

Route Network Restrictions

- Publication - Regional Variations
- Route Network Restrictions For AT(F)M
- Flight Planning System Capabilities

Application of AT(F)M Measures – Impact

Misapplication of AT(F)M measures have an impact on:

- Safety
- Operational Efficiency of the ATM System
- Predictability and Confidence in the ATM System
- Access to Available Airspace Capacity
- Adherence by Airspace Users to Measures Applied by ANSP
- Pilot / Controller Workload
- Flight Planning - Inconsistency with Tactical Operational Requirements
- Understanding
 - incorrect interpretation by user of published aeronautical information, route network restrictions (TOS, SRD, NOTAM, AIP etc).

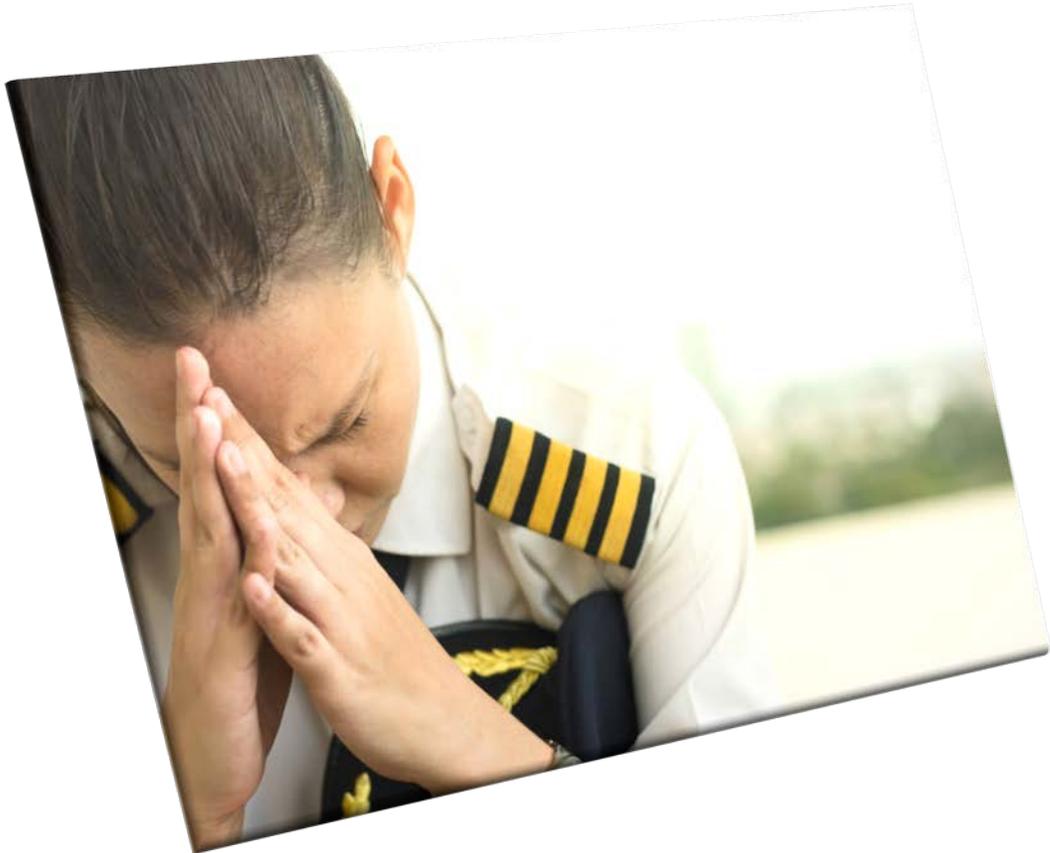
(ATFM) - A Proposal



To review AT(F)M Measures applied across the MID Region, to deliver Harmonized and Standardized ATM;

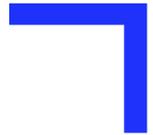
- Effective Publication of ATC Traffic Flow requirements
 - Dynamic | Time Based
 - Applied only when Demand /Complexity Requires
 - Foundation for Regional ATFM
- Incorporation of ATFM Measures into Publications
 - Presented in a suitable means that can be captured by Airline Computer Flight Planning Systems/ System Operators
 - Easily maintained tracked/traceability by ANSPs
 - One Standard across Region
- Create a better understanding of airlines' flight planning' capabilities, and dispatch functions, to improve coordination between ANSPs and Airlines
- To create predictability under both normal and contingency conditions
- To develop and deliver a joint program with each State and deliver an improvement program across region

Challenges – NOTAM Publication



- Communicating Requirements
 - No standard format for publication including terminology
 - Interpretation of Message and intent due ambiguity
- State Coordination
 - Conflicting Messages
- Timely Publication
 - Publication v Effectivity
- Contingency
 - Competing Requirements

