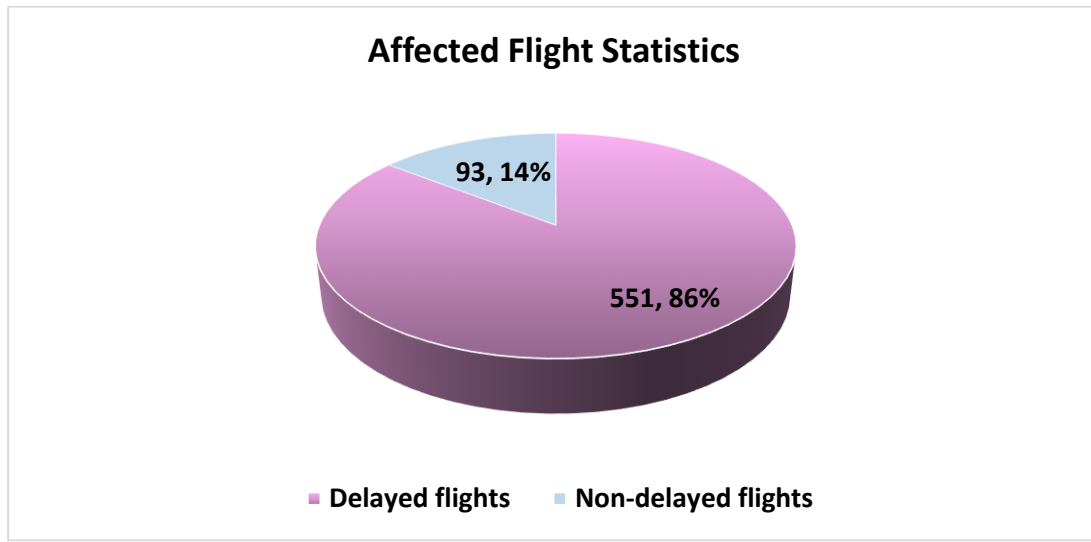
Figure 3: Affected Flight Statistics

1.3   Inference

1.   Out of the total arrivals captured for the constrained Airports during the CDM scenario , 74% of flights i.e. Domestic arrivals, are participating.

2.   Out of these Domestic Arrivals, 86% of arrivals are assigned ATFM ground delay & 14% of flights are without any ATFM ground delay.

3.   Out of the total arrivals captured to the constrained Airport during the ATFM scenario, 63% of flights are assigned ATFM Ground Delay.

2.   ATFM Ground Delay

Data analysis of this section provides insight into the impact of ATFM measures i.e. Ground delays due to ATFM measures. The study of delay distribution will provide seriousness of capacity constraint.

2.1   ATFM Delay statistics

Total participating flights in CDM (**Domestic Arrivals**)	644
Total ATFM Delay (CTOT-ETOT)	12317 minutes (205hrs:17mins)
Average ATFM Delay to participating flights*	19 minutes
Maximum ATFM Delay	54 minutes

Note:

$$*Average\ ATFM\ Delay = \frac{Total\ ATFM\ Delay}{Total\ Domestic\ Arrivals}$$
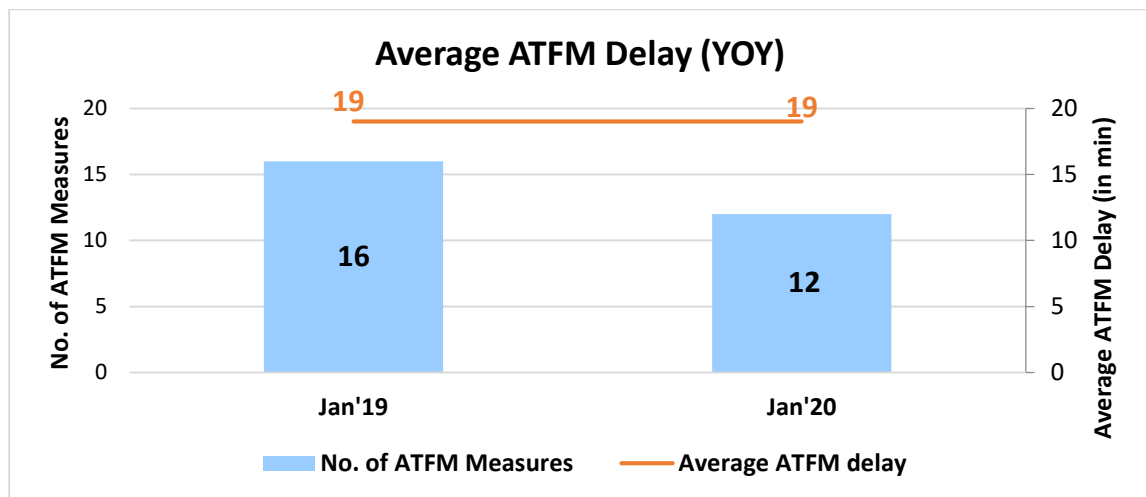
Figure 4: Average ATFM Delay Comparison

2.2   Inference:

1.   Average ATFM ground Delay in Jan'20 is same as that of January'19.

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3. ATFM Compliance Measurement

Data in this section helps us to assess the actual situation achieved at the constrained airport and a measure of collaboration achieved with the stakeholders.

Analysis provides:

- Overall picture of flights operating within the compliance window.

- Overview of regulated flight departures within ATFM slot tolerance window (ASTW), before ASTW & after ASTW

- Compliance rate- Airline Operator wise , Region wise, Station wise within Regions

3.1 Overall Compliance

Total Flights (Domestic arrivals)	644
Flights with complete data (ATOT)	619
Flights with incomplete data	05
Flights Not Operated	20
Compliant*	385
Non-Compliant	234

Total No. of Revised CTOTs issued = 104 (Compliance calculation for flights which were issued revised CTOT is w.r.t. new CTOT issued)
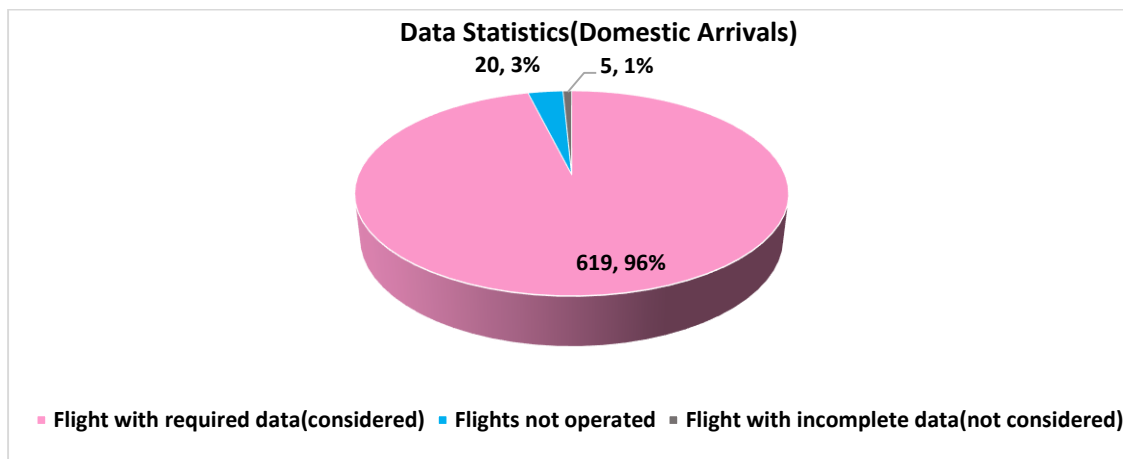
Figure 5: Data Statistics

Overall Compliance

234, 38%

385, 62%

■ Compliance   ■ Non-Compliance
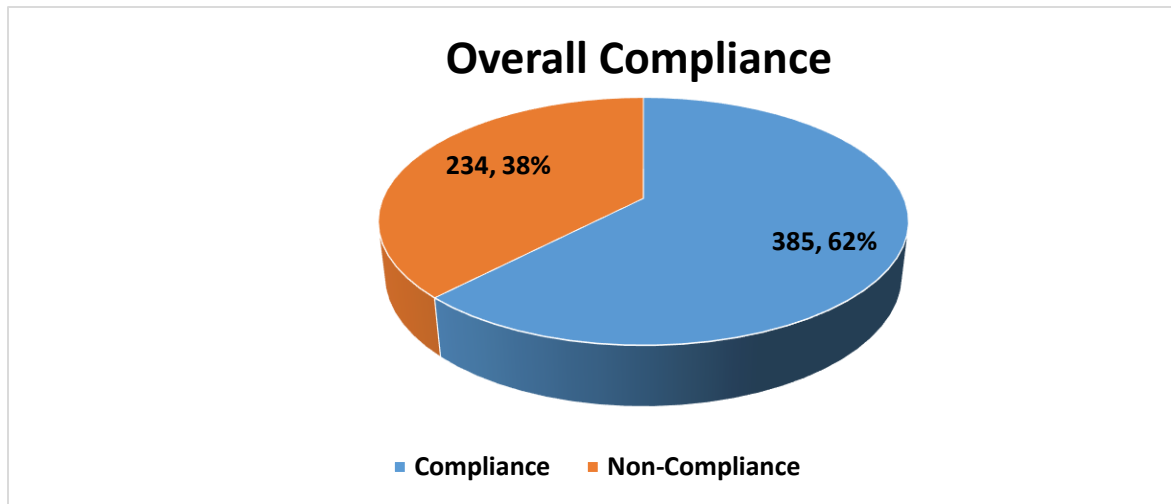
Figure 6: Overall Compliance

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

3.2 ATFM Slot Adherence distribution

ATFM Slot tolerance window (ASTW) is -5 to + 10 minutes of CTOT. The aircraft departing within this window shall be considered to have adhered to ATFM slots i.e. compliant flights.

