AIRSPACE MODERNIZATION DEVELOPMENTS IN KAZAKHSTAN

PRESENTED BY RSE "KAZAERONAVIGATSIA"

AIRSPACE AND SECTOR CONFIGURATIONS

- Four flight information regions — Aktobe, Astana, Almaty and Shymkent
- Class C airspace — from FL120 to FL510
- Class G airspace — at and below 10,000 ft, and above FL510
- Sector configuration kept under continuous review against traffic demand, controller workload and capacity assessments

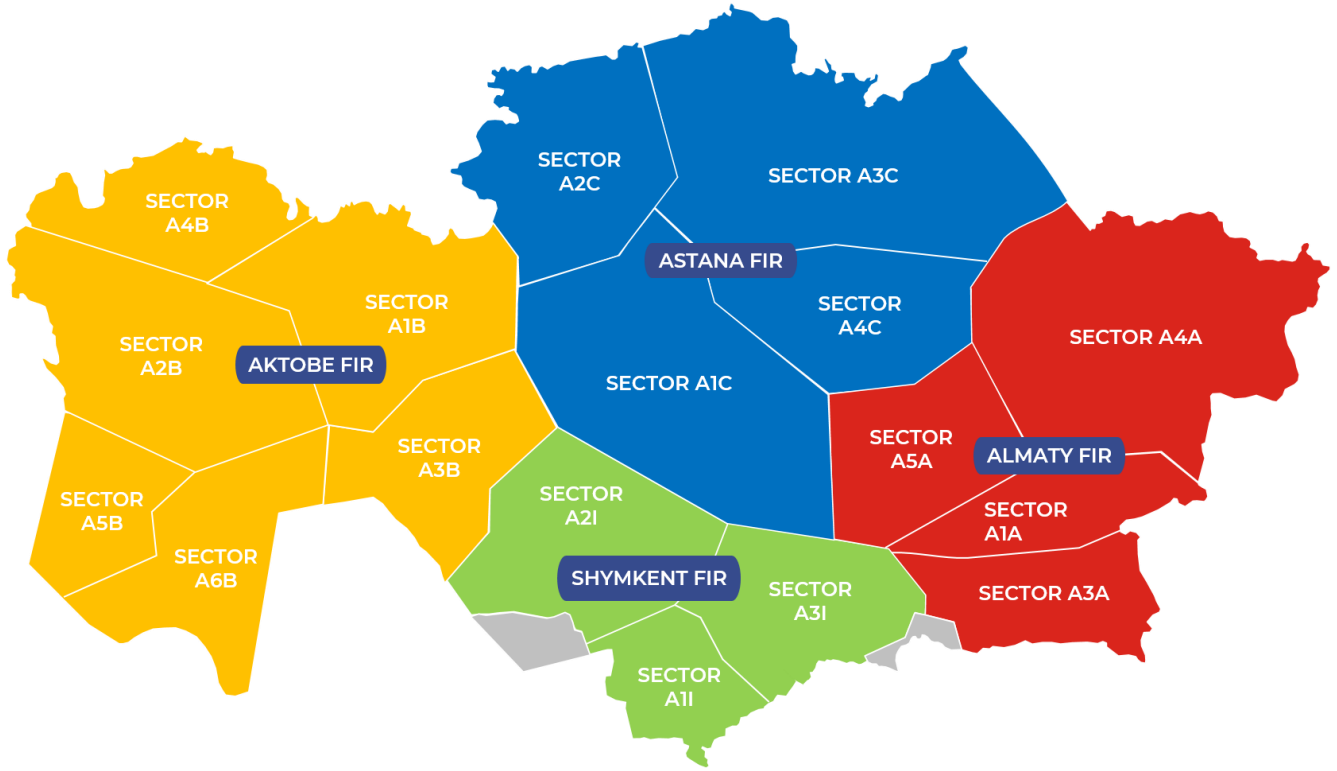


FIG. 01 · FIR AND SECTOR CONFIGURATION

2.7M
km² of airspace

4
Flight information regions

17
En-route ACC sectors

TRAFFIC STATISTICS

466,597

Flights handled in the airspace of Kazakhstan in 2025 — 4.59% year-on-year growth, including 252,328 scheduled transit flights.