Route Network Restrictions – Communicating Requirements

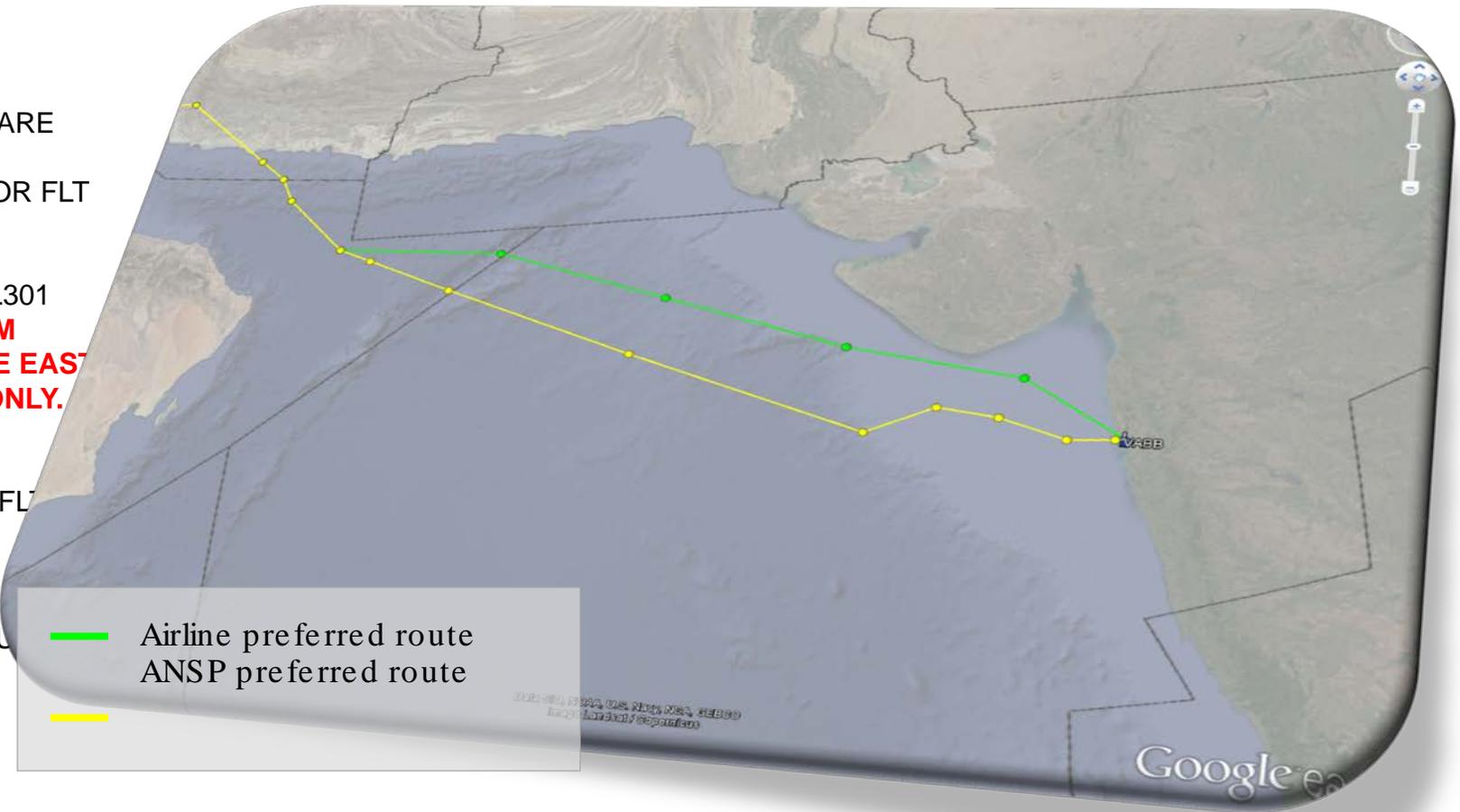


A0883/19

DUE TO CLOSURE OF PAKISTAN AIRSPACE, CONTINGENCY FLOW CONTROL MEASURES ARE IMPLEMENTED IN MUMBAI FIR AS BELOW:

- 1. ON ATS RTE L301/N571 FL300 NOT AVBL FOR FLT TRANSITING THROUGH MUMBAI FIR INTO MUSCAT FIR.
- 2. VABB DEP TO MIDDLE EAST VIA ATS RTE L301 NOT PERMITTED. **HOWEVER EDTO DEP FM MUMBAI AND OTHER AIRPORT TO MIDDLE EAST VIA ATS RTE L301 MAY FPL FL240/FL220 ONLY.**
- 3. FOR VABB DEP WITH DEST EUROPE AND BEYOND ATS RTE L301 AND P518 AVBL.
- 4. WB DEP FM VABB **ARE ENCOURAGED** TO FL PLAN VIA P574/N571 FOR HIGHER LEVEL.
- 5. DUE TO AIR TFC CONGESTION IN MUMBAI ACFT MAY EXPECT RE-ROUTING AND/OR LOWER LVL AND ARE ADVISED TO PLAN FU ACCORDINGLY.

29 MAY 09:46 2019 UNTIL 15 JUN 23:59 2019 ESTIMATED. CREATED:29 MAY 09:50 2019



Route Network Restrictions – State Coordination

NOTAM Published State A

A0913/19 NOTAMN

Q)VABF/QAFXX/IV/NBO/E/000/999/0930N06759E999

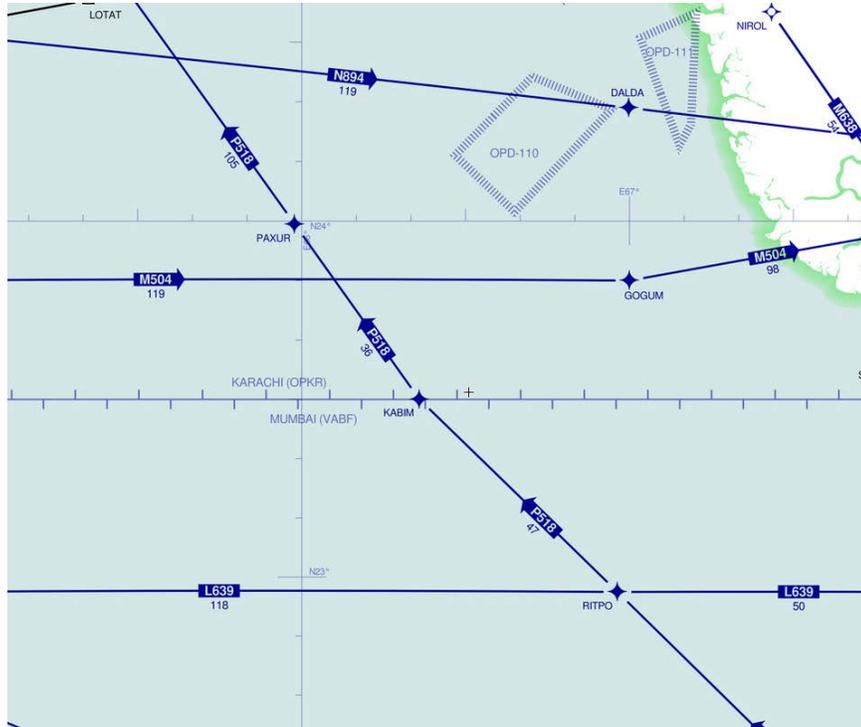
A) VABF

B) 1906021200 C) 1906152359EST

E) IN VIEW OF AIRSPACE RESTRICTIONS IMPOSED BY PAKISTAN
NO FLT IS PERMITTED TO ENTER OR EXIT MUMBAI FIR TO/FM
PAKISTAN AIRSPACE EXCEPT

1) WB REPEAT WB FLIGHTS ON ATS RTE P518.

2) EB REPEAT EB FLIGHTS VIA TELEM ON ATS RTE A791,G210,
G472 AND N893



NOTAM Published by State B

A0614/19 NOTAMR A0610/19

Q)OPKR/QARCA/IV/BO/E/280/430/2705N06714E391

A) OPKR

B) 1906120800 C) 1906282359EST

E) AA) IN ADDITION TO OUR NOTAM A0613/19 FOLLOWING ATS ROUTES ARE
ALSO AVAILABLE FOR OVERFLYING (TRANSITS) FLIGHTS:

- 1) KABIM P518 PG KEBUD
- 2) KABIM P518 PG ASVIB
- 3) EGRON/METBI JI A791 LAKIV N894 TELEM

BB) FOLLOWING CONTINGENCY CONNECTIVITIES ARE ALSO AVAILABLE FOR
OVERFLYING (TRANSITS) FLIGHTS:

- 1) **ASVIB PG PARET PAXUR KABIM**
- 2) **KEBUD PG PARET PAXUR KABIM**
- 3) **ALPOR DCT KABIM**
- 4) ALPOR DCT SAPNA
- 5) **EGRON/METBI JI LAKIV DCT KABIM**
- 6) EGRON/METBI JI LAKIV DCT SAPNA
- 7) ASVIB/KEBUD PG DCT PARET DCT 2427N06537E DCT DALDA N894
TELEM CHECK MUMBAI FIR NOTAMS FOR CONTINUITY IN INDIAN
AIRSPACE.

