Free Route Airspace Implementation Workshop

17-18 November 2026







INTERNATIONAL CIVIL AVIATION ORGANIZATION

Part One

Direct Routing: The First Step Towards UPR

How frontline tactical decisions expose airspace availability, prove efficiency, and provide empirical groundwork for User Preferred Routes.

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CORE PREMISE Tactical DCT = Empirical UPR Proof

Presentation Outline

01 **Thesis & Rationale**

Every tactical direct is evidence of capacity

02 **Impacting Factors**

Surveillance, remote / oceanic airspace and DARP

03 **Risks & Learnings**

Controller-initiated considerations and lessons learned

04 **Indonesia Practice**

Ujung Pandang ACC direct routing realities

05 **Action Plan**

Inventory method and the path to full UPR

06 **UPR in Operation**

Indonesia: roadmap, mandates, FPCF, lessons

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Every Tactical Direct is Evidence of Capacity

Direct routings issued on the shift floor reveal real-time dynamic airspace availability

> *Every direct routing a controller issues is live proof that airspace was available for more efficient use under those specific conditions. Systematically reviewing these decisions shows where UPR can work before designing new routes.*

01 Tactical Field Observation

Captures dynamic window openings missed by static air route structures.

02 Pre-Redesign Discovery

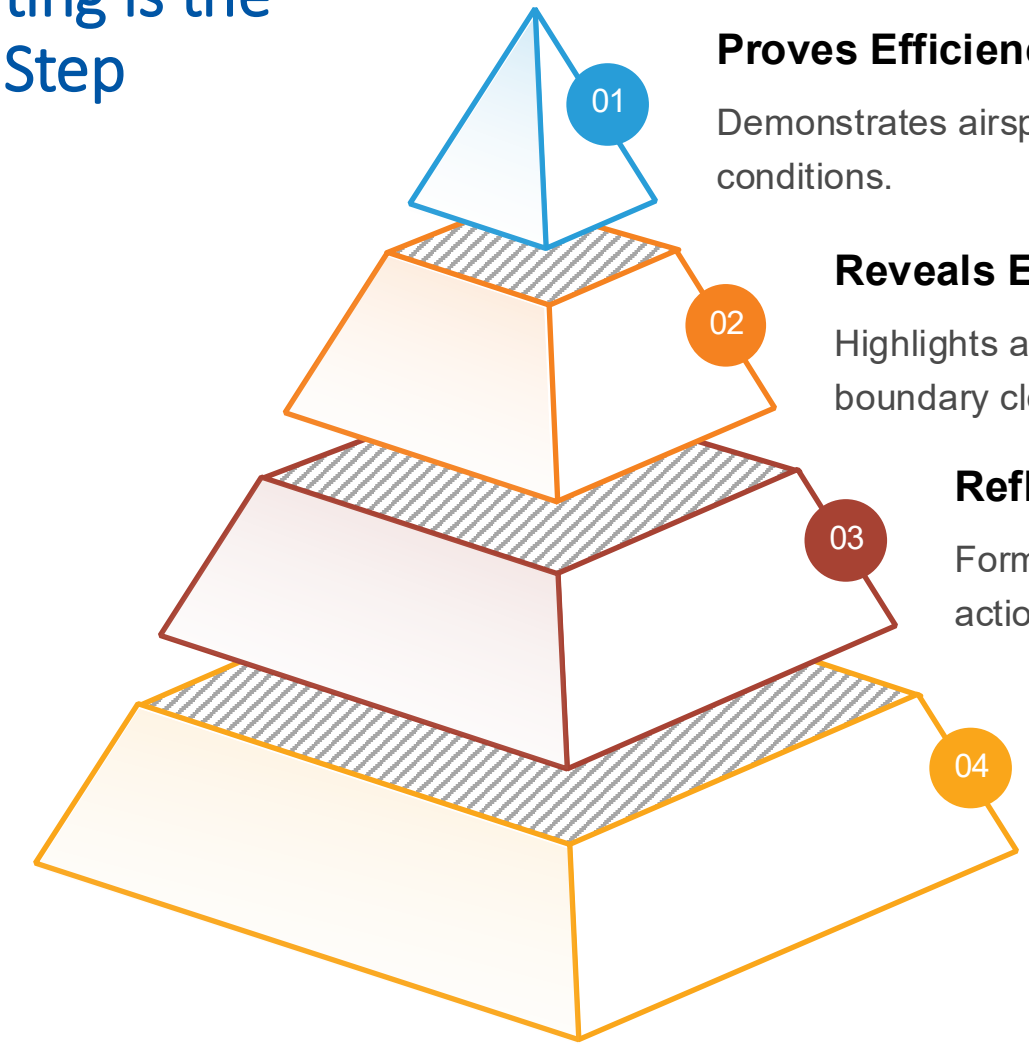
Identifies operational efficiency without waiting for formal airspace overhauls.

03 Data-Driven Baseline

Converts anecdotal controller shortcuts into measurable empirical data sets.

Why Direct Routing is the Necessary First Step

Strategic rationale



Proves Efficiency

Demonstrates airspace availability during specific traffic conditions.

Reveals Enablers

Highlights active military, weather and traffic boundary clear windows.

Reflects Practice

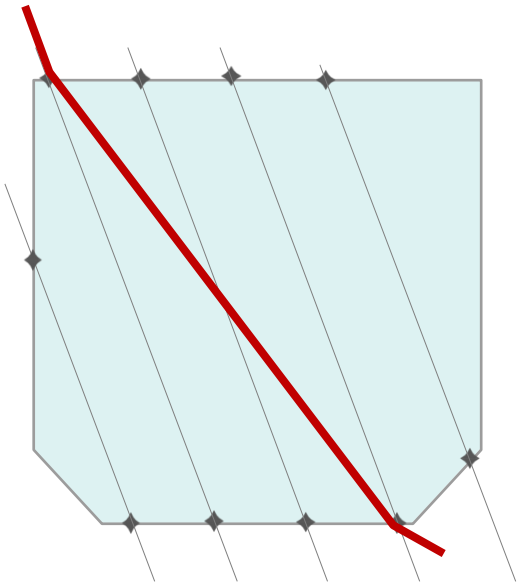
Formalizes existing frontline controller actions rather than forcing new methods.

Exposes Planning Gap

Tactical miles saved do not yield pre-flight fuel efficiency without UPR planning.