Flight departing before 5 minutes & after 10 minutes of CTOT shall be considered out of ATFM slot tolerance window & accordingly termed as Non-Compliant i.e. before / after ASTW departures respectively.
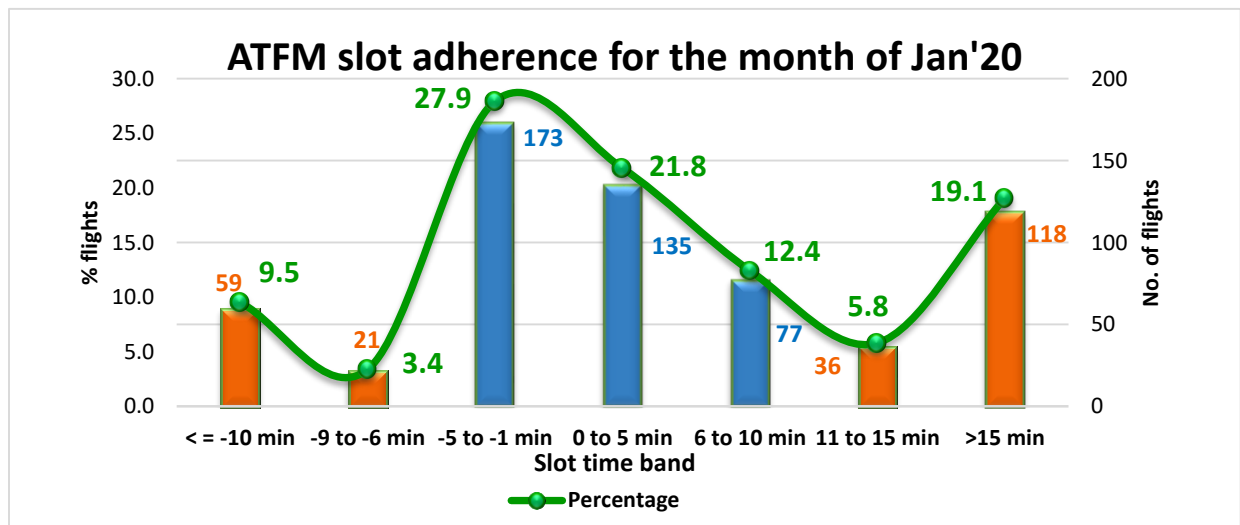
Figure 7: Slot Adherence Jan'20
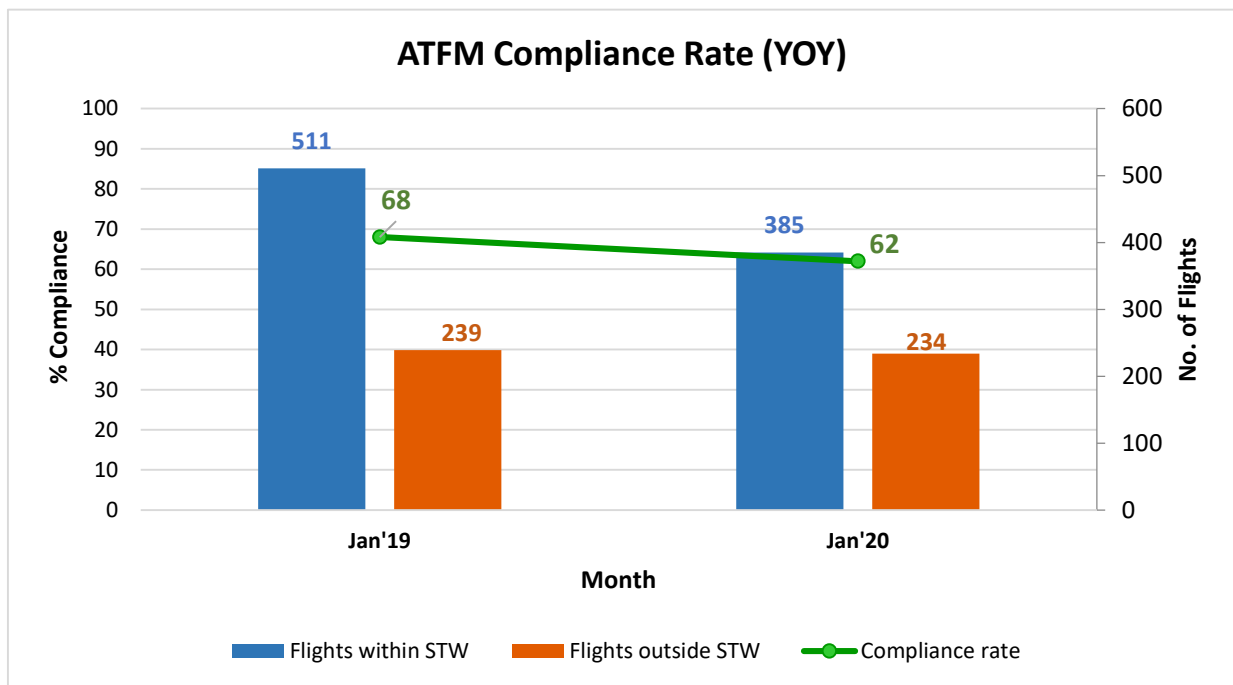
Figure 8: ATFM Compliance

3.3   CTOT Compliance rate of Airline Operators
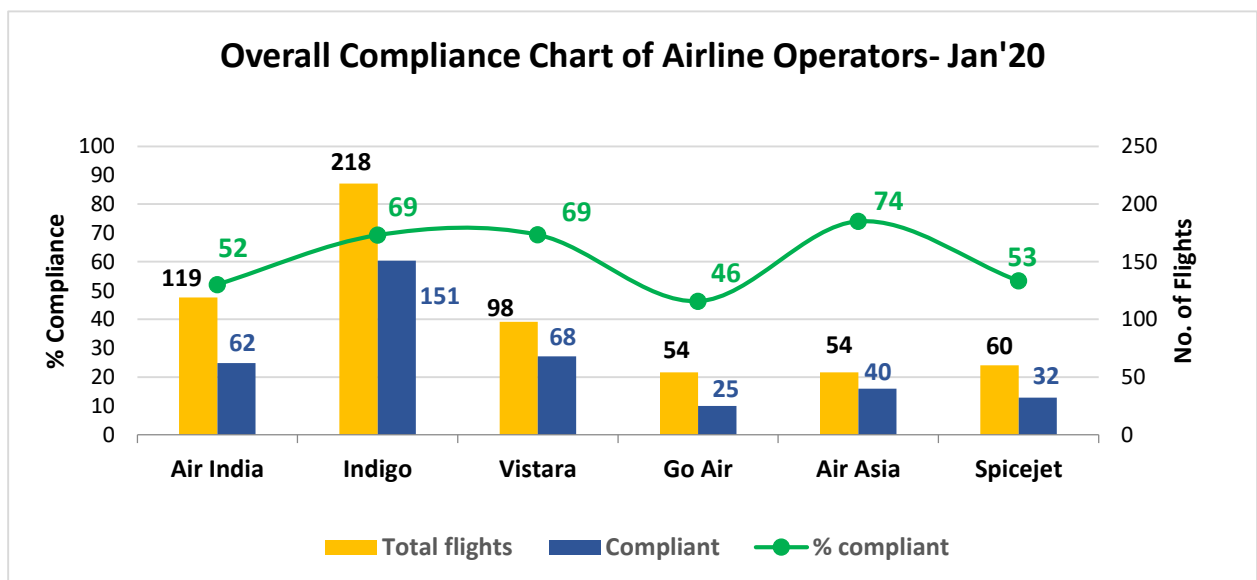
Figure 9: Airlines Overall Compliance Jan'20

3.4 CTOT Compliance rate by FMPs (Region wise)
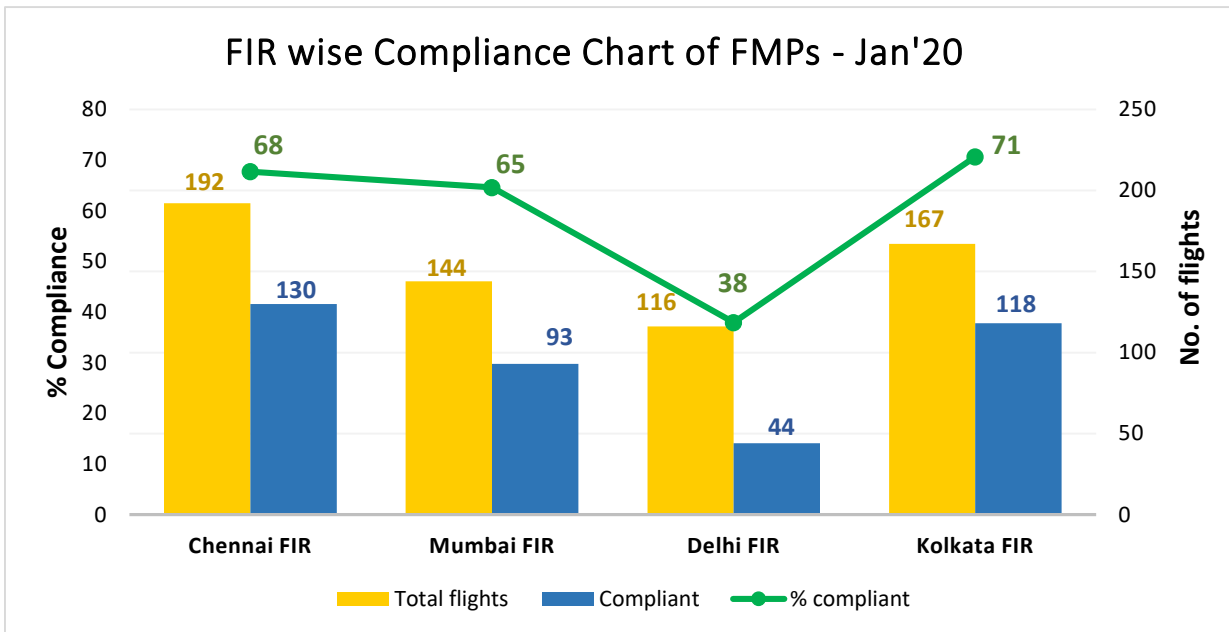
Figure 10: FIR wise Compliance Jan'20