F) FL280

G) FL430

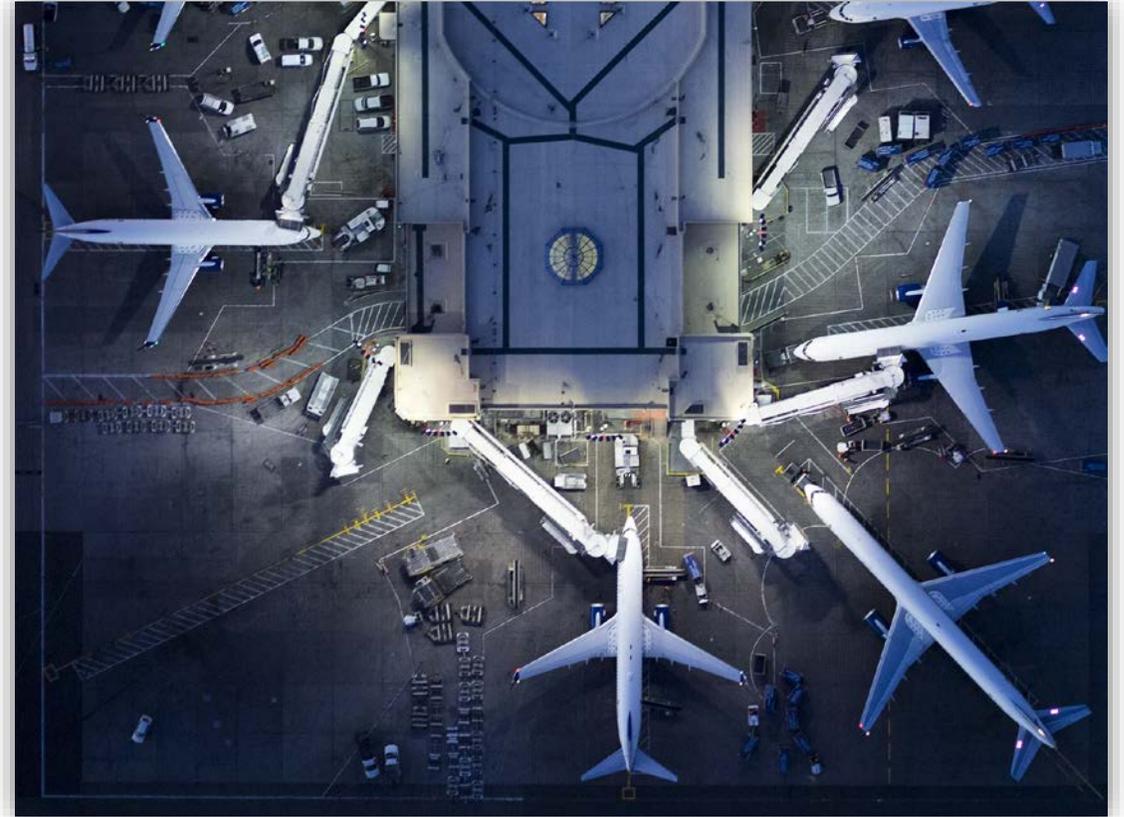
State B published NOTAM making WPT **KABIM** available for both eastbound and westbound direction while at the same time, State A was restricting same WPT only for westbound direction.

Route Network Restrictions – The Time Challenge

NOTAMs Cause significant operational issues when published '*with immediate effect*'

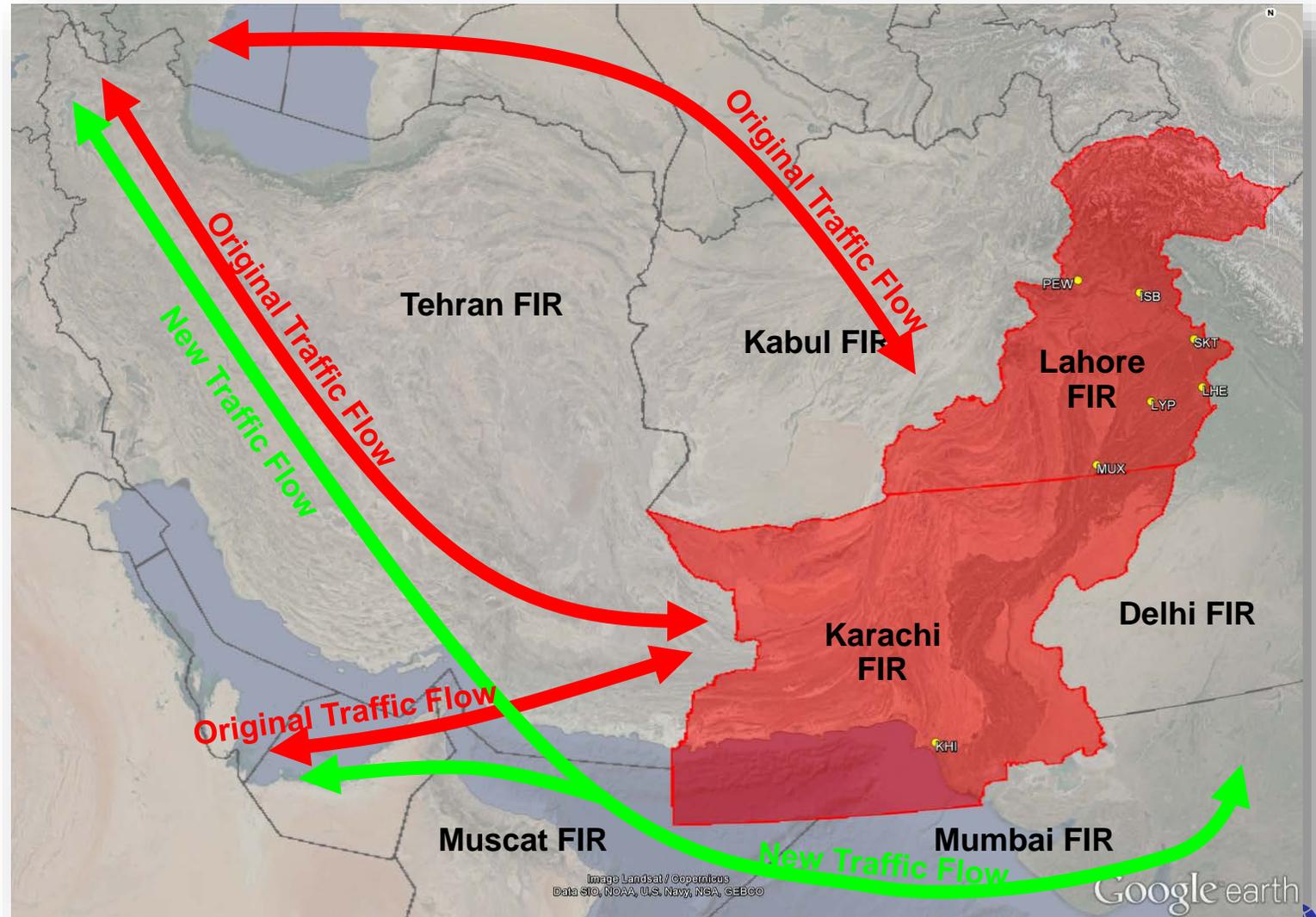
Airlines are Required to update hundreds of company routes within a couple of hours.