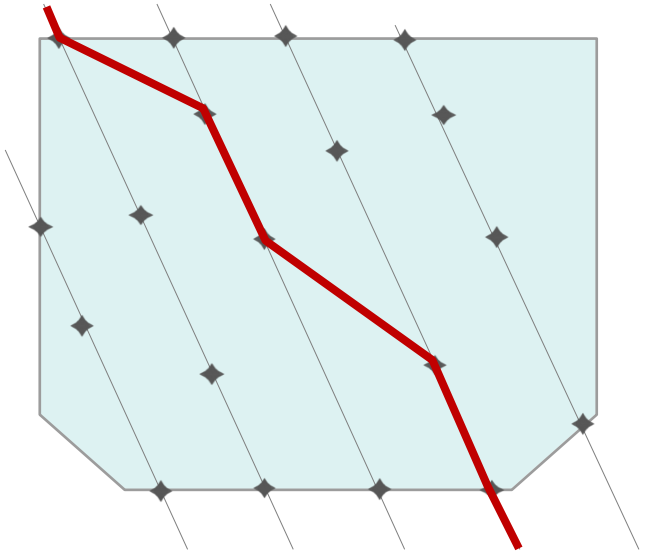
How UPR Trajectories Are Constructed

Subject to airspace availability, via ATS route, direct route and/or free route



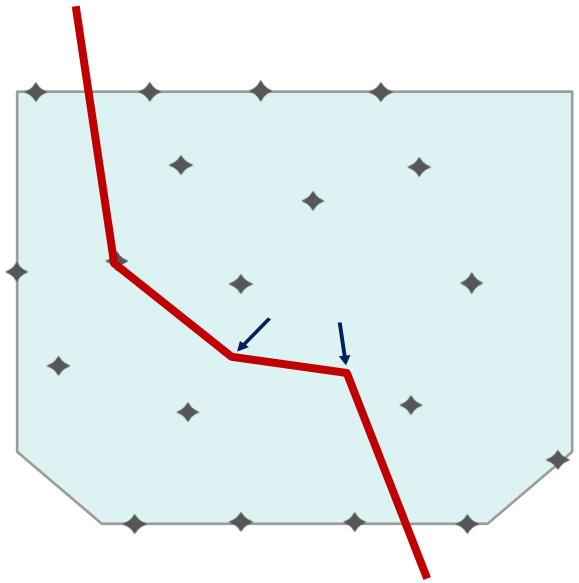
01 DIRECT ROUTE

Direct entry to exit



02 DIRECT ROUTE

Via intermediate waypoint



03 FREE ROUTE

Using a new designated point based on latitude and longitude

Factors Impacting Direct Routing – Surveillance

What enables or limits directs in surveillance airspace

01 Route Structure
- Flow – race track / one-directional
- Jet / turbo traffic mix

02 Airspace Architecture
- Upper / lower
- Navigation capability of aircraft

03 Separation Standards
- T15, 10 NM, 5 NM, 3 NM

04 Coordination Capability
- System supported
- Electronic system supported
- Voice

05 Procedures
- Standardisation
- LoA
- Sector / FIR cross-pollination

06 Complexity
- ATC workload – vectoring / weather avoidance

CROSS-CUTTING ENABLER **Embedded positive safety culture · Non-punitive just culture reporting**

Factors Impacting Direct Routing – Remote / Oceanic

What enables or limits directs in Remote / Oceanic airspace

01 Time Efficiency

- System capability to reflect DCT
- Communication medium – CPDLC, VHF, HF relay
- AIDC, electronic system capability or voice

02 Coordination Capability & Efficiency

- Degree of AIDC
- Electronic
- Voice / manual

03 ATC Workload

- Present
- Inherited
- Resultant

04 Procedures

- LoA / MoU
- Document review
- Cross-boundary

05 Separation

- Laterally separated routes or charts
- Restricted, danger or prohibited areas
- Conflict probe
- Compatible separation standards (30/10 implementation)