3.5 CTOT Compliance rate - Airport wise
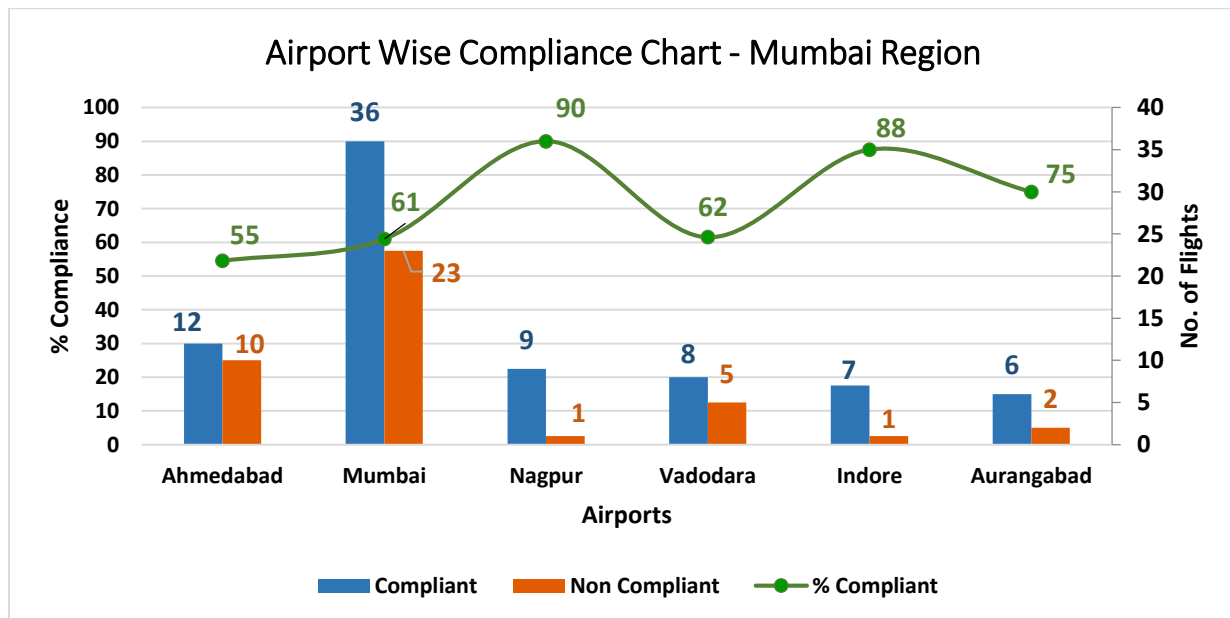
Figure 11: Mumbai Region Airport wise Compliance
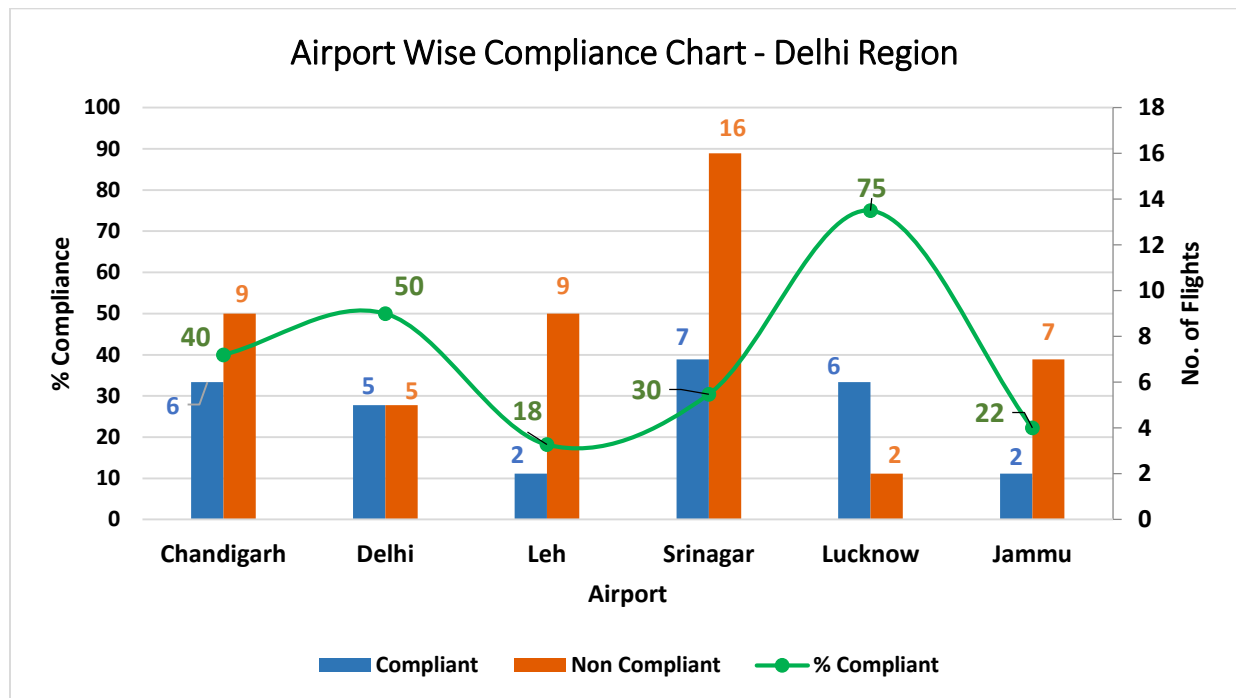
Figure 12: Delhi Region Airport wise Compliance
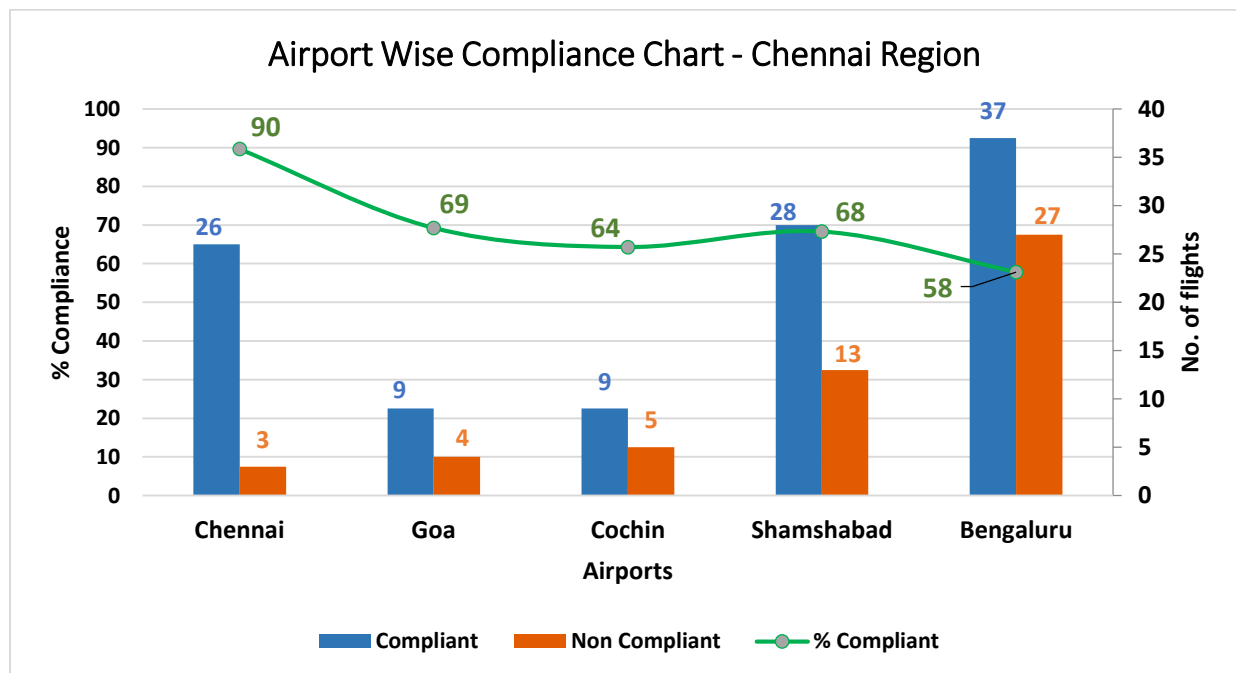
Figure 13: Chennai Region Airport wise Compliance
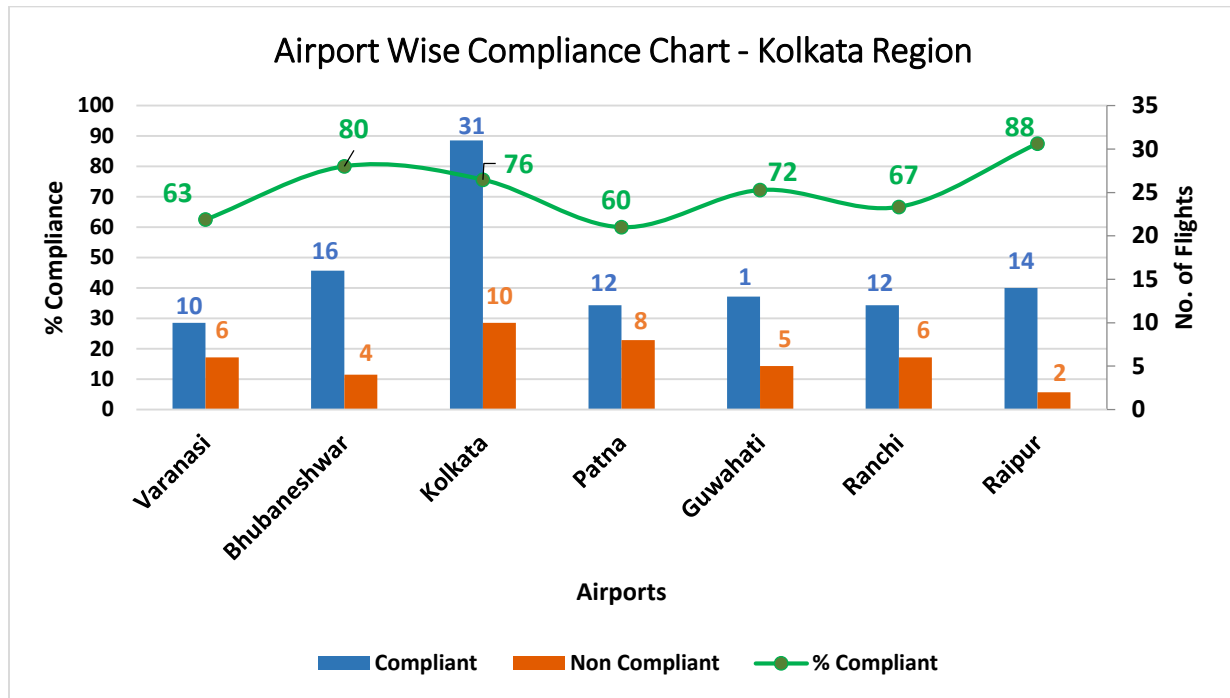
Figure 14: Kolkata Region Airport wise Compliance

3.6 Inference

1. Out of the total domestic arrivals with complete data in the CDM scenario, 62% arrivals are compliant.

2. 13% of flights are departing before the compliance window whereas 25% of flights are departing after the tolerance window.