High risk of human error which may lead to significant operational disruptions.



Route Network Restrictions – Contingency

- During contingency situations, ATFM measures that are properly working during normal operations may become ineffective; in some cases even contradictory.
- This leads to:
 - Airspace Congestion
 - Loss of Predictability for both Airspace Users and ANSPs.
 - Confusion
 - Increased Workload
 - Increased number of safety related occurrences



Application | Publication | Standards

Airway	From - To	Restriction
UL1	AAAAA - BBBBB	Not available or Only available or Compulsory for traffic 1. ARR 2. Via ... Except a. ARR b. DEP..... 3. Via ... with

3.2.4. Usage of combinations and terms in utilization expression

If circumstances allow or if it is required for better expression of the utilization, the 3 (th) can be combined as follows:

- a. "Only available" and "Compulsory" might be used in combination, resulting in "Only Compulsory".

Fictitious Example

Airway	From - To	Utilization
UL1	AAAAA - BBBBB	<i>Only available and Compulsory for traffic</i> ARR

- b. "Only available ..." together with "Not available ...", are combined by using the formula:
"Only available for ...
Except ..."

Fictitious Example

Airway	From - To	Utilization
UL1	AAAAA - BBBBB	<i>Only available for traffic</i> ARR Except Via...

- c. Combining "Compulsory..." with "Not available...." is NOT POSSIBLE. The TWO independent numbered expressions shall be given within the same box.

Fictitious Example

Airway	From - To	Utilization
UL1	AAAAA - BBBBB	1. <i>Compulsory for traffic</i> ARR Via... Above FL245 at... 2. <i>Not available for traffic</i> DEP

- d. term "Except" to define usage:
The expression "Not available for traffic except ..." shall be avoided, "Only available for traffic..." shall be used instead.

Airway	From - To	Utilization
UL1	AAAAA - BBBBB	<i>Only available and Compulsory for traffic</i> ARR

UL1	AAAAA - BBBBB	1. <i>Only available for traffic</i> a. ARR ...Via... b. ARR... Via... 2. <i>Not available for traffic</i> DEP
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UL1	AAAAA - BBBBB	<i>Only available for traffic</i> DEP
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Clear Definition of Terms

One Standard

Guidelines for Use / Interpretation



ATFM Traffic Demand Alleviation

Chris Allan

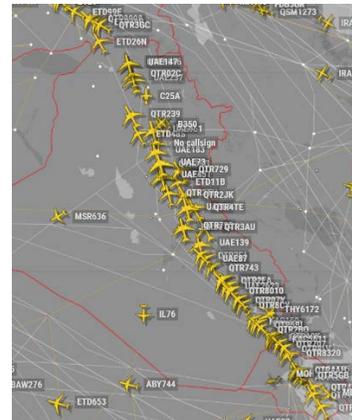
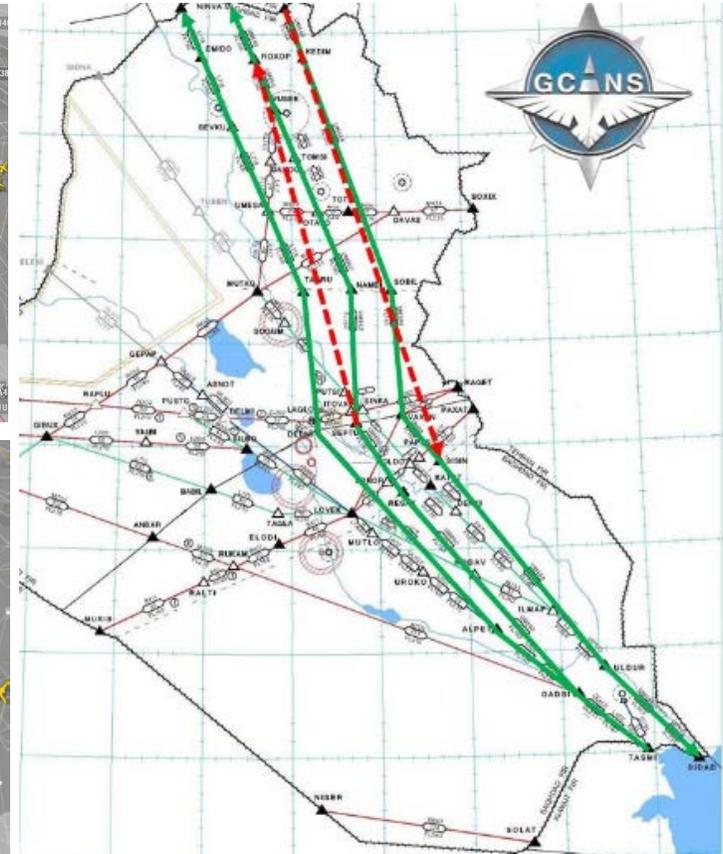
Milan Stefanik

Dynamic Route Utilization

- Optimization during reduced traffic levels (COVID-19 or off-peak times).
- Flexible TOS, CDRs, Flight Plannable Direct Routes etc.
- Capitalize from our MID Region traffic schedule dynamic.

Traffic Orientations Scheme for SIDs

- Peak Hour Departure Scenarios
- Reduction of Departure Delays
- Efficient Airspace Utilization

Flight Planning Capabilities

Alexander Smith

Regional Manager-
Navigation & ATM

British Airways

21 September 2020



Flight Planning System – Capabilities (ATFM)



Introduction to the Capabilities to Manage Traffic Flow Restrictions through Flight Planning Systems

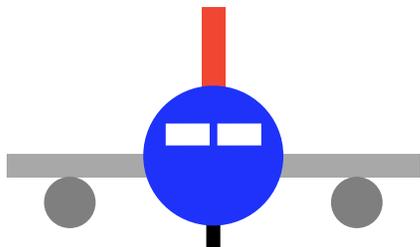
How the modern Flight Planning System can ensure adherence to Route Network Restrictions

Flight Deck Crew Briefing Pack / Flight Plan generated to account for the expected and desired tactical environment



Lufthansa Systems

The following 'Flight Planning' slides are courtesy of Lufthansa Systems and demonstrate Lido Flight Planning System



Flight Planning – Then v Now



Operational Case
Standard ST

Climb
Procedure MN IAS
Speed 0.850 330

Cruise
Procedure Cost Index
ECON 70
Fixed MN Airspace/Airway VSOPTS
Optimum MN ON