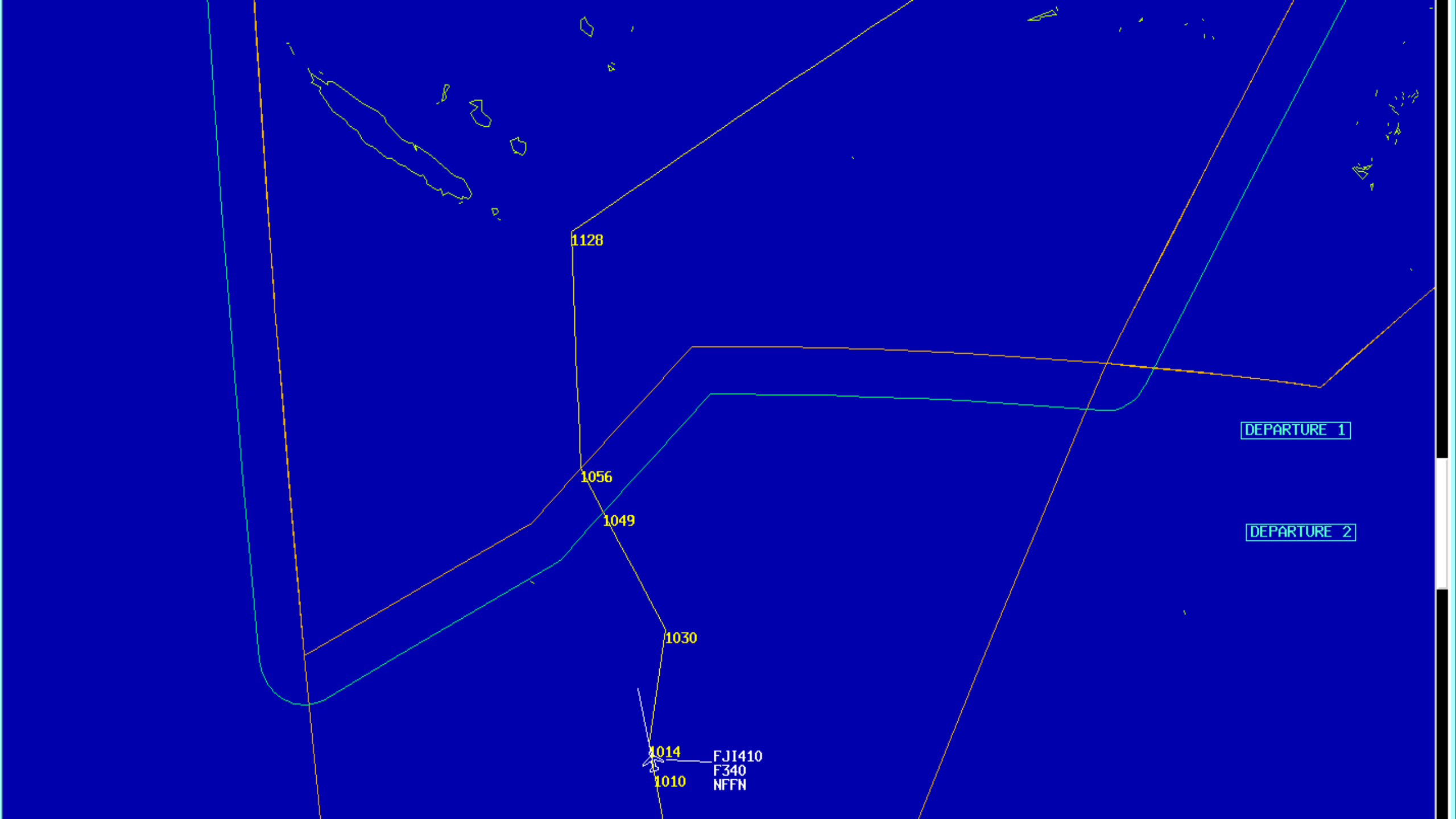
06 Service Provision

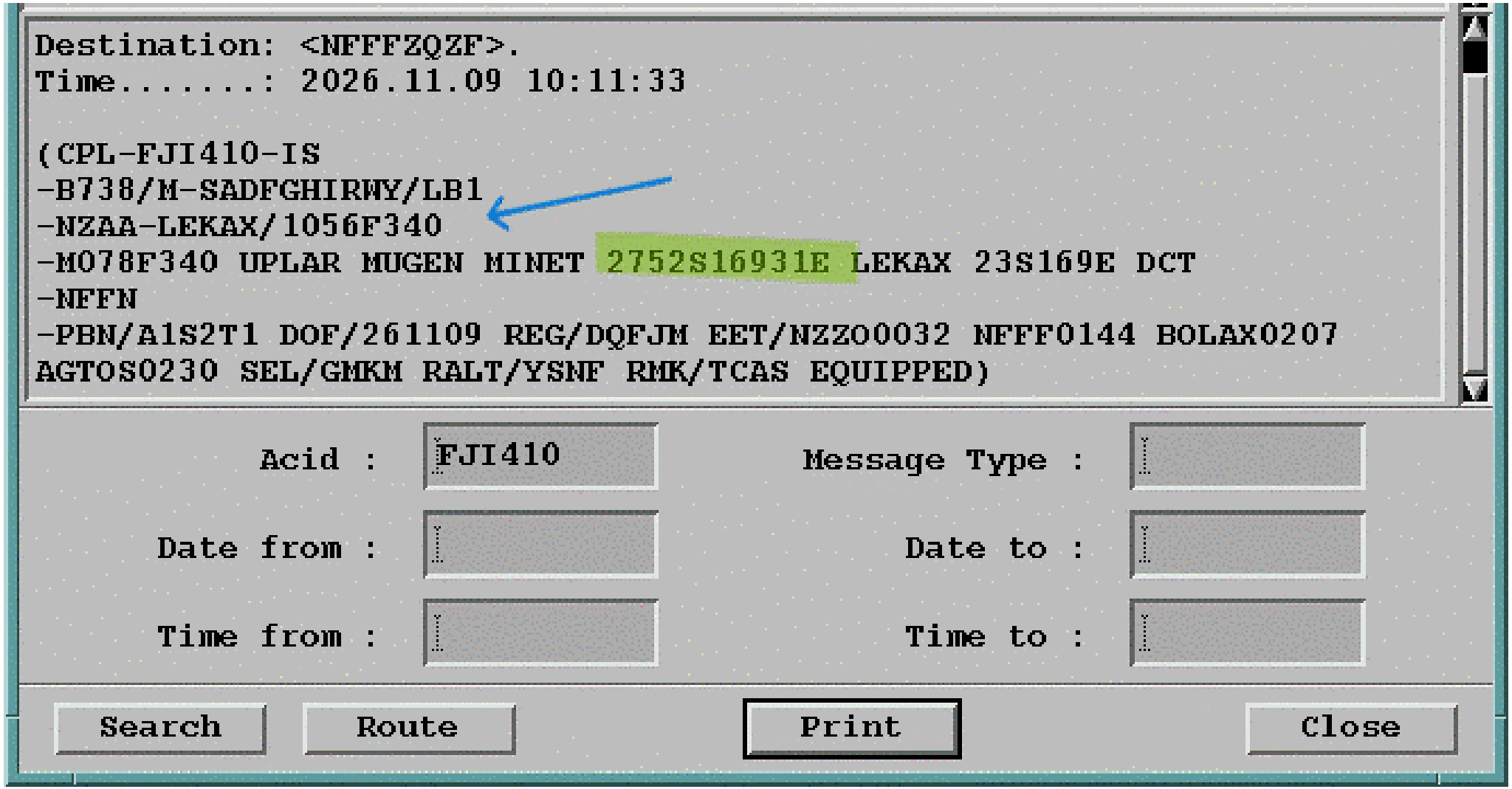
- Contingency requirements
- Flexible sectorisation