AIRSPACE DESIGN

- Continuous review of airspace structure and sector configuration against traffic demand, controller workload and capacity
- Direct Routing (DCT) study in the Astana FIR — an initial step towards Free Route Airspace
- CTRs and TMAs established and redesigned for Arkalyk, Katon-Karagay, Kenderli and Satpay

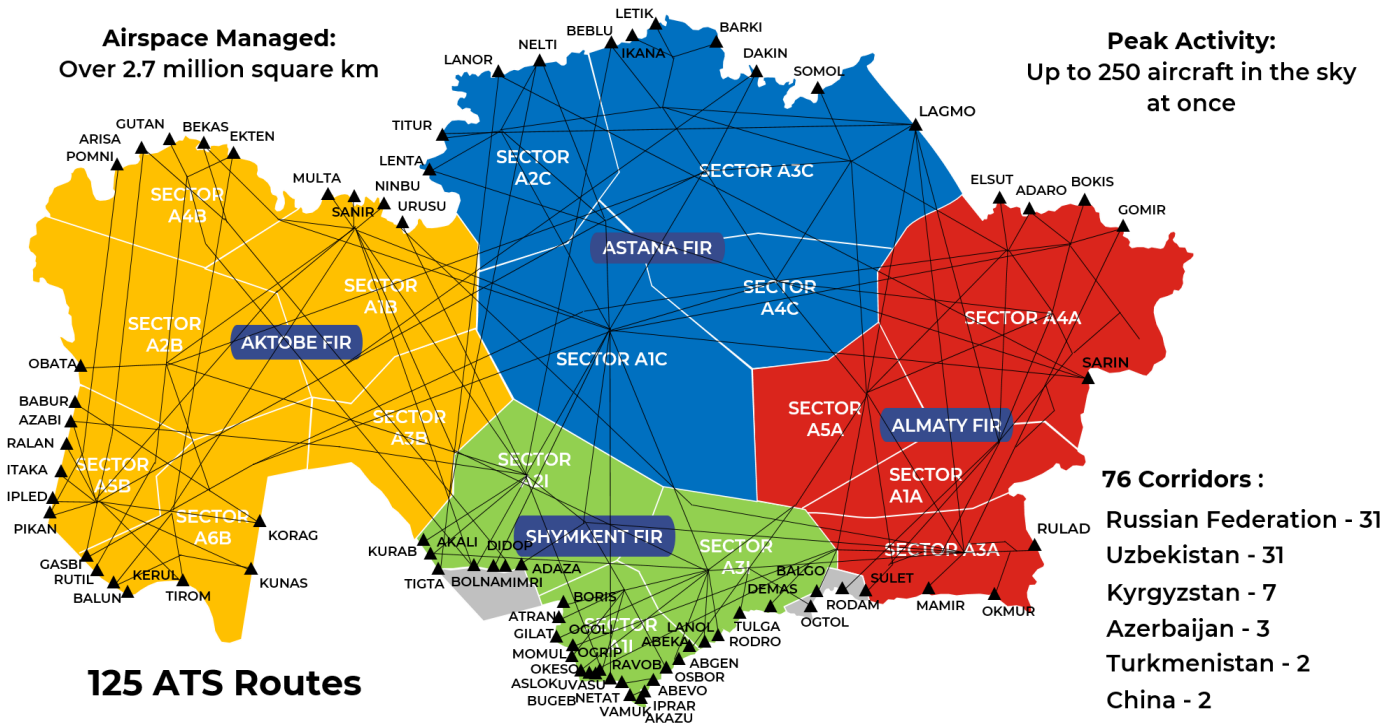


FIG. 02 · ATS ROUTE NETWORK — 125 ROUTES, 76 CORRIDORS

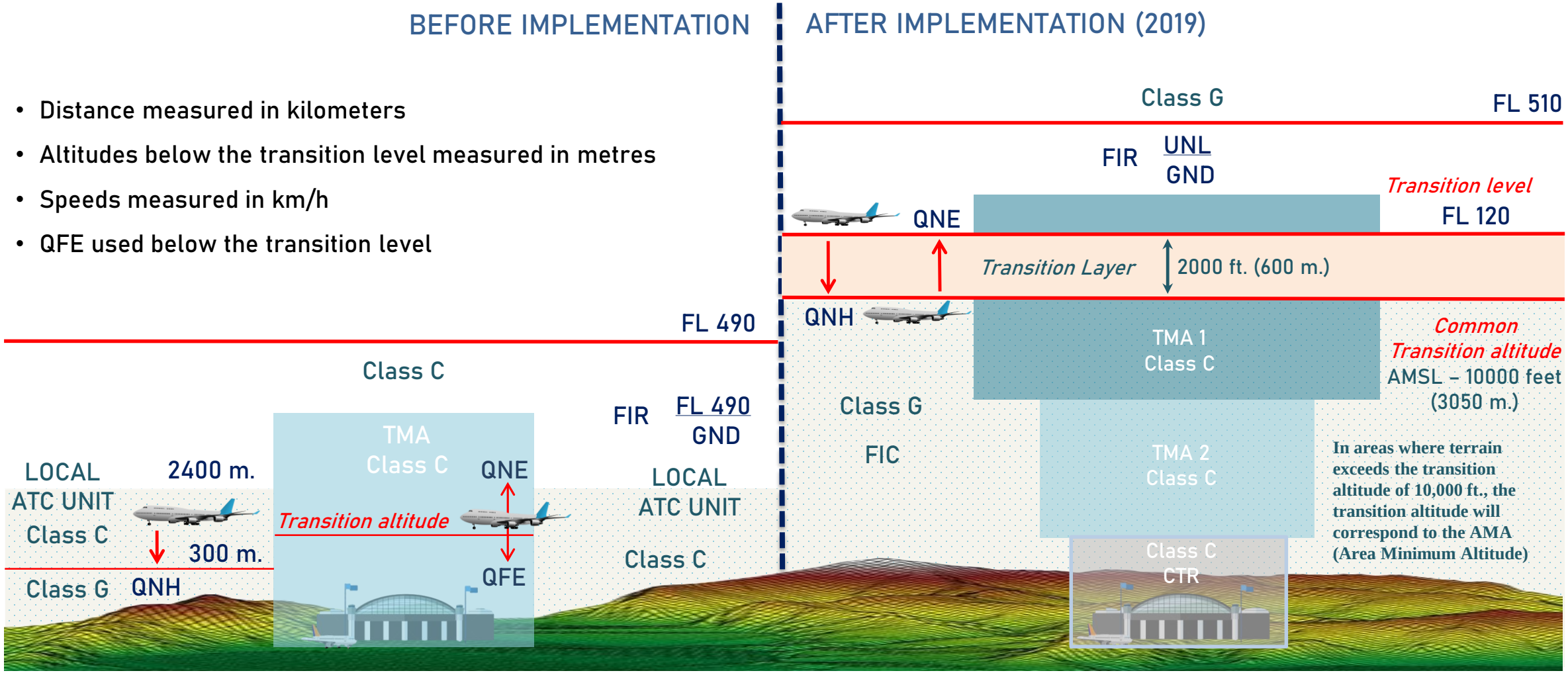
125
ATS routes

76
International corridors

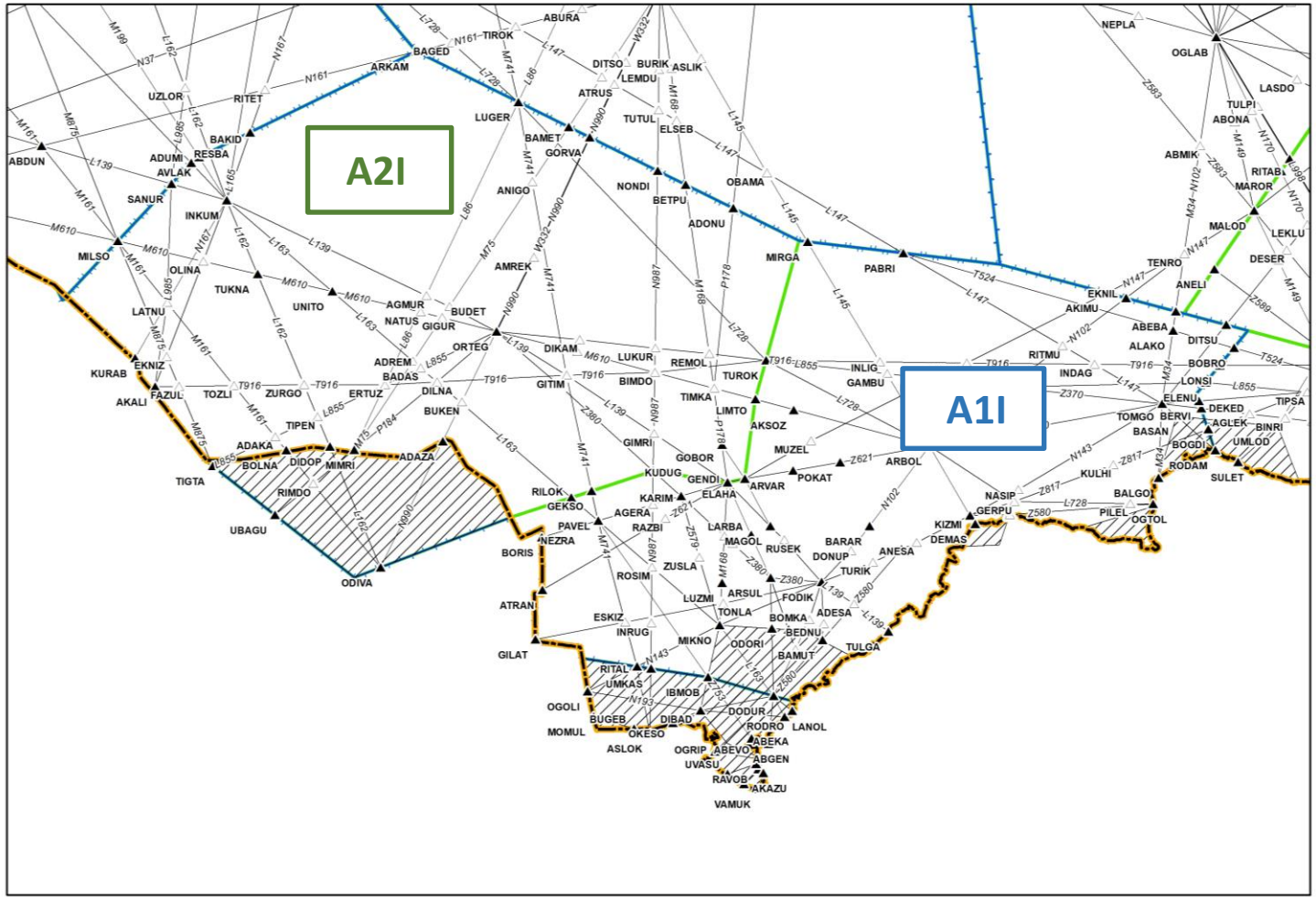
250
Aircraft in the sky at peak

SEA LEVEL PRESSURE REFERENCE AND ALTITUDE MEASUREMENT IN FEET

- Distance measured in kilometers
- Altitudes below the transition level measured in metres
- Speeds measured in km/h
- QFE used below the transition level



OPERATIONAL NEED



Former two-sector configuration (A1I, A2I) with TMA and CTR.