3. Kolkata region is having the highest compliance rate of 71% whereas Delhi region is having the lowest compliance rate of 38%.

4. Air Asia, Indigo and Vistara Airline have a compliance rate above the average recorded 62% compliance.

C. Airport wise Analysis

1. Delhi Airport

1.1 Traffic Trend

Delhi handled the maximum movements in India with 21,160 arrivals and 21101 departures. The average ATM handled in Jan'20 is 1363 which is less than the average ATMs in Dec'19 (1371 ATMs). The average ATM handled in Jan'20 is more than that handled in Jan'19.
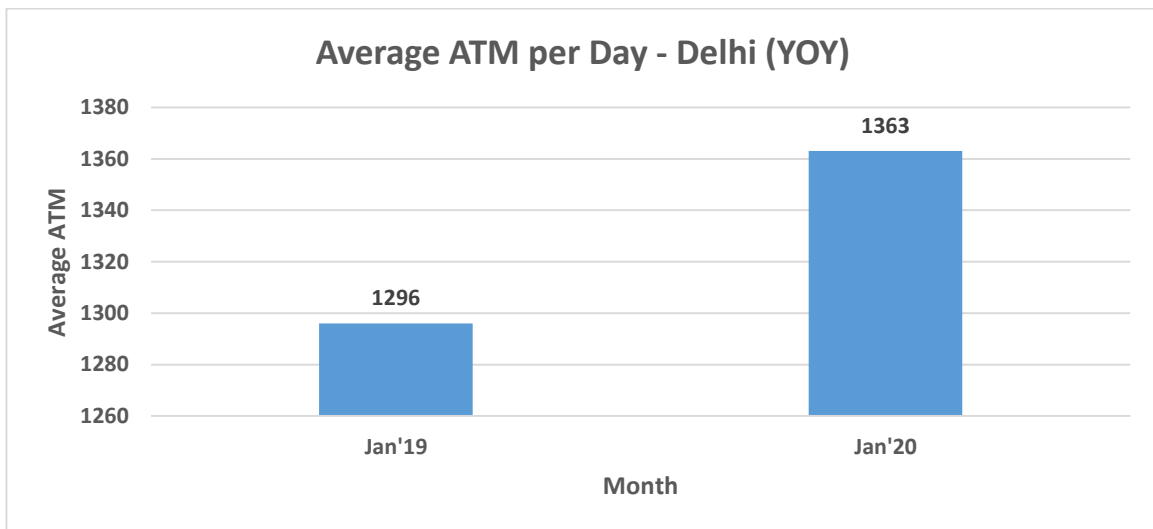
Figure 15: Average ATM per Day (Delhi)

1.2 Details of ATFM Measures:

Number of ATFM measures applied due to constraint at Delhi : 8

Average ATFM Ground delay due to measures at Delhi : 20 min

Maximum ATFM Ground delay due to measures at Delhi : 54 min

% Compliance for Delhi CDM : 62%
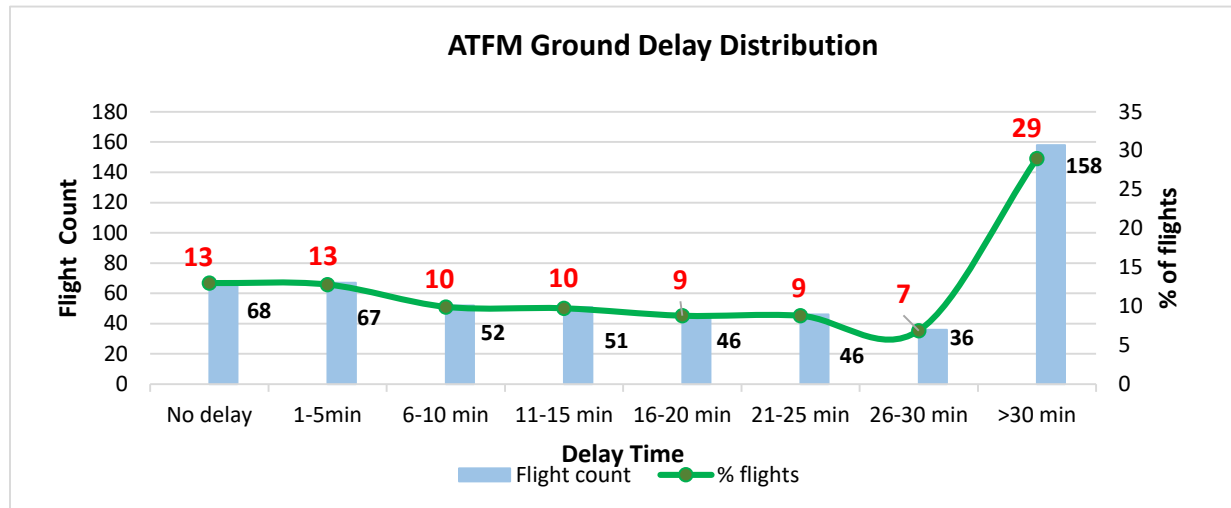
Figure 16: ATFM Ground Delay Distribution (Delhi)

Inference

1. 13% of flights for Delhi had no ATFM ground delay assigned by the system.

2. 33% of flights for Delhi had a ATFM ground delay of up to 15 minutes.

3. 25% of flights for Delhi had an ATFM ground delay in the range of 16 to 30 minutes.

4. 29% of flights for Delhi had an ATFM ground delay of more than 30 minutes.

1.3   Air Delay during the CDM Scenario period:

 Average Air Delay to domestic arrivals* within the CDM Scenario period for Delhi is 8 minutes.

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

Distribution of difference between AET & filed EET

AET-EET min (time band)		<= -10	-9 to -6	-5 to -1	0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	>30
Delhi	**Flt. Count**	24	19	66	141	102	64	45	25	9	6
	% flight	5	4	13	28	20	13	9	5	2	1
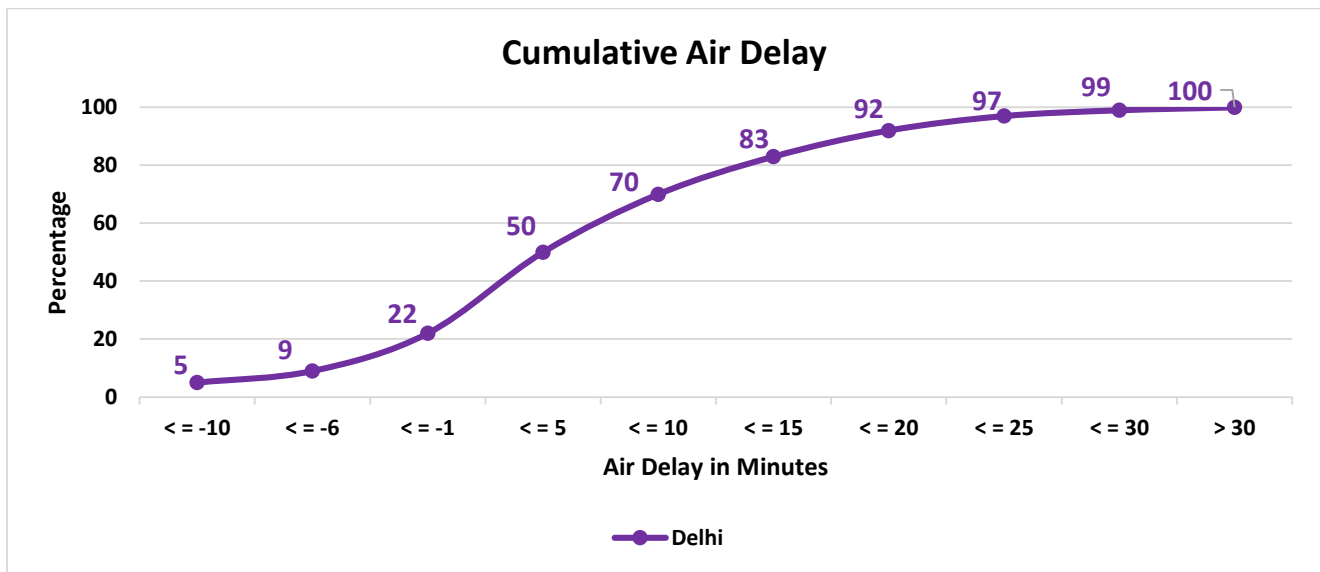
Figure 17: Cumulative Air Delay during CDM period (Delhi)

Inference

1. 83% of flights for Delhi had an Air delay of equal to or less than 15 minutes during the CDM period.

2.   Mumbai Airport

2.1   Traffic Trend:

Mumbai was the 2nd busiest Airport in India with 13,998 arrivals and 13,875 departures. The average ATM recorded for the month of Jan'20 is 899 which is almost equal to the average recorded in the month of Jan'19 (900 ATMs).