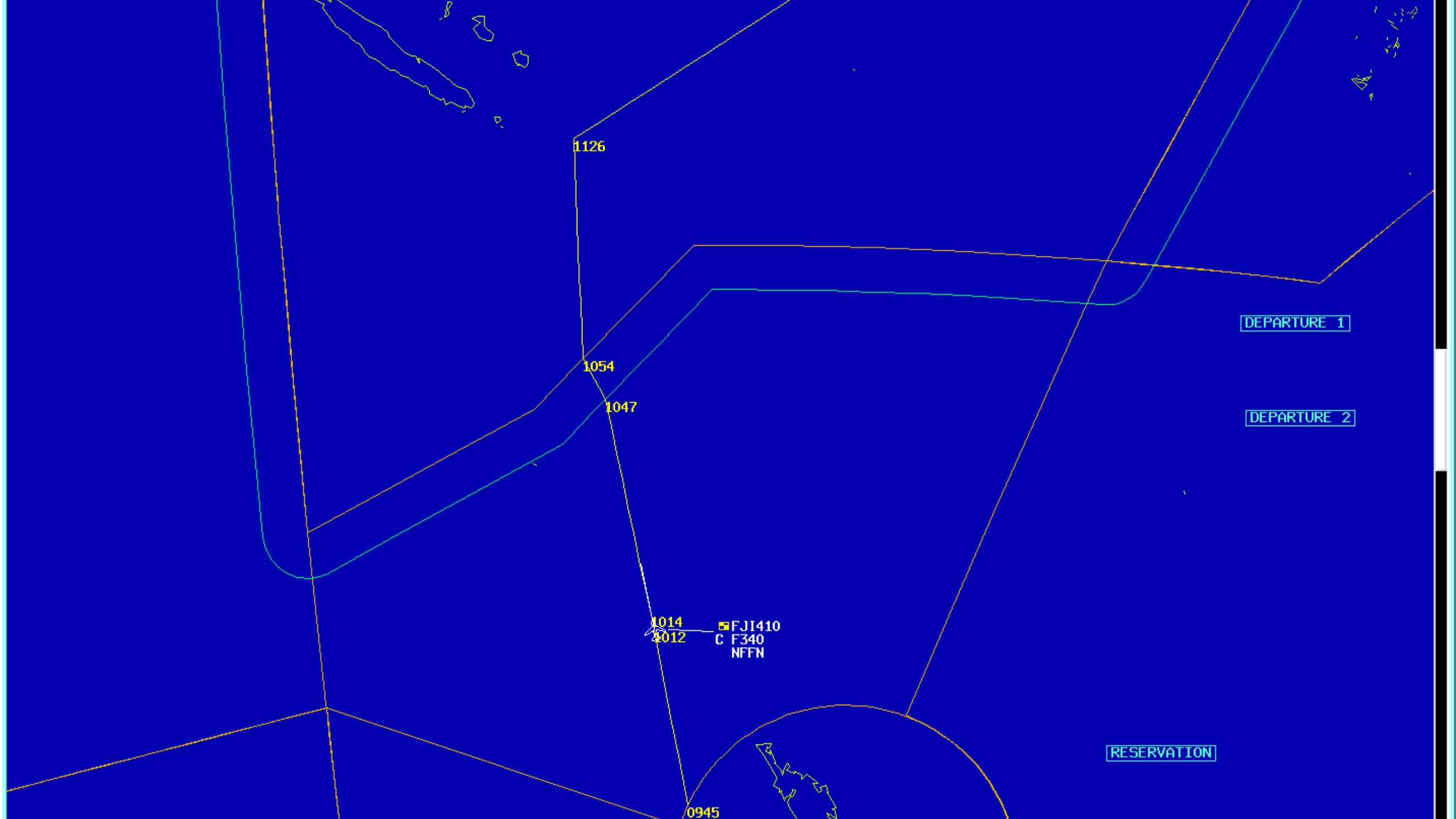
07 Negotiation Complexity

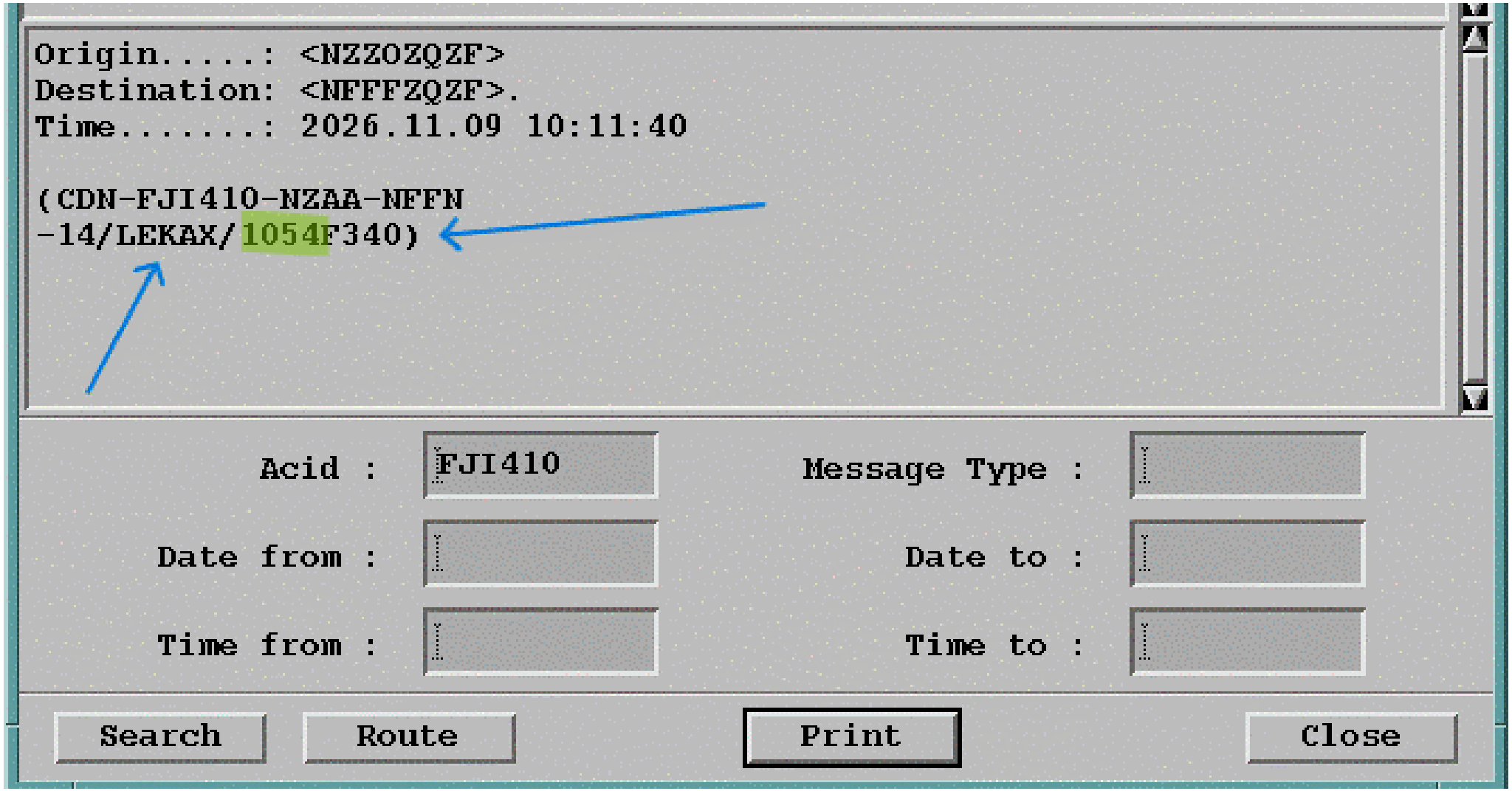
- LoA requirements
- Backward, forward
- Adjacent FIR downstream coordination requirements

CROSS-CUTTING ENABLER **Embedded positive safety culture · Non-punitive just culture reporting**