45 **aircraft/hour**

Peak hourly traffic in A1I, 2023 – Oct 2024, against 36.4 calculated in 2025 (two controllers, pre-2026 methodology)

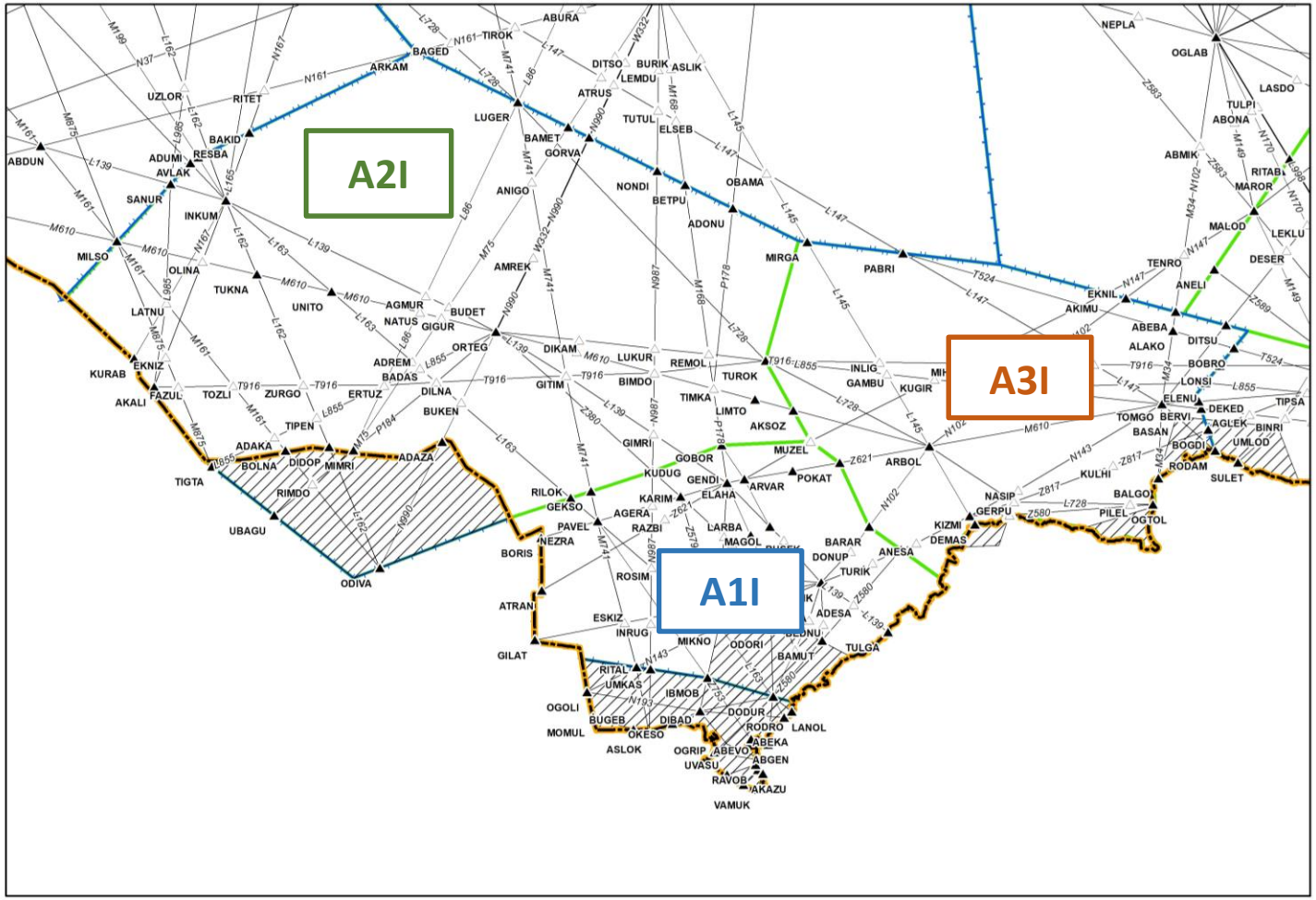
- Shymkent FIR had two en-route sectors, A1I and A2I
- Inspection of 20 November 2023: peak-hour traffic in A1I above its calculated capacity