Descent
Procedure MN IAS
Speed 0.850 330
Fuel Gravity 0.000
Holding Time Fuel

ROUTE	HFT/R	MCT/R	HRDXB11	HRDXB14	HRDXB40	LHRDXB6	E/HCT/R	E/HCT/R
OFF NO	1	2	4	6	8	9	11/0/1	12/0/1
REG	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ
CRUISE	C170	C170	C170	C170	C170	C170	C170	C170
TRIP	62463	60275	60805	60903	61114	67841	60270	59976
TTIME	0628	0618	0620	0621	0621	0659	0618	0617
ETA	1907	1857	1859	1900	1900	1938	1857	1856
COSTS	28091	27141	27273	27443	27450	29986	27140	27038
CONT	2562	2549	2568	2562	2574	2693	2548	2536
CONT POL	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95
ALTN	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS
AFUEL	6610	6609	6609	6609	6609	6612	6609	6603
RESERVE	4170	4170	4170	4170	4170	4170	4170	4160
PLNTOF	75805	73603	74152	74244	74467	81316	73597	73275
P EXTRA	44117L	44131L	44112L	44118L	44106L	43984L	44132L	44861L
DIST	3289	3094	3101	3127	3117	3509	3094	3094
AVG WC	P043	P029	P025	P027	P029	P035	P029	P030
MAXZFW	246750	246750	246750	246750	246750	246750	246750	246750
ESTZFW	228301	228301	228301	228301	228301	228301	228301	227600
PLNZFW	228301	228301	228301	228301	228301	228301	228301	227600
MALTOW	396810	396810	396810	396810	396810	396810	396810	396810
PLNTOW	304106	301904	302453	302545	302768	309617	301898	300875
MALLW	285760	285760	285760	285760	285760	285760	285760	285760
PLNLW	241643	241629	241648	241642	241654	241776	241628	240899
ADDFU								
TCAP	173477	173477	173477	173477	173477	173477	173477	173477
SAVINGS								

FLIGHT LOG
CAPTAIN MURRAY
1ST OFFICER LOVETT
UNITED AIR LINES TRANSPORT CORPORATION
OBSERVER
TRIP 1
DATE 3-11-40 PLANE CV-LG

BLOCK TIME	CV	AX	FPN	CT	MC	BF	SV	XA - HX	PG	FMN	NK	LG
OVER-ON-OFF	11:56		11:39									
	11:21	4T			11							9:03
	:20	4T			4T							:06
	160	160			175							climb
	45	210-52			160							130
	overst	45			240							clr
		lgt ovc			40							clr
	275	269			270							250
	160	160			155							

TRAFFIC INFORMATION

8:05 UI CLRD FROM LG TO ALLENTOWN AT 4T
9:36 CLRD TO NY BNDRY
10:58 CLRD NY BNDRY TO CLEVELAND CR 4T
11:52 CLRD CV TO CV BNDRY 4T

ALTO CUMULUS

Then...

Now...

ROUTE	HFT/R	MCT/R	HRDXB11	HRDXB14	HRDXB40	LHRDXB6	E/HCT/R	E/HCT/R
OFF NO	1	2	4	6	8	9	11/0/1	12/0/1
REG	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ	GCIVZ
CRUISE	C170	C170	C170	C170	C170	C170	C170	C170
TRIP	62463	60275	60805	60903	61114	67841	60270	59976
TTIME	0628	0618	0620	0621	0621	0659	0618	0617
ETA	1907	1857	1859	1900	1900	1938	1857	1856
COSTS	28091	27141	27273	27443	27450	29986	27140	27038
CONT	2562	2549	2568	2562	2574	2693	2548	2536
CONT POL	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95	CONT95
ALTN	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS	OOHS
AFUEL	6610	6609	6609	6609	6609	6612	6609	6603
RESERVE	4170	4170	4170	4170	4170	4170	4170	4160
PLNTOF	75805	73603	74152	74244	74467	81316	73597	73275
P EXTRA	44117L	44131L	44112L	44118L	44106L	43984L	44132L	44861L
DIST	3289	3094	3101	3127	3117	3509	3094	3094
AVG WC	P043	P029	P025	P027	P029	P035	P029	P030
MAXZFW	246750	246750	246750	246750	246750	246750	246750	246750
ESTZFW	228301	228301	228301	228301	228301	228301	228301	227600
PLNZFW	228301	228301	228301	228301	228301	228301	228301	227600
MALTOW	396810	396810	396810	396810	396810	396810	396810	396810
PLNTOW	304106	301904	302453	302545	302768	309617	301898	300875
MALLW	285760	285760	285760	285760	285760	285760	285760	285760
PLNLW	241643	241629	241648	241642	241654	241776	241628	240899
ADDFU								
TCAP	173477	173477	173477	173477	173477	173477	173477	173477
SAVINGS								



Flight Planning Systems – Data Driven

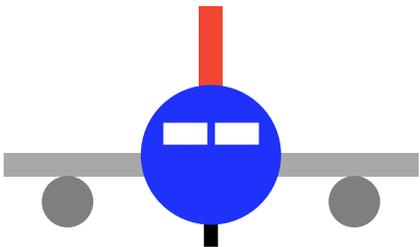


Airline Company Data

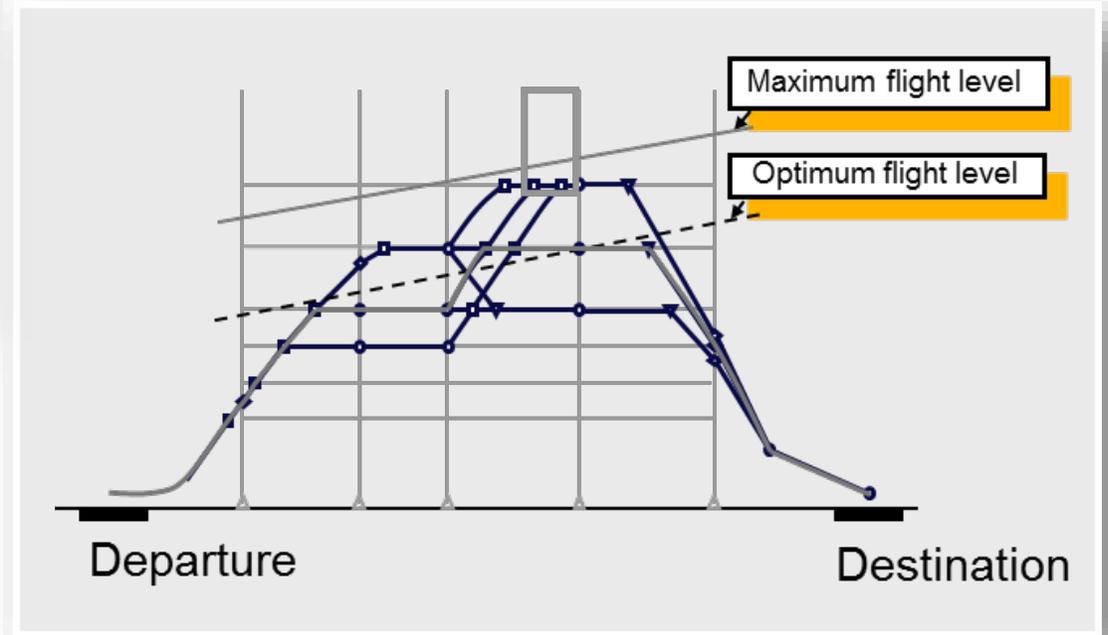
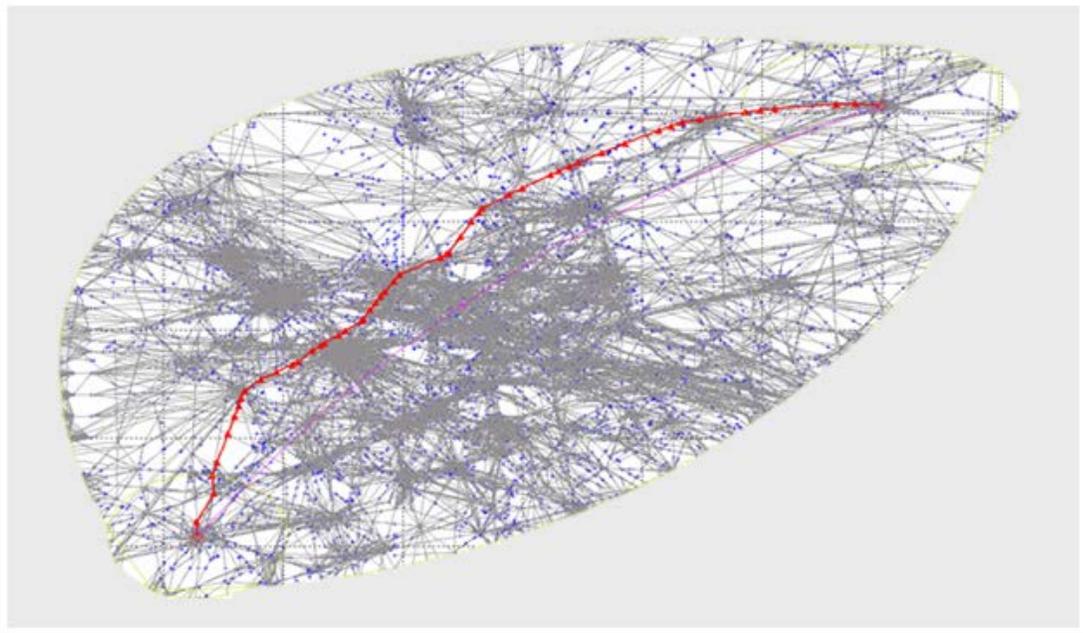
- Company Restrictions
- Company Preferred Routes
- Fuel
- Aircraft Costs
- Cost of Time
- Aircraft Performance
 - By Type | Tail