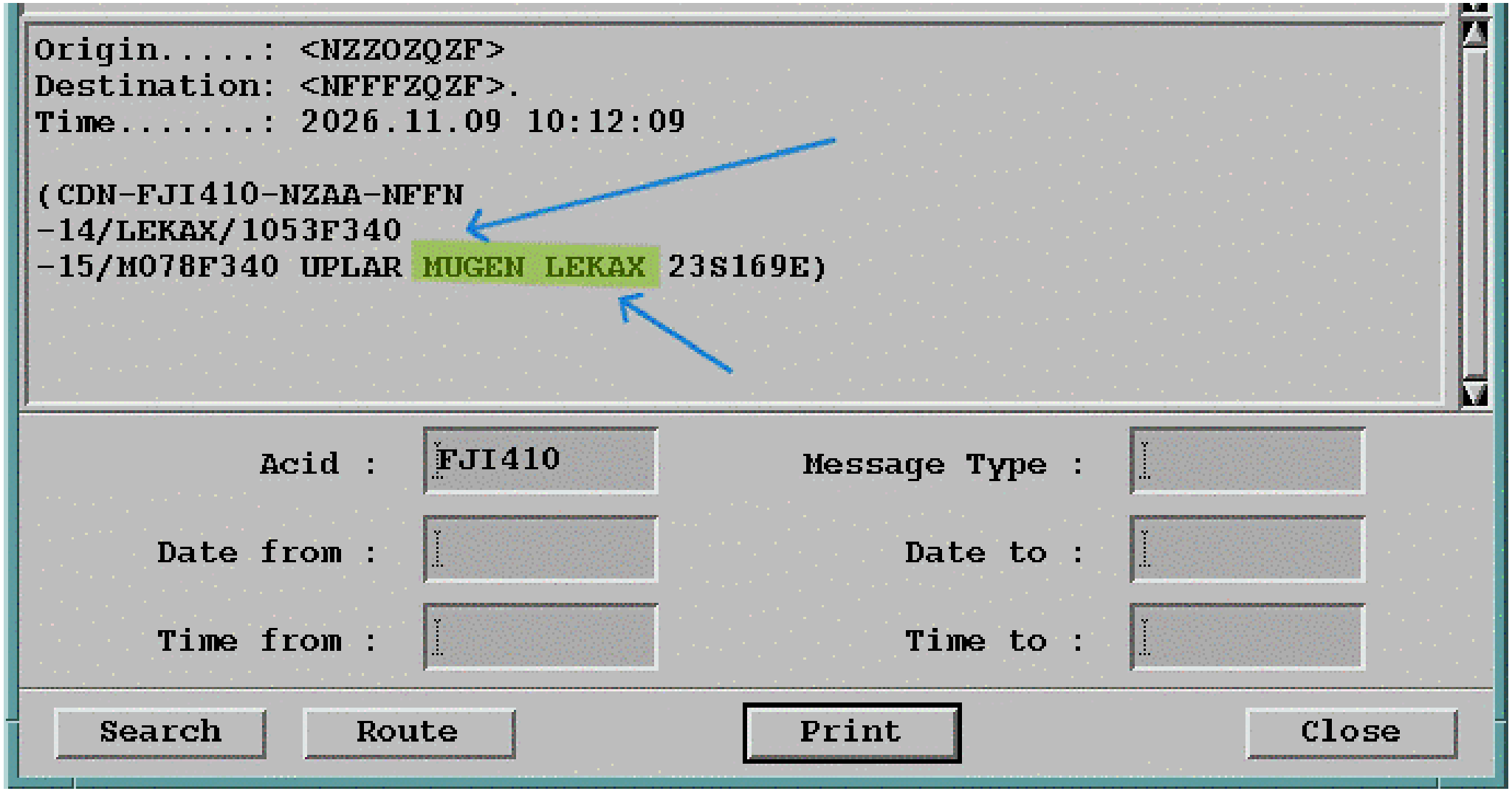

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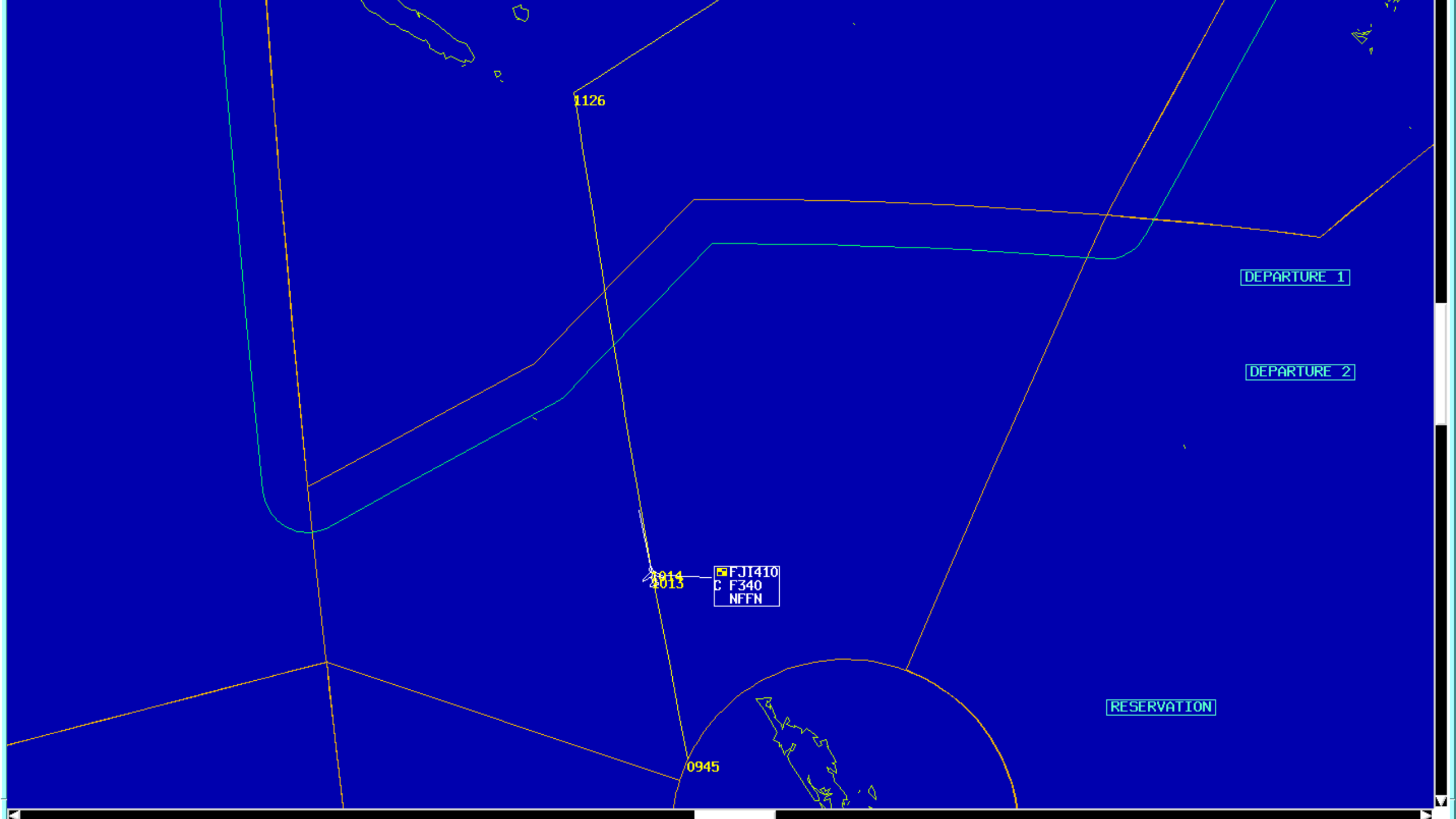