SECTORISATION OPTIONS

	Option 1 Vertical split of A1I	Option 2 – SELECTED Geographical split of A1I	Option 3 Merge of A1I and A2I parts
Concept	A1I divided by a vertical boundary; A2I unchanged	A1I divided into south-western A1I and north-eastern A3I; A2I boundary adjusted	Western part of A1I and eastern part of A2I combined into A3I
Aircraft served, Aug–Sep 2024 (A1I / A2I / A3I)	15,325 / 17,906 / 17,710	**17,683 / 17,338 / 16,869**	17,683 / 14,741 / 21,681
Voice coordination, aircraft/day (A1I / A3I)	More than 110 / more than 210	More than 65 / more than 95	More than 71 / more than 41
Radio infrastructure	New radio stations at Shymkent, Taraz and Turkestan; new frequency	**No additional radio equipment; new frequency for A3I**	New radio station at Kyzylorda; new frequency

Why Option 2: the most even distribution of traffic between the three sectors; less voice coordination than Option 1 and the former A1I; existing radio sites reused. Option 3 needed the least voice coordination, but gave the least balanced distribution and required a new radio site.

IMPLEMENTED THREE-SECTOR CONFIGURATION



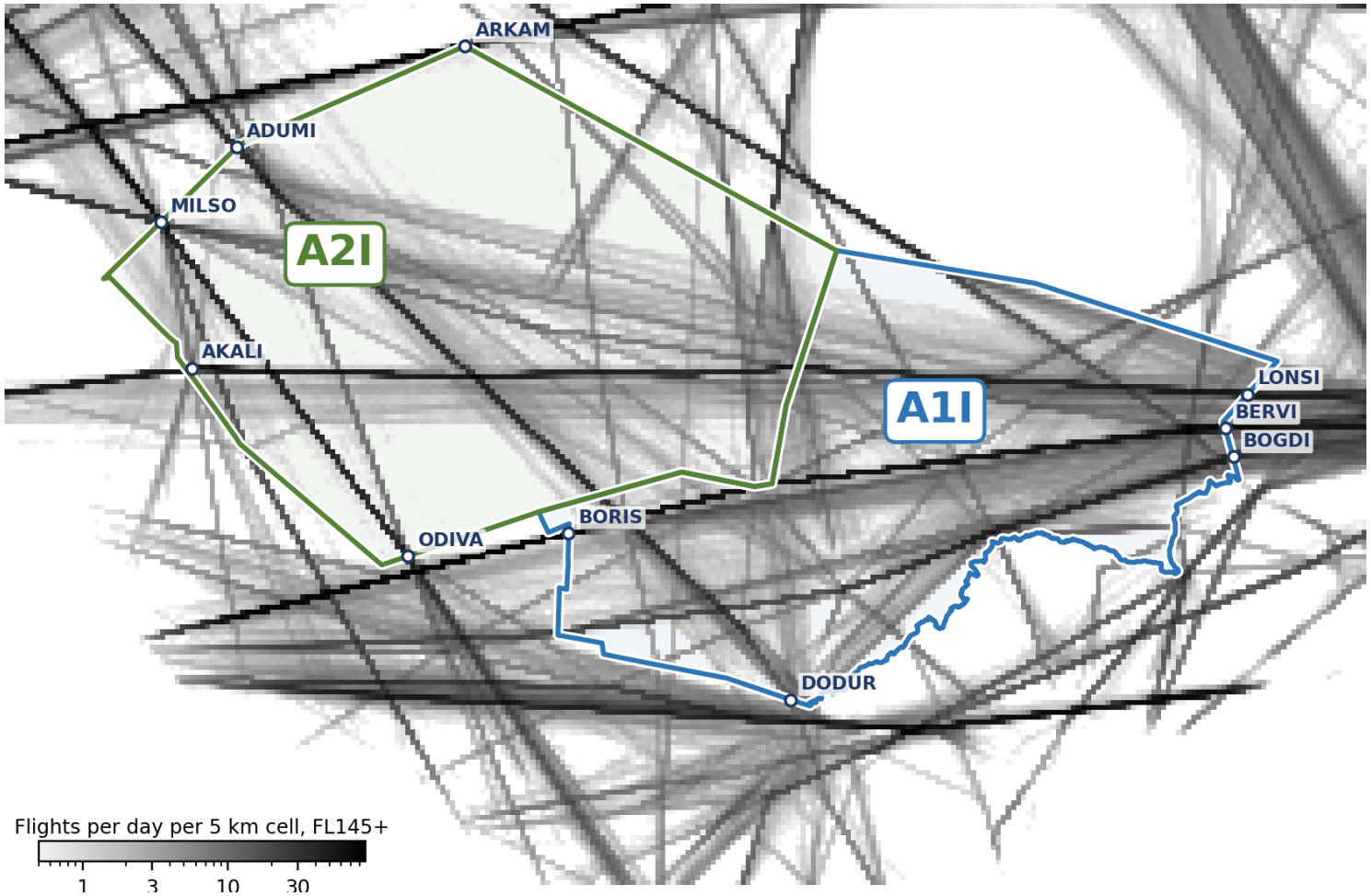
In operational service since 3 September 2026