Average ATM per Day - Mumbai (YOY)

Jan'19: 900
Jan'20: 899

(Y-axis: Average ATM, 0 to 1000; X-axis: Month)
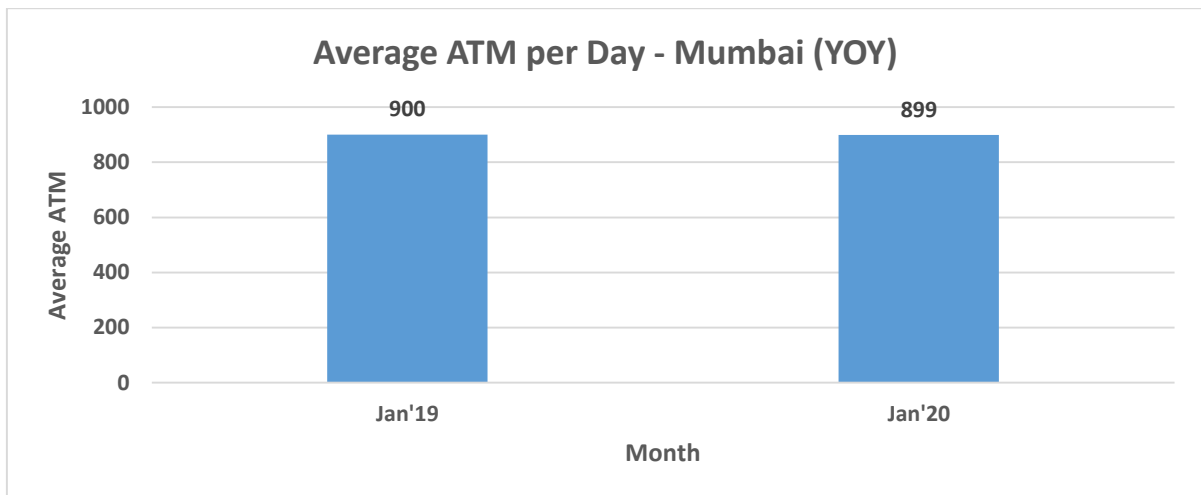
Figure 18: Average ATM per Day (Mumbai)

2.2   Number of ATFM measures and Ground Delay Distribution:

Number of ATFM measures applied due to constraint at Mumbai   : 2

Average ATFM Ground delay due to measures at Mumbai   : 13 min

Maximum ATFM Ground delay due to measures at Mumbai   : 26 min

% Compliance for Mumbai CDM   : 49%

ATFM Ground Delay Distribution
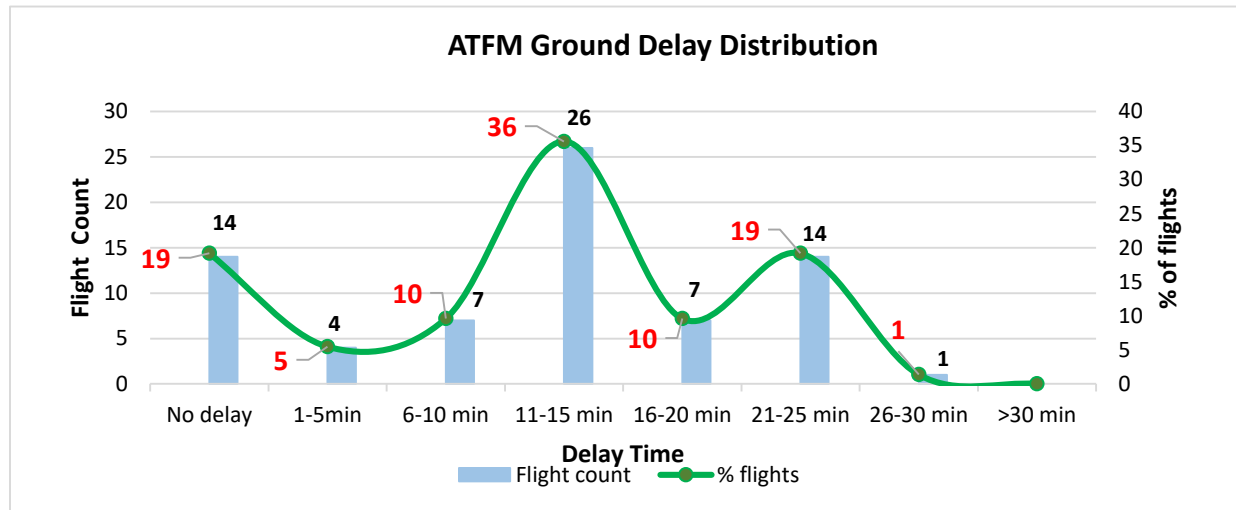
Figure 19: ATFM Ground Delay Distribution (Mumbai)

Inference

5. 19% of flights for Mumbai had no ATFM ground delay assigned by the system.

6. 51% of flights for Mumbai had a ATFM ground delay of up to 15 minutes.

7. 30% of flights for Mumbai had an ATFM ground delay in the range of 16 to 30 minutes.

8. No flight for Mumbai had an ATFM ground delay of more than 30 minutes.

2.3   Air Delay during the CDM Scenario period:

Average Air Delay to domestic arrivals* within the CDM Scenario period for Mumbai is 13 minutes

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

Distribution of difference between AET & filed EET

AET-EET min (time band)		<= -10	-9 to -6	-5 to -1	0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	>30
Mumbai	**Flt. Count**	0	2	5	12	11	11	14	12	6	0
	% flight	0	3	7	16	15	15	19	16	9	0
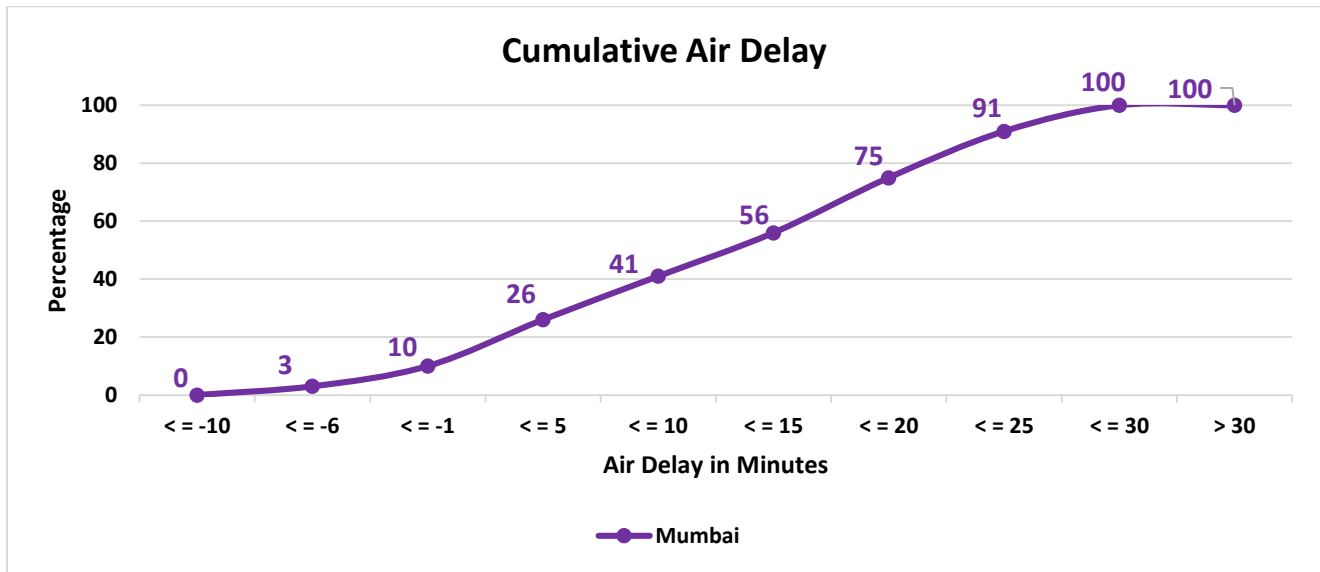
*Figure 20: Cumulative Air Delay during CDM period (Mumbai)*

Inference

2. 56% of flights for Mumbai had an Air delay of equal to or less than 15 minutes during the CDM period.

3.   Bengaluru Airport

3.1   Traffic Trend :

Bengaluru Airport recorded 10555 arrivals and 10560 departures. The average ATM recorded for the month of Jan'20 is 681 which is more than the average recorded in the month of Dec'19(669).As compared to Jan'19 the ATMs recorded this year is less in the month of January.
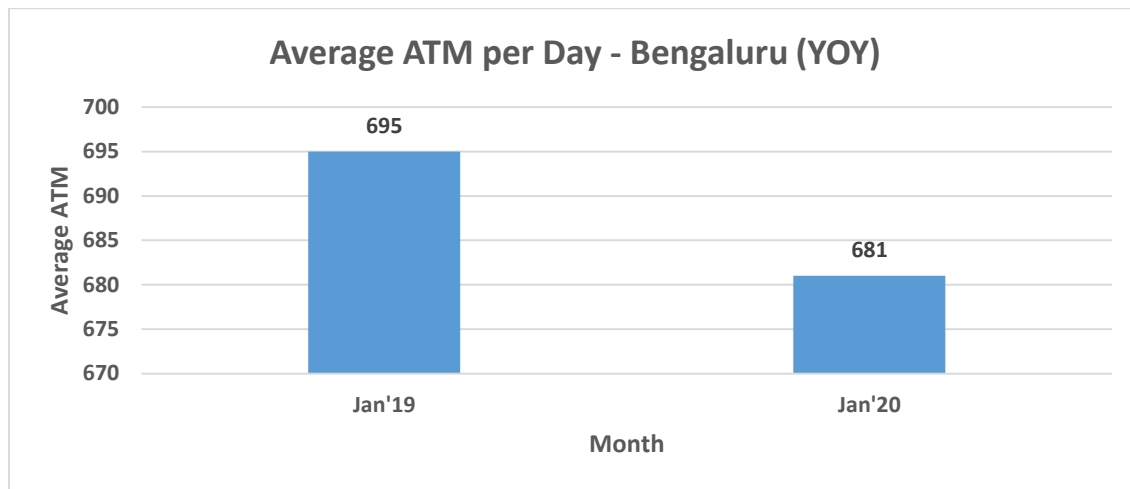
*Figure 21: Average ATM per Day (Bengaluru)*

3.2   Number of ATFM measures and Ground Delay Distribution:

Number of ATFM measures applied due to constraint at Bengaluru : 2

Average ATFM Ground delay due to measures at Bengaluru   : 15 min

Maximum ATFM Ground delay due to measures at Bengaluru   : 29 min

% Compliance for Bengaluru CDM   : 86%

ATFM Ground Delay Distribution
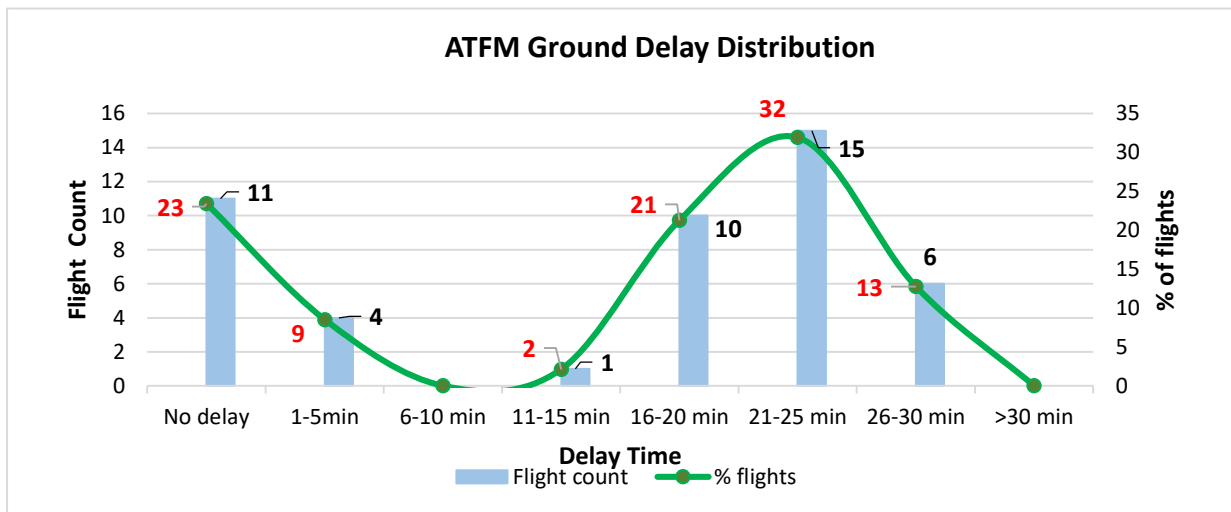
Figure 22: ATFM Ground Delay Distribution (Bengaluru)

Inference

1. 23% of flights for Bengaluru had no ATFM ground delay assigned by the system.