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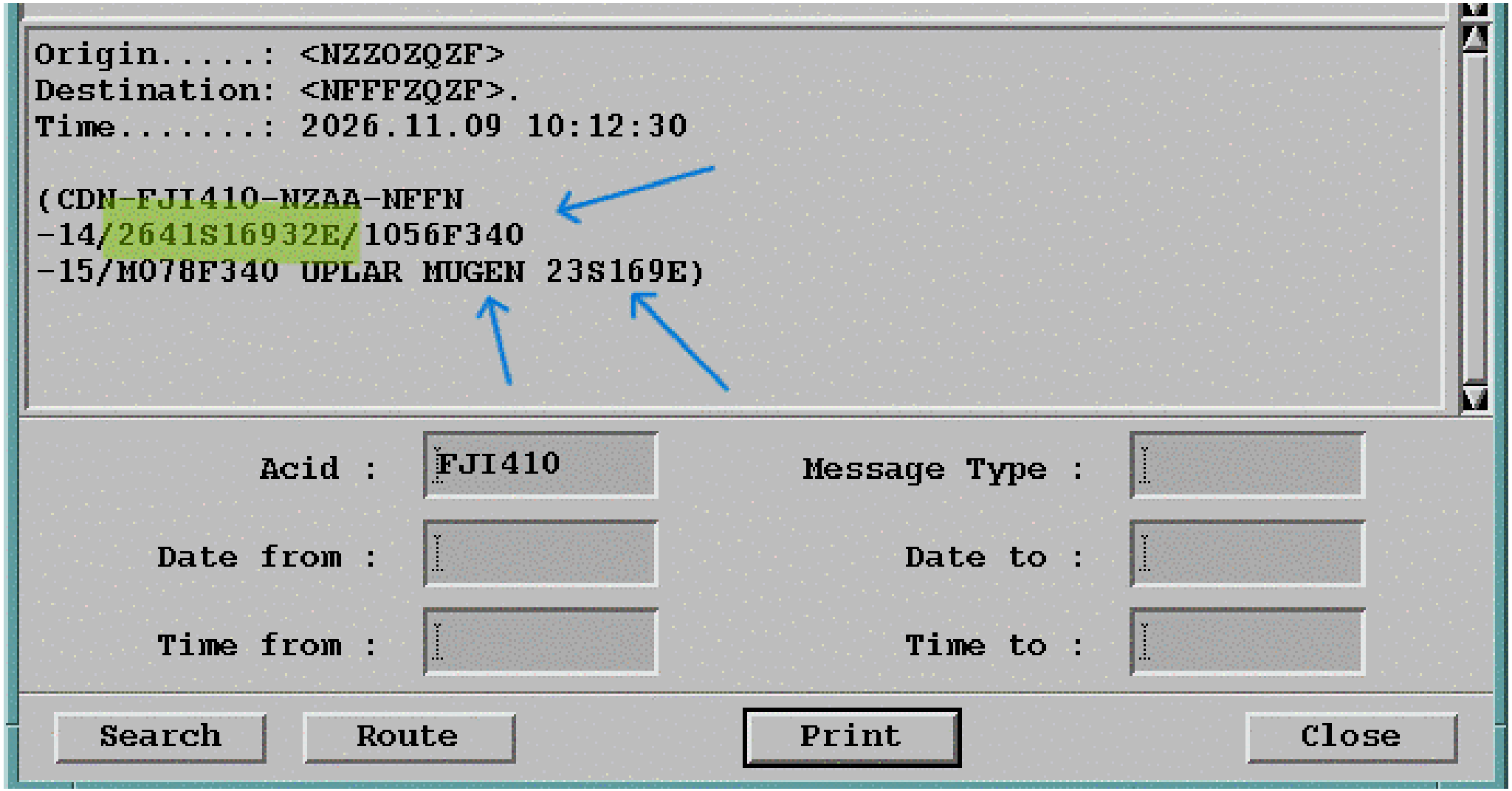

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DARP – Dynamic Airborne Re-Route Procedure

ICAO Datalink Working Group – GOLD Manual

01

Re-route to be completed prior to completion of coordination, i.e. EST.

02

Electronic exchange of flight plan data is a fundamental and critical component of direct routing in remote oceanic airspace, and will affect contiguous, adjacent sectors and FIRs.

Considerations

Risks introduced when directs are controller-initiated

CONTROLLER-INITIATED Surveillance

a. Risk if the crew has inadequate time to brief a new SID or arrival / MAP procedure resulting from the DCT.

b. Enables 'rush' or compliance decision-making by pilots.

c. Cabin may not be prepared for a shorter leg, impacting safety or intended efficiencies.

d. Positive bias, e.g. a controller initiating a direct for reasons other than expeditiousness.

e. Pilot accepting a direct routing believing it is an instruction for safety.

CONTROLLER-INITIATED Remote / Oceanic

Introduces risks such as:

a. Unplanned fuel usage – headwinds.

b. Unplanned weather penetration.

c. Time pressure for crew to brief, update the FMC and coordinate with cabin service / operations.

d. Controller liability.

e. Communication risks when relaying latitude & longitude waypoints (clearance, relay & voice coordination).

Learnings

What direct routing experience tells us

01 DCT may contravene min/max ICAO-recommended waypoint leg segments.

02 RNP10 capability may inadvertently create an economic penalty for other users, as RNP4 opportunities / levels are blocked.

03 Introduction of future complexity.

04 Increased controller workload.

05 Blocking actions of direct routing.

06 Long-haul vs short-haul considerations.

07 Controller-initiated directs may contravene flight operations intent, e.g. arrival gate allocation – the aircraft may have to wait on the tarmac.

08 The flight plan may be designed to use upper winds and the jet stream; a DCT can remove the aircraft from its optimal trajectory.

Ujung Pandang ACC (MATSC) Direct Routing Realities

Case study: AirNav Indonesia

CONCRETE ROUTE EXAMPLE

SOP-Sanctioned UPR Area (FL330 – FL600)

Frequent direct routings bypass fixed ATS structures across Ujung Pandang Upper Airspace (e.g. direct waypoints bypassing dense airway junctions between Java and Papua sectors).

Enabling Conditions for Directs

SOP ACC MATSC

01 **Civil-Military Clearance**
Inactive ALKI / military restricted airspace.