Aeronautical Data

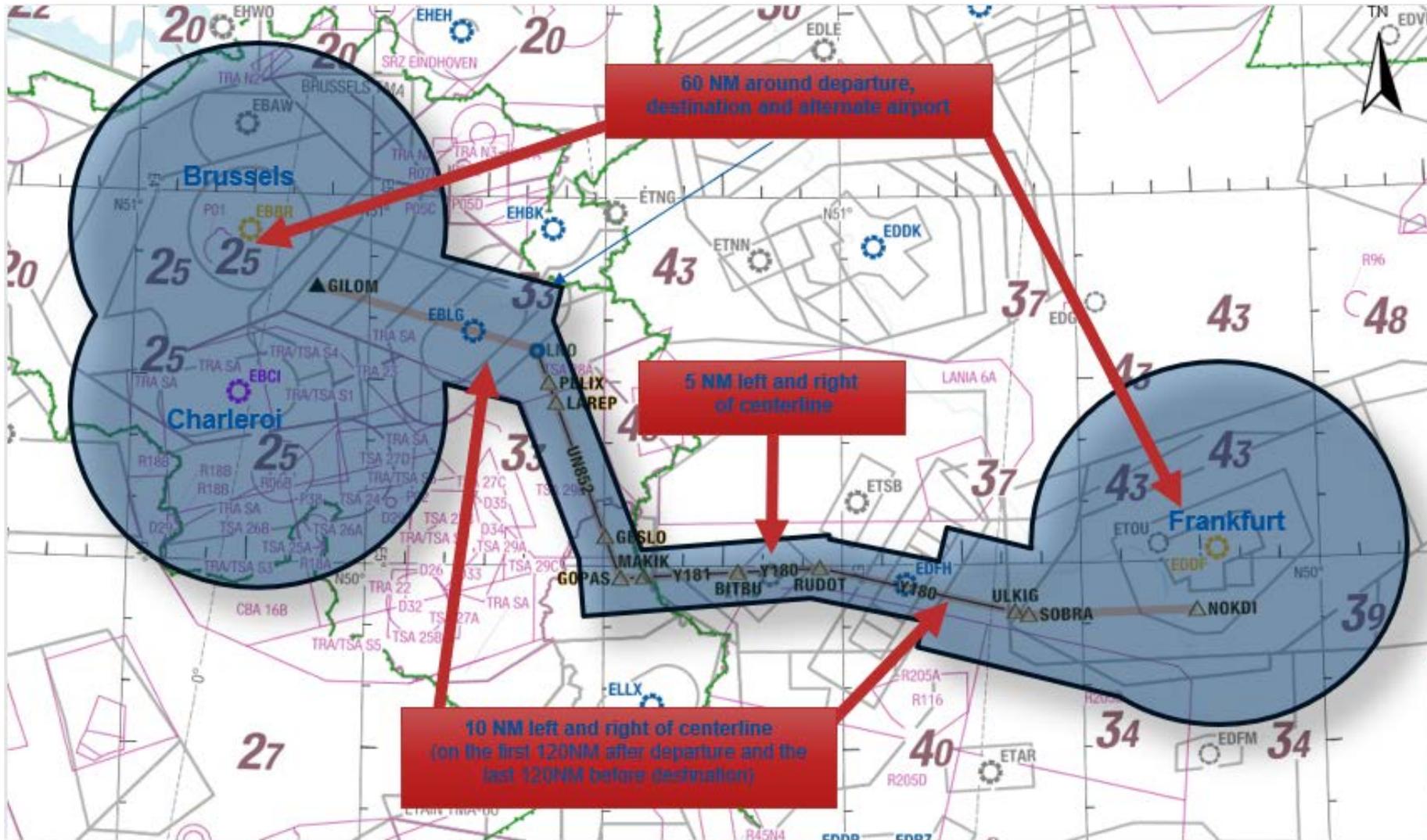
- AIS
 - NOTAMS
 - Traffic Schemes
 - Flexible Airspace Use
- MET
- Overflight Charges & Permits
- Terrain