2. 11% of flights for Bengaluru had a ATFM ground delay of up to 15 minutes.

3. 66% of flights for Bengaluru had an ATFM ground delay in the range of 16 to 30 minutes.

4. No flight for Bengaluru had an ATFM ground delay of more than 30 minutes.

3.3   Air Delay during the CDM Scenario period:

 Average Air Delay to domestic arrivals* within the CDM Scenario period for Bengaluru is 8 minutes

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

Distribution of difference between AET & filed EET

AET-EET min (time band)		<= -10	-9 to -6	-5 to -1	0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	>30
Bengaluru	**Flt. Count**	0	3	9	13	4	2	7	3	1	0
	% flight	0	7	21	31	10	5	17	7	2	0
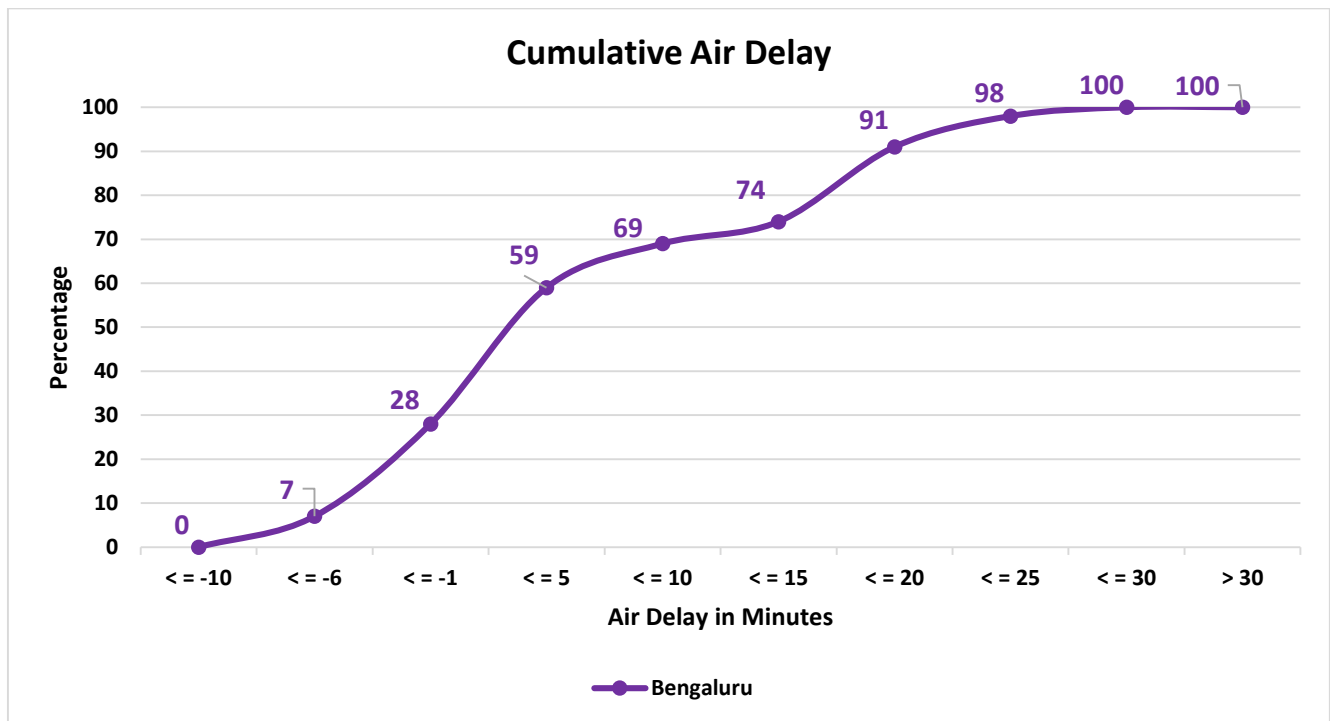
Figure 23: Cumulative Air Delay during CDM period (Bengaluru)

Inference

1. 74% of flights for Bengaluru had an Air delay of equal to or less than 15 minutes during the CDM period.

D.   Challenges

1.   System related issues

1. "Watch Hours" of all the Airports is entered in the system. However, the system does not consider these watch hours while issuing CTOTs and issues CTOTs beyond the watch hours of the Airport.

2. "Partial Update" feature of updating the demand in tactical environment leads to large delays to a new FPL or any "CHG" message received for any FPL (irrespective of the change , e.g. an aircraft type, route, EOBT change etc. is likely to affect the profile of the aircraft, whereas a change in navigation capability, squawk change does not have any influence on the profile)

3. After using "APPLY" feature to a CDM scenario, Delay messages (DLA) are being sent by SKYFLOW system resulting in revision of EOBT of the delayed flight in ATS automation system .This is incorrect, as the initiation of a DLA message is the prerogative of the originator. The issue is already taken up with ATECH.

4. The system does not have any feature to put independently Airport Arrival rate (AAR) and Airport Departure rate (ADR) to regulate the demand against the practiced capacity.

5. The Arrival message for Delhi Arrivals isn't interpreted correctly by SKYFLOW because of format inconsistency, resulting in large error queues. This leads to inaccurate demand in the tactical environment for Delhi.

6. System functionalities are limited to balancing demand against capacity of an individual Aerodrome**. In case of two constrained Airports with overlapping timings, the SKYFLOW system Algorithm may not be able to give an acceptable solution. (refer ATECH e-mail dated 28th April, 2017).**

7. Once the CDM is applied , the system does not update the CDM Scenario. Lack of dynamic update presents stale demand information through the CDM.

2.   Operational Issues

1. The present means of communicating the application of ATFM measures is through instant messaging followed by an email addressed to all stations. This has proved to be an inefficient means of information broadcast as many stations are unaware of the measures till CTOTs are actually passed to them from the main FMP units. Many stations are not manning the FMP position.

2. The existing means of CTOT dissemination by FMPs to different ATS units and ATCs within their jurisdiction leads to delays in timely dissemination of CTOTs for ensuring compliance. The Airline operators are also falling short in their responsibility of sharing the CTOTs received with their Air crew.

3. FMPs installed at Defence and few satellite Airports have been trained on ATFM "SKYFLOW" but still have CTOT accessibility issues. Information sharing regarding commencement of ATFM measures and ADP is still an issue with these stations.

4. A lead in time of at least 3 hours is required for preparation of CDM, in order to disseminate CTOTs at least 2 hours prior to EOBT. Airports with flying time of more than 2 and half hours face the difficulty in dissemination of the CTOT information to Airlines in time for CTOT compliance. This leads to non-compliance of CTOT timings, as with passengers on board the flights, it becomes difficult for Airlines to comply with the CTOT restriction.

5. The RPLs received from Airlines on fortnightly basis does help CCC in strategic decision making. Very few domestic airlines share their "No ops" information or send an associated AFTN CNL or CHG message. As SKYFLOW utilizes, RPL for Demand projection, absence of correct information leads to wrong demand prediction.
   In some cases, the EOBT shared in RPLs with CCC and FPL filed on the 'D' day does not match leading to long error queues. These FPLs with different EOBT get stuck in error queues because of a duplicate plan already available in the system.
   Such flights have to be manually allocated a revised CTOT after application of ATFM measures or at times they take off without a valid CTOT.

6. The RPLs and FPLs in SKLYFLOW get annulled after 120 minutes of their EOBT in absence of timely origination of "DLA" messages by airlines, This leads to display of wrong demand in the System, specially any CDM prepared for post disruption period will reflect wrong demand until and unless the Airlines amend their flight intentions by generating appropriate AFTN message addressed to VIDPCTFM.

7. SKYFLOW system is not receiving DEP messages from many domestic and international Airports. In such cases, the demand is not correctly updated for a constrained Airport.

8. At times, additional tactical flow measures are applied by ATC of constrained Airport during the period when ATFM measures are in force. leading to confusion and conflicting instructions for Airline operators.

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Tactical flow measures initiated by constrained Airport cannot be incorporated in the SKYFLOW system which causes wrong representation of demand in the system.

9. Requests for revised CTOT has increased but the airlines are still not updating their flight intent in SKYFLOW by originating an appropriate AFTN message addressed to VIDPCTFM. Genuine requests for revision of slot allocation are handled manually by CCC as there is no provision of revision of CTOT in SKYFLOW system after the use of " APPLY " feature. This leads to over delivery of flights to a constrained Airport during such hours. The slots vacated cannot be assigned to others through the system. This leads to under delivery during that period. SKYFLOW system does not have facility of dynamic CTOT allocations. (refer ATECH e-mail dated 28th July, 2017) [This procedure sometime leads to over or under delivery of flights to the constrained airport, as revised CTOTs and vacant slots cannot be assigned through SKYFLOW system.]

10. Due to lack of understanding at many Airports, flights following ATFM Ground delay for a constrained Airport are held on ground and made to depart within their CTOT tolerance window whereas flights which are actually planned to operate after the ATFM Scenario period to the same constrained Airport are not restricted at all.