02 **Surveillance Coverage**
ADS-B / MSSR tracking with 5 NM radar separation.

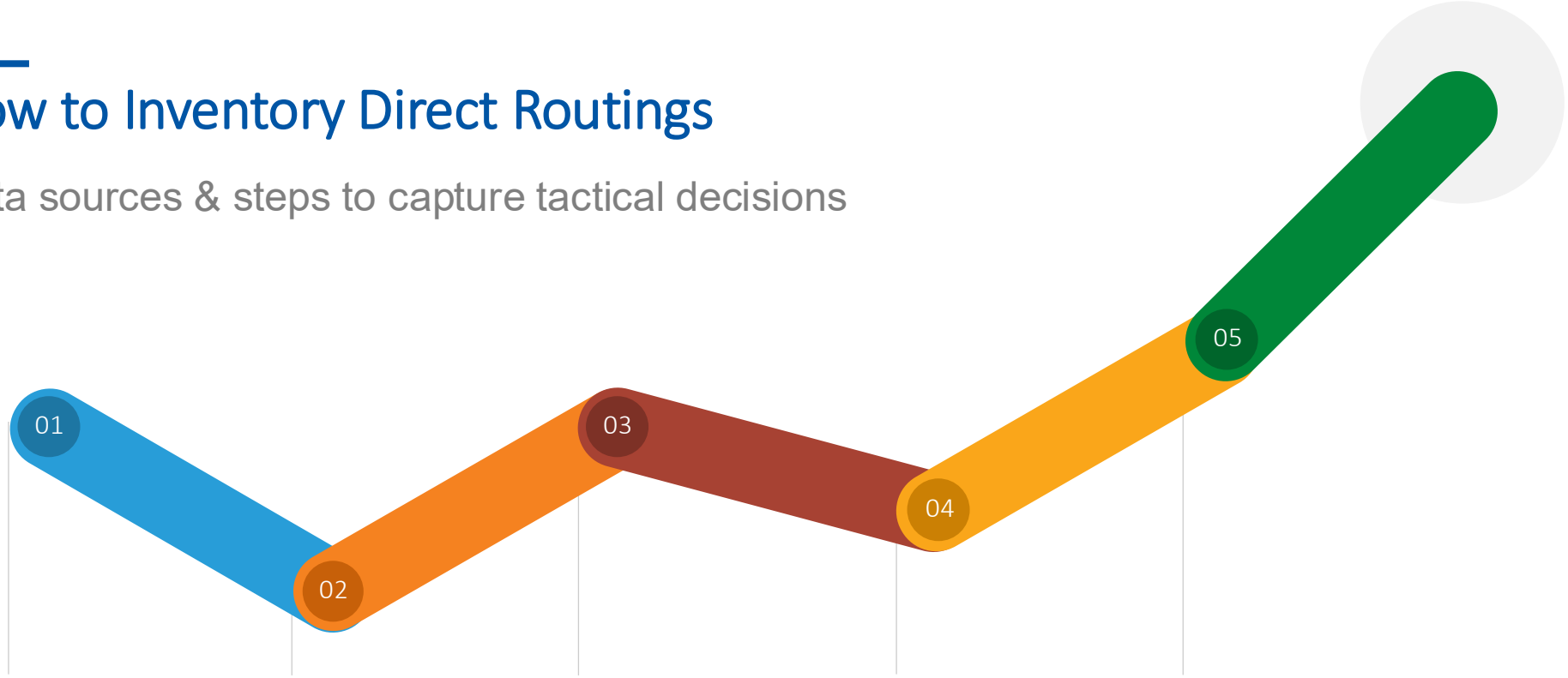
03 **Avionics Compliance**
RVSM approved, RNP10 / RNAV10, GNSS and ADS-B Out.

04 **Traffic Conflict Clear**
Zero conflict at transfer of control points (TCP).

UPRINA RMK IDENTIFIER **Item 18 RMK/UPRINA** – Field 18 flight plan tagging for approved flights

How to Inventory Direct Routings

Data sources & steps to capture tactical decisions



STEP 01

TopSky / ATS Data Extract

Extract actual radar tracks (ASD) and CWP historical logs to match filed vs actual tracks.

STEP 02

CPDLC & Voice Logs

Analyse uplink messages (DIR TO [waypoint]) to isolate tactical shortcuts issued by controllers.

STEP 03

Condition Correlation

Cross-reference DCT occurrences with airspace status, weather charts and military activity windows.

STEP 04

Frequency Mapping

Identify high-frequency direct routing corridors to formalize into predictable UPR zones.

OUTCOME

Baseline for UPR

Primary data sources: TopSky FDR history, ADS-B / MSSR track data and CPDLC message archives.

From Direct Routing Inventory to Full UPR Implementation

Practical recommendations for APAC Air Navigation Service Providers (ANSPs)

Phase	Action Item	Operational Focus
1. Analyze	Conduct State DCT Inventory	Extract 6–12 months of tactical direct routing logs across Upper Control Areas.
2. Harmonize	Bilateral LOCA / LoA Updates	Align transfer of control points (TCP) with neighbouring FIRs to support non-published tracks.
3. Publish	AIP Supplement Publication	Formalize UPR geographic zones, flight level bands (e.g. FL330–FL600) and RMK requirements.
4. Automate	FDP & Flight Plan Centre Integration	Enable pre-flight flight plan validation (RMK/UPRINA) so airlines can optimize fuel loading.

Key takeaway for APAC: Each State leading its own case study builds a regional map of pre-validated UPR corridors, accelerating seamless trans-boundary flight efficiency.

Part Two

Indonesia UPR Operations & ATCO Experience

Umi Muthiah Syahirah

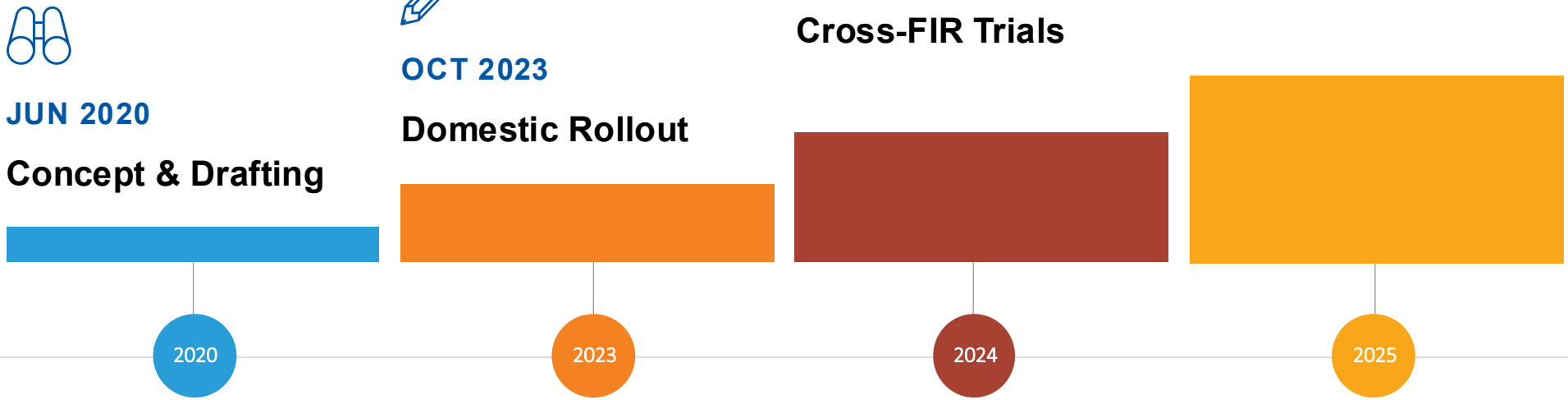
IFATCA Regional Secretariat for Southeast & West Asia