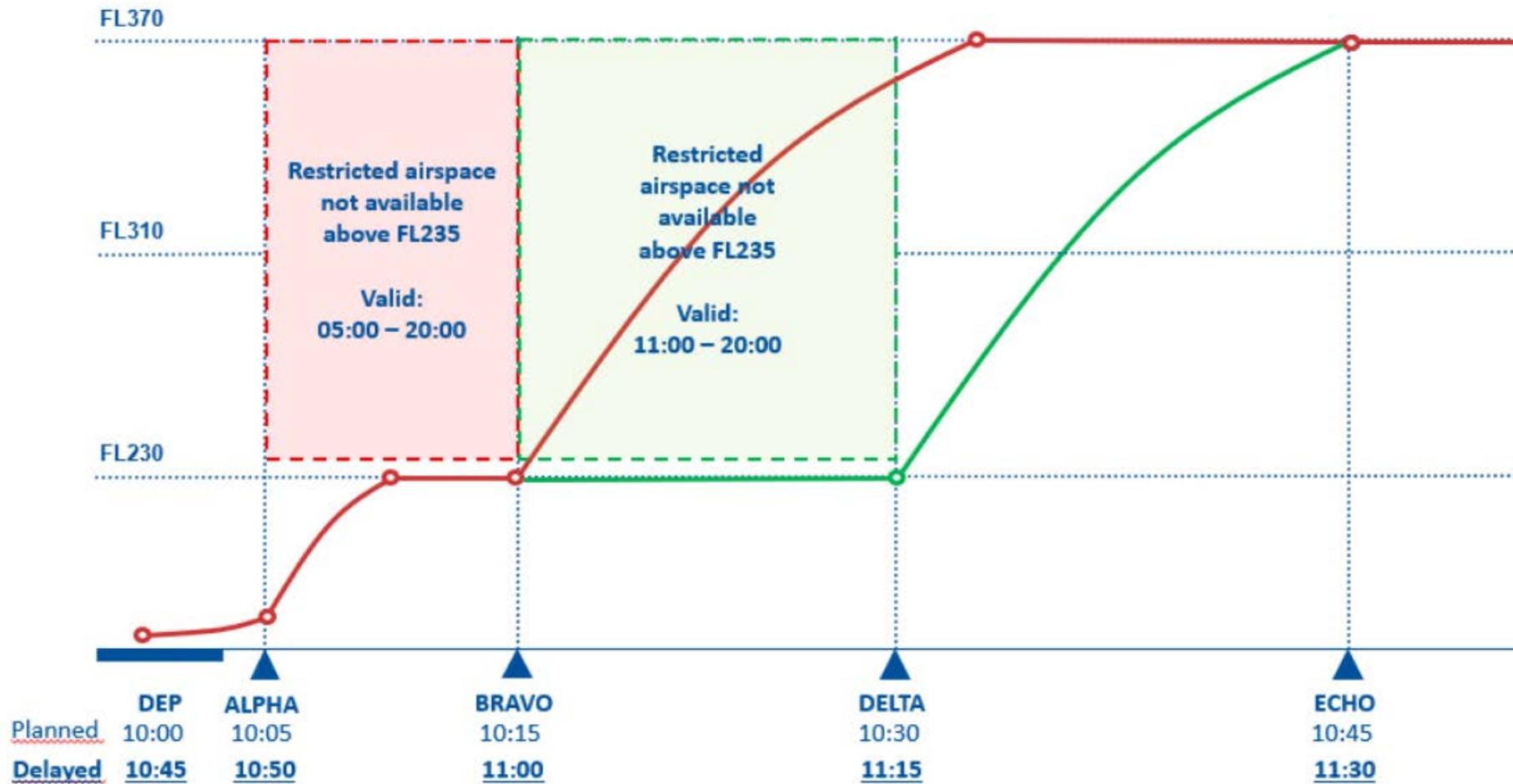
Flight Planning Systems - Optimisation



Flight Planning - NOTAMs



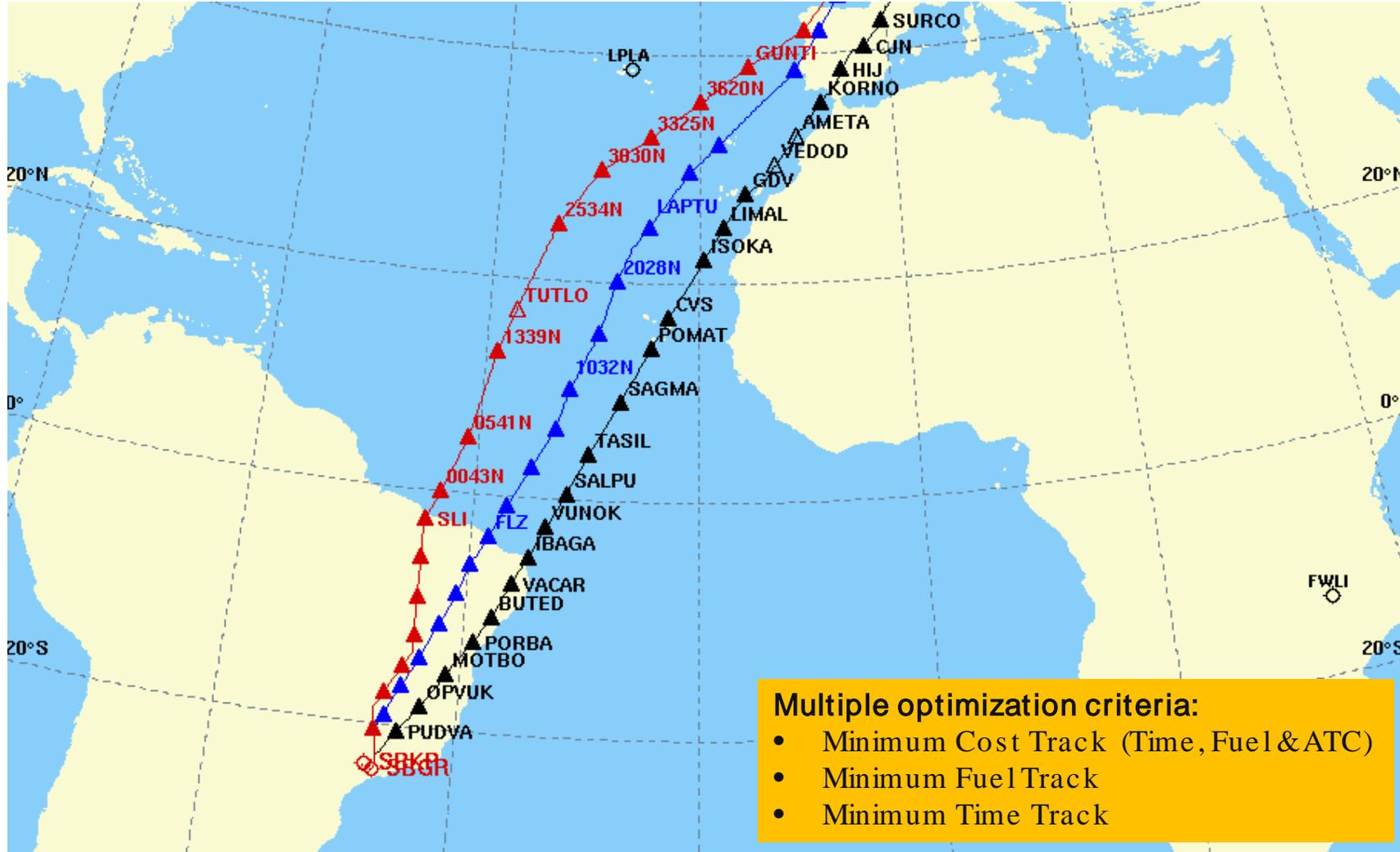
Flight Planning – Flight Level Restrictions



Flight Planning – The Challenges

- ❑ ANSPs are responsible for effective Demand-Capacity balancing:
 - ANSPs have direct access to both Airspace Capacity data and Traffic Demand data. Airspace users do not have access to this information.
 - For this reason, ANSPs are in the position of rule-maker.
- ❑ Airspace Users are obliged to comply with published ATFM rules.
 - Airspace Users are using Flight Planning Systems with incorporated flight optimizing algorithms.
 - All Flight Planning Systems work on a similar principal, searching for the optimal route taking into account published restrictions often generating identical or very similar routes.
 - If the ATFM rules are ineffective or ambiguous, traffic may be planned in a completely different way than ANSPs intended or expected.