11. Many operators, mostly non-scheduled operators and Military flights, are not filing their FPLs three (03) hours prior to their EOBTs leading to wrong demand prediction.

12. The flights given exemption(accommodated in the CDM with no delay) on operational grounds are at times not following the allotted CTOT (which is same as filed EOBT plus default taxi time). It is essential for all stakeholders to note that these exempted flights are accorded priority over others but even these flights need to adhere to the issued CTOT, within the permissible tolerance window of minus 5 to plus 10 minutes.

13. Increasing number of exemption requests on various reasons like VIPs on board, watch hour restrictions, Sunset restrictions , operational Constraints etc. leads to undue delays to other flights. This problem becomes grave when the constrained Airport has a grid lock lasting for more than an hour.

14. The CDMs prepared to cater to demand capacity imbalance towards the end of a day usually reflects wrong demand as the Flight intentions are not timely updated by Airlines in the SKYFLOW i.e. by originating appropriate ATS messages through AFTN.

15. CTOT compliant flights are not receiving any preference over non-compliant flights while arriving at constrained airport, therefore getting substantial ground as well as airborne delay.

16. **CDMs prepared to cater to post Weather disruption or post exigency period**, even with few hours prior notice might not capture actual scenario, as for a correct demand prediction updated information on delayed and diverted flights in the SKYFLOW system is essential. Airport operators are also unable to provide advance flight information due to uncertainty in such situation.

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CASE STUDY
Republic Day Airspace Closure

Executive Summary

Due to Republic day celebrations, Delhi Airport/Airspace was closed from 0505 to 0645 UTC on 18th, 20th – 24th and 26th Jan '20 vide NOTAM no. A0020/20 and A0013/20. Later on, Exercise was called off on 24th Jan'20(stand by day).

Proactive Measures:

1. CCC officers and Delhi ATC had a prior meeting to discuss the modalities of Airspace closure.
2. Flight Schedule approved by DIAL was shared with CCC well in advance to predict any imbalance.
3. A stakeholder's meeting was called by CCC on 17th Jan'20 to apprise all concerned regarding the plan of action to handle the Airspace closure.

4. It was agreed that pre closure traffic will be handled tactically by Delhi ATC.
5. All Airlines were requested to send their representative to CCC during the Republic day closure for effective coordination. A met personnel was also requested to be present to update on Met forecasts.
6. 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.

Challenges:

1. Despite the best efforts in updating the flight intent in SKYFLOW system based on the Airline data, on the "D" day some mismatch was observed w.r.t. schedule received from DIAL for the same day,
2. Only representative from Indigo Airlines was present on all days. Go Air representative was present only on 18th Jan'20.
3. Non-compliance of CTOT was observed from many stations on 18th Jan'20. Stations were apprised and counselled by CCC officers about the same.
4. Operationally essential messages such as "DLA" '"CHG", "CNL" received telephonically or through AFTN after CDM was applied were incorporated manually.
5. Few flights which were scheduled to operate pre -closure were observed operating after the Airspace closure and had to be manually allotted a CTOT.
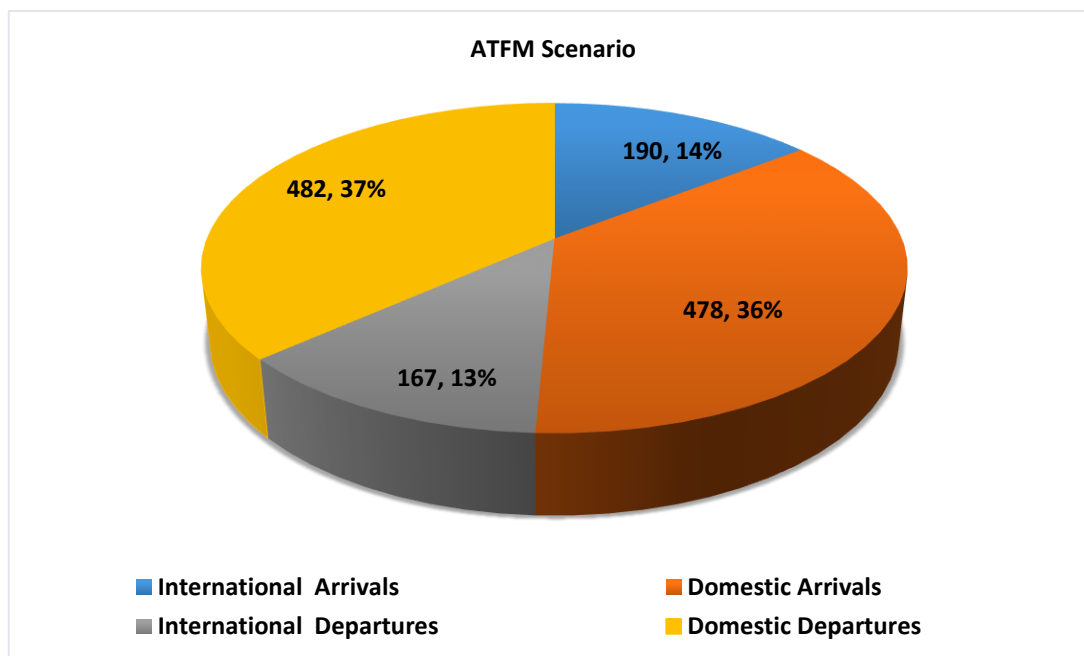
Highlights:

- Stake holder's meeting prior to the closure helped in raising awareness about the effective NOTAM and proposed ATFM measures.
- Better coordination with Delhi ATC as per the agreed plan. Pre closure traffic was handled tactically by Delhi ATC as agreed in Stakeholders Meeting and hence no measure applied.
- Presence of representatives from only Indigo Airlines led to frequent coordination on telephones with OCC of other Airlines for CDM.
- A Met Officer was available in CCC on most days of exercise.
- Regulated flow of Air traffic to Delhi ATC post reopening of Airspace ensured less airborne holdings.

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Overview:

A Study was conducted for the period during which ATFM measures were applied in Delhi on 18th,20th,21st, 22nd, 23rd & 26th January 2020. 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.

ATFM Scenario: (An overview of traffic within the CDM scenarios for the period, representing ratio of International traffic & domestic traffic.) Total 1317 flights were captured within the CDM scenario whose break up is as presented below:

ATFM Scenario

190, 14%
478, 36%
167, 13%
482, 37%

■ International Arrivals
■ Domestic Arrivals
■ International Departures
■ Domestic Departures

Inference:

- Only 36% of the total traffic (domestic arrivals) was affected because of ATFM measures.
- 27% of traffic comprised of international arrivals and departures.

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CCC-CATFM/2020/02/04

The performance of some of the ATFM parameters are as under:

- Average delay due to ATFM measures during the CDM period on various days of exercise are as presented below.

Average ATFM Delay
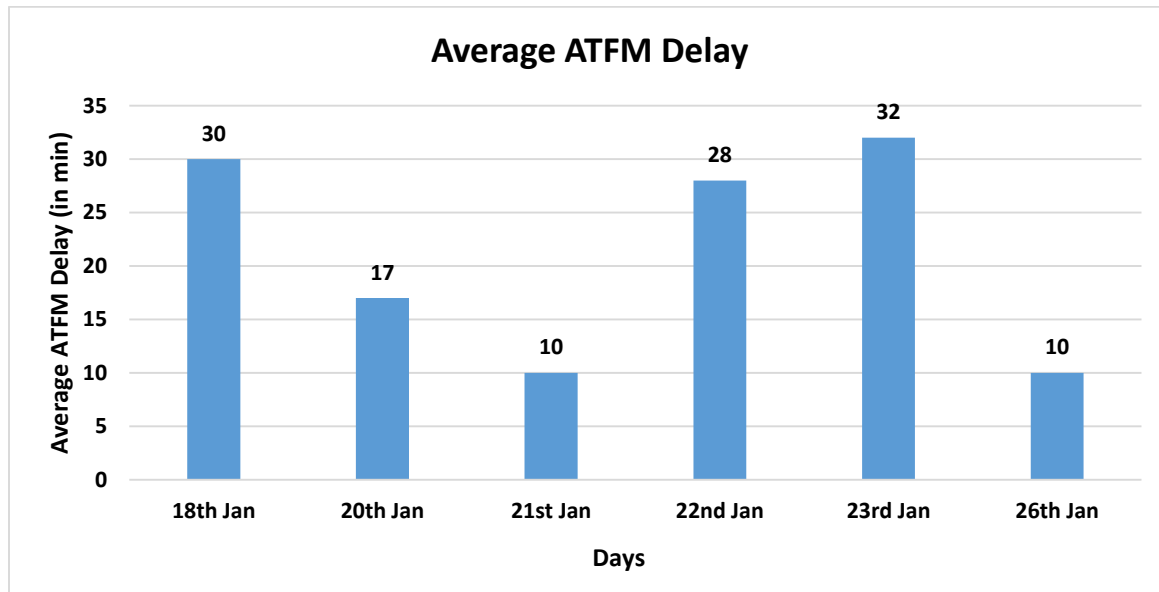
Inference

- The Average Ground delay due to ATFM measures was highest on 23rd Jan'20 because arrivals were planned only after 0640 UTC as advised by Jt. GM(OPS) IGI Airport.
- The CDM Scenario captured on 18th was from 0500-0800 UTC with Ground stop program from 0530 to 0630 UTC, leading to high ground delays.
- Average ground delay is low on 21st and 26th Jan'20 because arrivals were planned from 0620 and 0615 UTC respectively.