A comprehensive overview of User Preferred Route deployment, conflict prediction automation, and cross-FIR boundary trials in the Jakarta and Ujung Pandang FIRs.

Indonesia UPR Operational Roadmap

Implementation architecture · 2020–2025 milestones

Key strategic objective: transition ATCO duties from fixed-airway radar monitoring to 4D trajectory-based strategic conflict management.



UPR Technical Mandates & Flight Planning (AIP ENR 1.8)

Regulatory framework · AIRAC AIP AMDT 135, effective 05 OCT 2023

Requirement	Technical Specification / Standard	FPL Item 18 / Verification
Vertical Limits	FL330 to FL600 inclusive	Filed level in Item 15
Navigation Capability	RNP10 / RNAV10 & GNSS navigation	PBN/A1 or R1 in Item 18
Altimetry & Surveillance	RVSM approved & ADS-B Out operational	Equipment code 'W' & 'B1/B2'
Flight Plan Identifiers	Include remark identifier string	RMK/UPRINA
Notification Window	Submit via email to FPLC (e-fpl@airnavindonesia.co.id)	At submission or 3-month recurring batch

Route Construction Rules

- Entry/exit via published waypoints or FIR boundary Lat/Long.
- Max 60-minute elapsed interval between intermediate waypoints.
- Lat/Long in degrees & minutes (11 characters, e.g. 0102S10435E).
- Strict avoidance of Prohibited, Restricted and Military Danger Areas (e.g. WAR1).

MANDATORY PROTOCOL

Flights remaining in WIIF/WAAF > 60 min must designate 4D track points every hour.

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Flight Plan Conflict Function (FPCF) Architecture

System automation at Ujung Pandang ACC · active 23 Jan 2025 (0000 UTC)



Example label **[FPCW ALERT: GIA713 / QFA39 – CST 1422Z]**

Turns conflict resolution from an immediate tactical reaction into a structured strategic clearance process.

Comparative Operational Impact Assessment

Performance metrics · before vs after UPR & FPCF

Operational Indicator	Conventional Fixed-Route Baseline	UPR + FPCF Automated Environment	Operational Gain
Conflict Detection Horizon	Tactical radar scanning (~10–15 min ahead)	Automated FPCF probe scanning up to 60 min ahead	**+400% earlier warning**
Flight Track Flexibility	Confined to rigid published ATS airway segments	Direct origin-to-destination optimized 4D trajectories	**Shorter distances & lower fuel burn**
ATCO Workload Profile	High routine monitoring of fixed convergence points	Strategic trajectory monitoring & probe simulation	**Reduced repetitive tactical workload**
Hot-Spot Management	Reactive vectoring during traffic convergence	Proactive level/route adjustments 5 min prior to CST	**Enhanced situational awareness**

01 **Environmental Gains**

Measurable reductions in fuel burn and CO_2 emissions across long-haul corridors.

02 **Safety Margins**

Standardized conflict alerting across surveillance (5 NM) and procedural (50 NM) areas.

Lessons & Strategic Recommendations

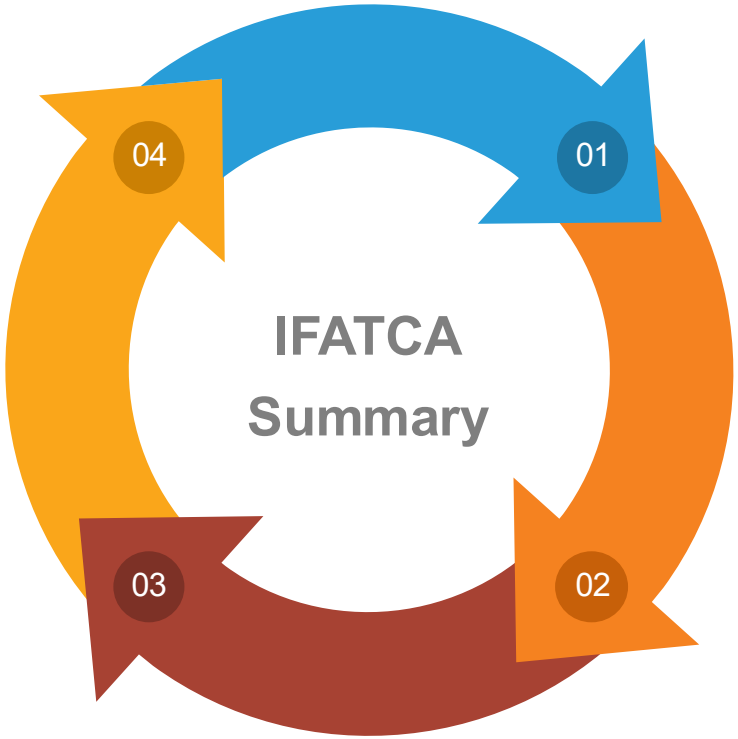
Way forward

Robust Contingency Rules

Clear contingency protocols and recurrent SMS training for severe weather, equipment degradation or traffic density surges.

Airline Equipage

Encouraging operator equipage (RNP10 / GNSS / ADS-B) to maximize performance-based separation uptake and environmental efficiency.



ATCO SME Involvement

Continuous engagement of controllers as subject matter experts in software design, simulation and procedure evaluation ensures practical field usability.

Advanced Decision Support

Further investment in 4D trajectory prediction and automated inter-centre coordination (AIDC) to support regional Free Route Airspace.

SUMMARY & CALL TO ACTION

Closing the Gap Between Tactical Savings and Pre-Flight Planning

Direct routing proves the airspace is ready. Formalizing direct routings into UPR turns tactical track miles saved into predictable pre-flight fuel and carbon reduction across APAC.

Thank You



Questions & Answers

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