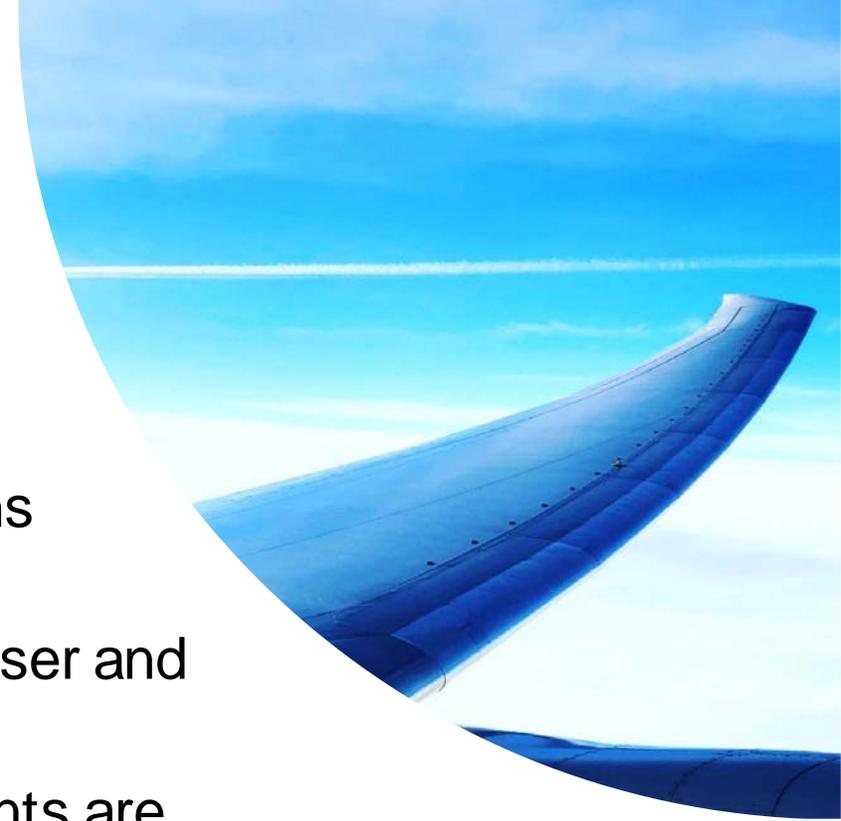
Flight Planning – Why The Differences



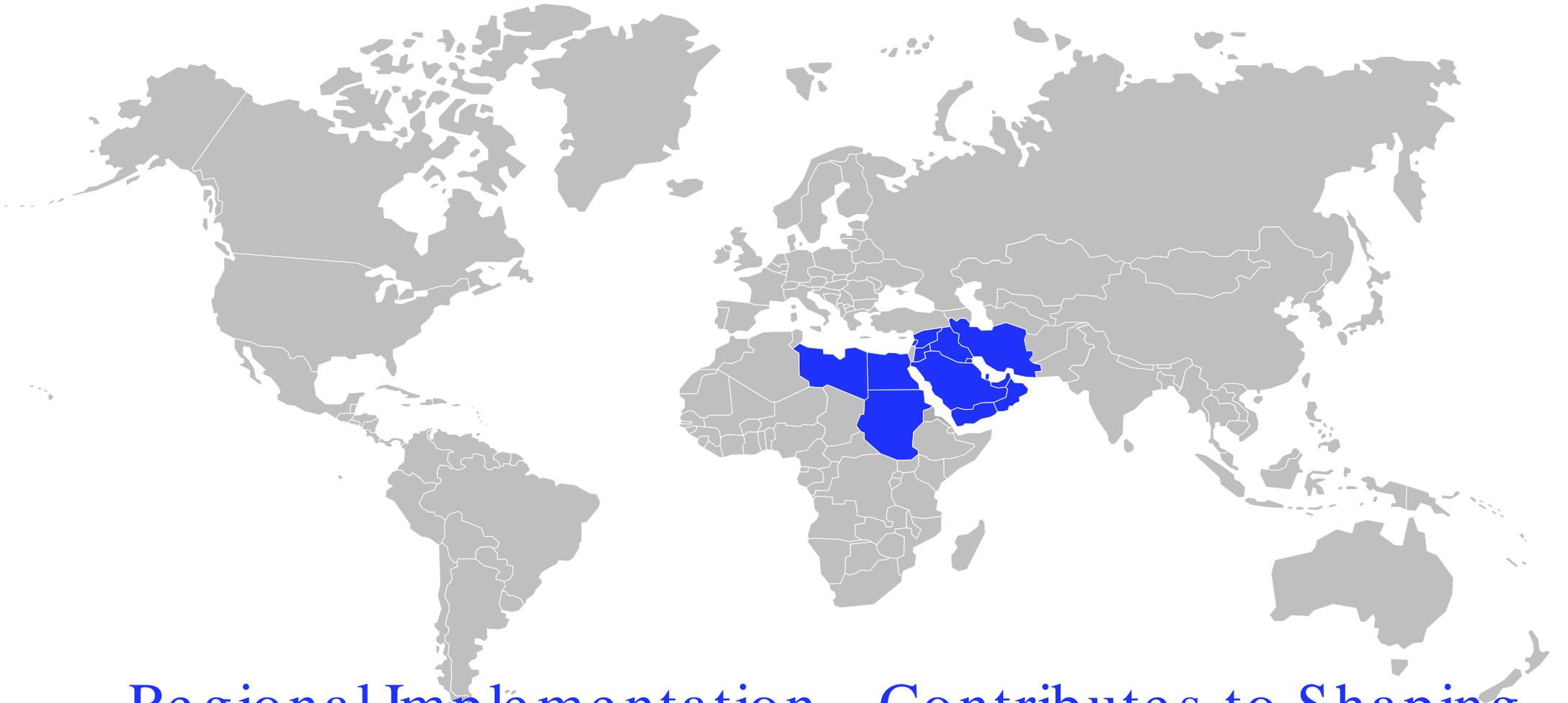
Considerations

ATFM - TF

- Standardisation of the Publication of Route Network Restrictions (ATFM Measures) across the Region
- Provision of 'Operational Flexibility' for the benefit of Airspace User and Service Provider
- Collaborative approach to ensure Airspace Provider requirements are met by Airspace User
- Introduction of Standards across the region for NOTAM publication and AIP publication pertinent to ATFM
 - Guidelines | Best Practices | Training | Awareness | Info Sharing
- Incorporate ATFM in Regional and Cross Regional Contingency Plans



Thank You



Regional Implementation – Contributes to Shaping
ATFM Globally