CTOT Compliance – Day wise

CTOT Compliance Rate
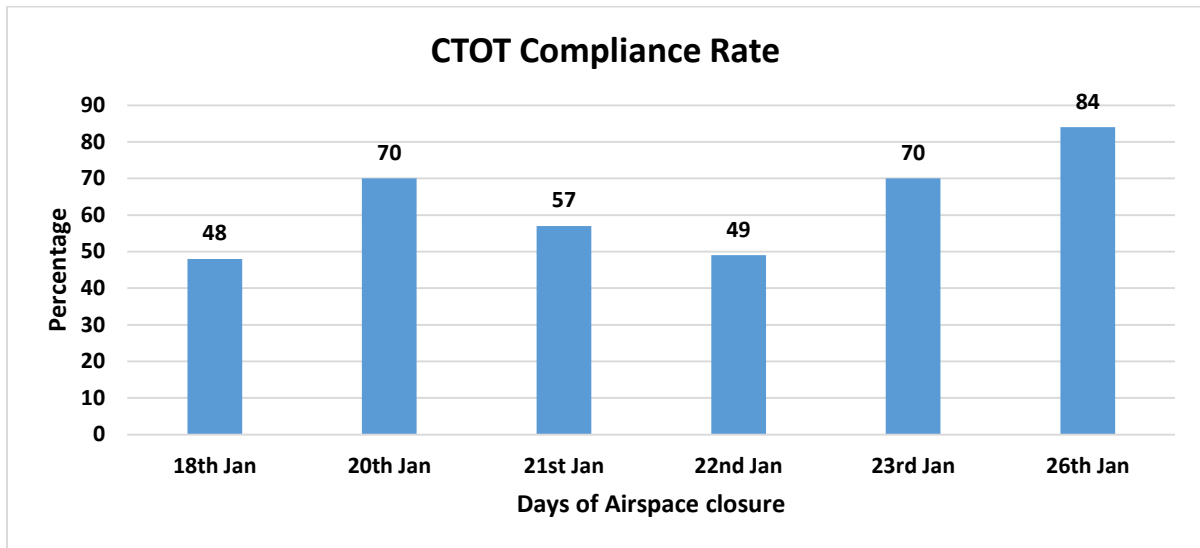
Inference

- CTOT compliance rate was highest on 26th Jan due to Stakeholders participation and preparedness of the FMPs.
- CTOT compliance rate was lowest on 18th Jan (48%). Few Non-compliance were observed from Guwahati, Hyderabad, Bengaluru, Aurangabad, Bhopal, Coimbatore and Kolkata.
- Heavy Fog at Delhi disrupted normal operations on 22nd Jan. Due to Cat III operations pre- closure, manual CTOTs were issued to many flights which intended to operate pre -closure but actually operated post closure. Compliance was observed to be less as the whole network operations was impacted due to fog.
- Compliance was lower on 21st Jan due to fog at Bengaluru and major Non-Compliance observed from Bengaluru.

CTOT Compliance– FIR wise during the Republic day Airspace Closure

FIR wise Compliance Chart of FMPs
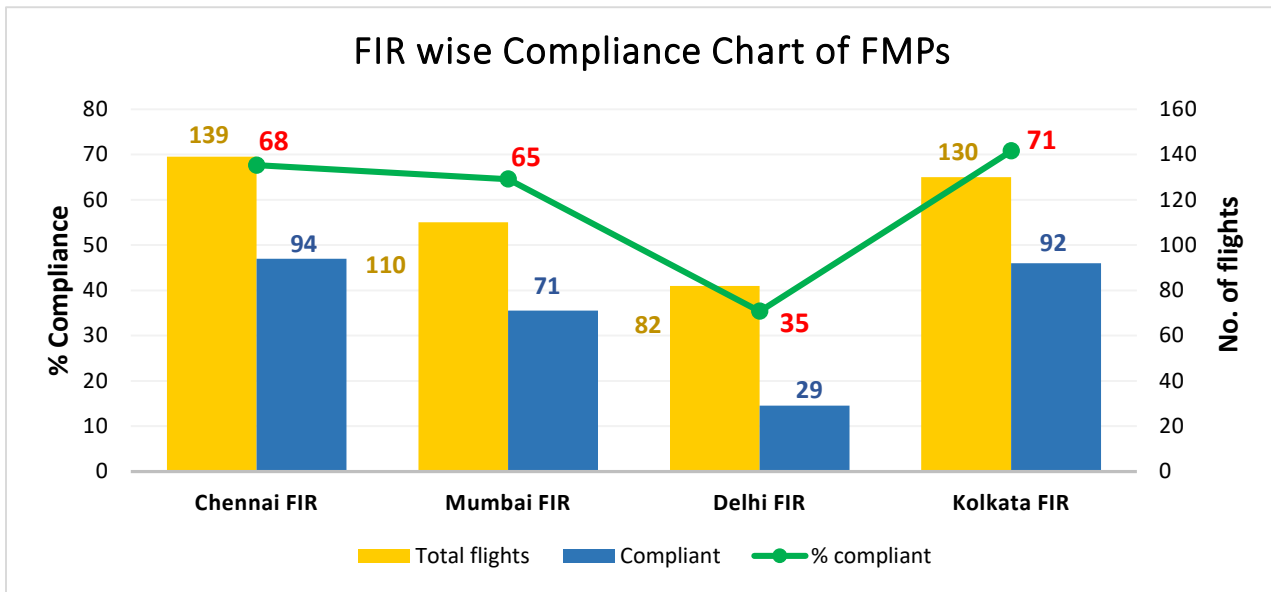
Inference

- Kolkata FIR had the highest compliance rate of 71% whereas Delhi FIR had the minimum compliance rate of 35%.

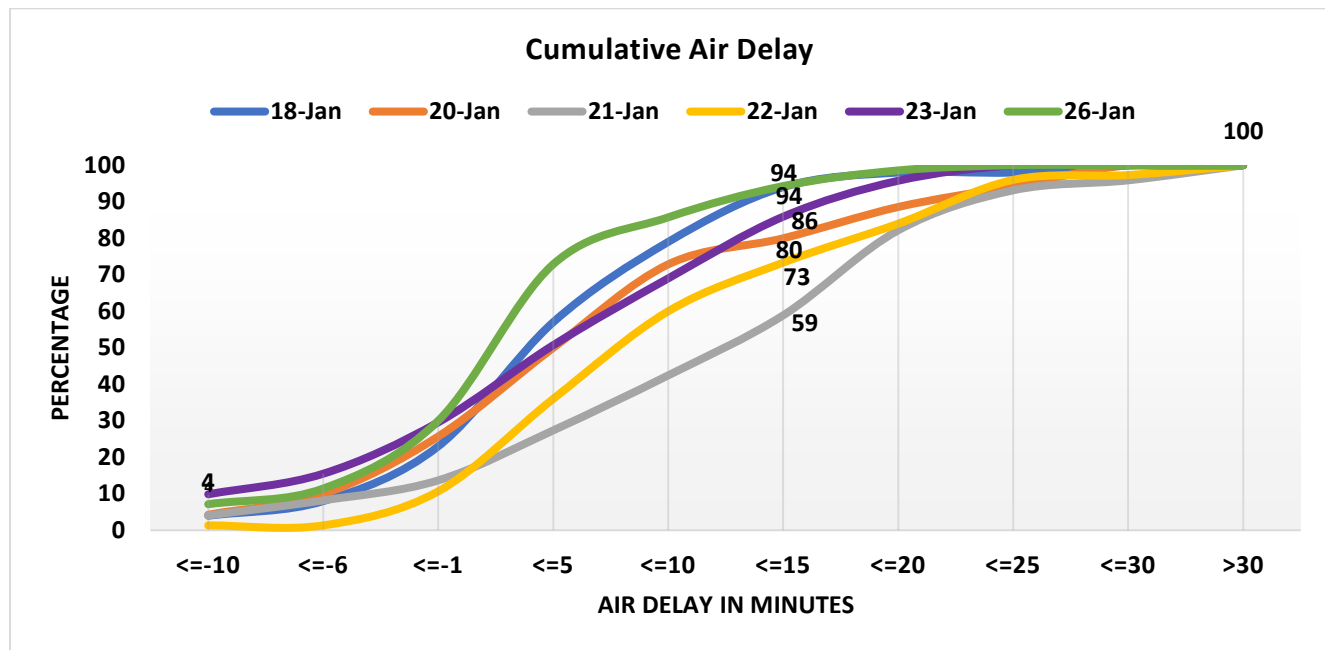**CTOT Compliance (Airline-wise) during the Republic day Airspace closure**

Overall Compliance Chart of Airline Operators- Jan'20
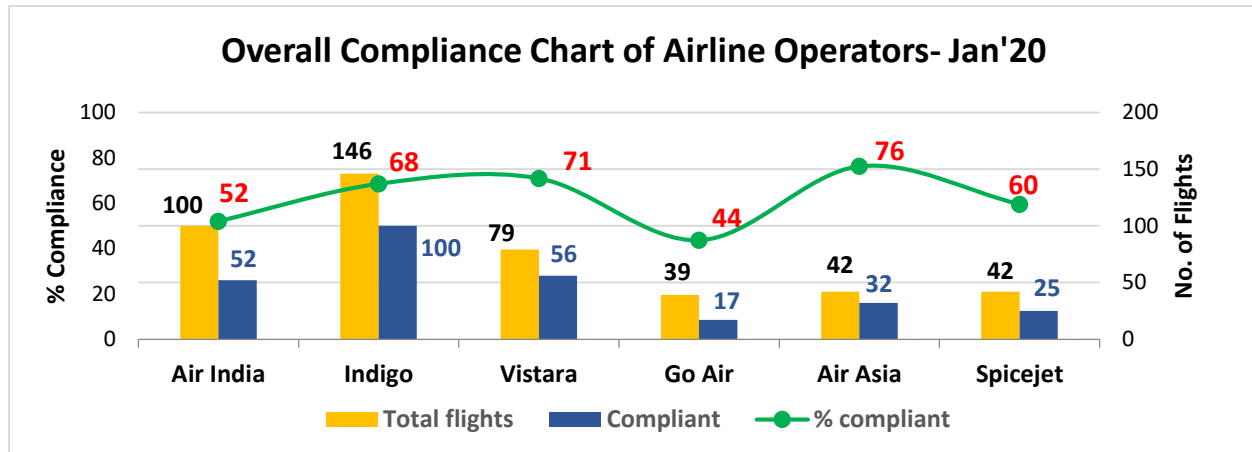
Inference

- Air Asia Airlines had the highest compliance rate of 76% whereas Go Air had the lowest compliance of 44%.

Cumulative Air Delay Post Closure Period:

Inference

1. 94% of arrivals to Delhi had an air delay less than 15 minutes on 18th Jan.

2. 80% of arrivals to Delhi had an air delay less than 15 minutes on 20th Jan.

3. 59% of arrivals to Delhi had an air delay less than 15 minutes on 21st Jan.

4. 73% of arrivals to Delhi had an air delay less than 15 minutes on 22nd Jan.

5. 86% of arrivals to Delhi had an air delay less than 15 minutes on 23rd Jan.

6. 94% of arrivals to Delhi had an air delay less than 15 minutes on 26th Jan.

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