A1I	South-western part of former A1I
A3I	North-eastern part of former A1I (new)
A2I	Western sector, boundary adjusted

- A1I divided along MUZEL – POKAT – BARAR – KOLAM
- A1I/A2I: RILOK – OKESO – POBEK – KUDUG – GOBOR – MUZEL; A2I/A3I: MUZEL – TUROK
- Horizontal change only: vertical limits, TMA/CTR, SIDs/STARs and ATS routes unchanged

Area of change (thick green lines: sector boundaries introduced on 3 September 2026).

TRAFFIC FLOWS BEFORE SECTOR RECONFIGURATION



Recorded ASTERIX CAT062 tracks, FL145 and above, 20 Aug – 2 Sep 2026 (14 days, UTC). Density = distinct flights per day per 5 km cell (same scale on both maps). Dots: main FIR entry/exit points.

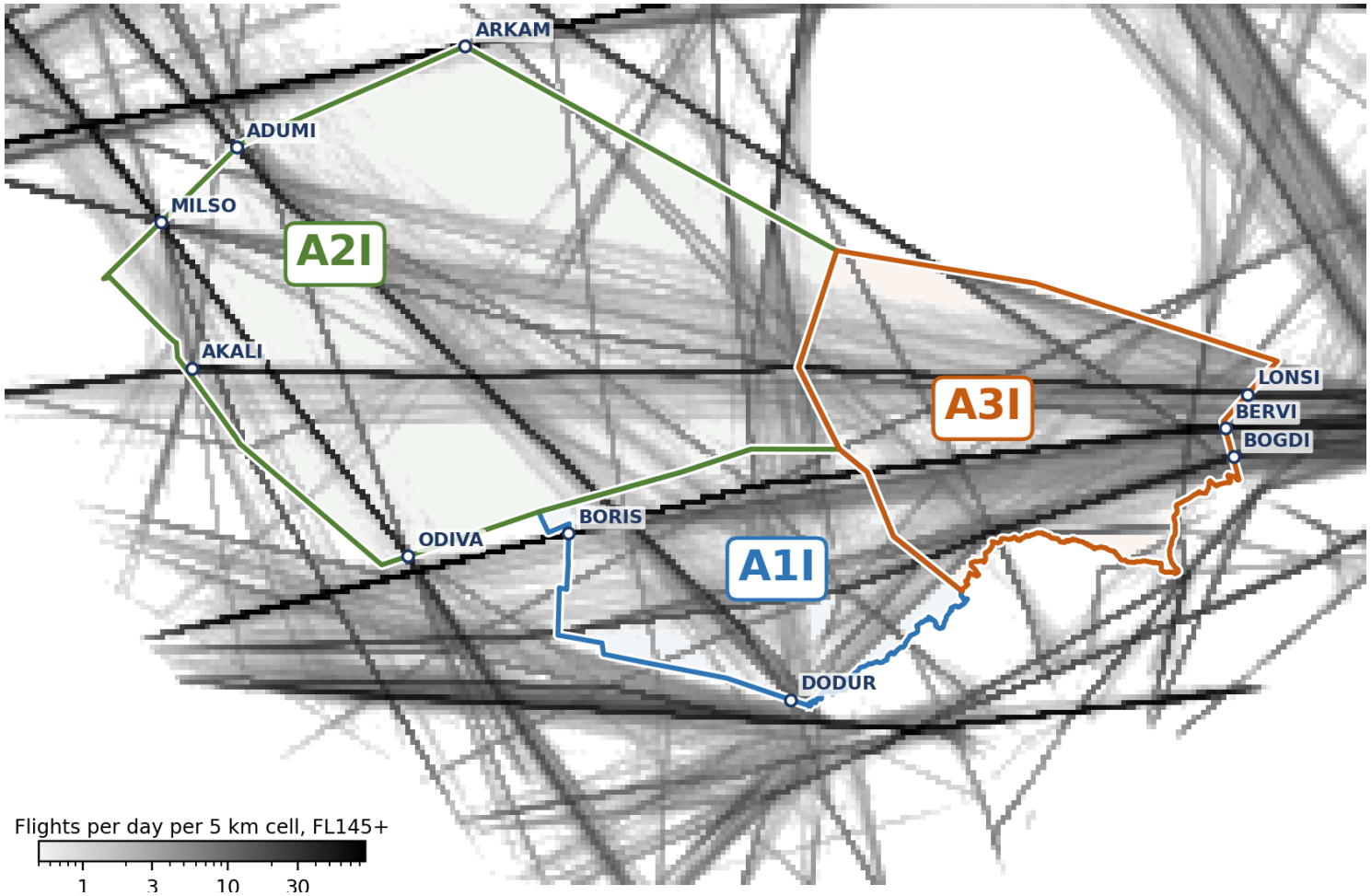
CAT062, 20 Aug – 2 Sep 2026 (14 days)

Sector	Flights per day	Peak hour avg / max	Hours above 1-controller value
A1I	492	37 / 40	21
A2I	337	25 / 33	0

Sector entries per clock hour (UTC). One-controller calculated values: 34 / 39 aircraft/hour. No hour exceeded the two-controller values.

- FIR: 650 flights per day at FL145+
- Main flows: east–west via BORIS and AKALI to BERVI, LONSI and BOGDI; north-west – south-east via MILSO – ODIVA
- A1I handled 62% of sector entries; one-controller value exceeded on 13 of 14 days, mainly 00–03 UTC

TRAFFIC FLOWS AFTER SECTOR RECONFIGURATION



Recorded ASTERIX CAT062 tracks, FL145 and above, 4 – 17 Sep 2026 (14 days, UTC). Density = distinct flights per day per 5 km cell (same scale on both maps). Dots: main FIR entry/exit points.

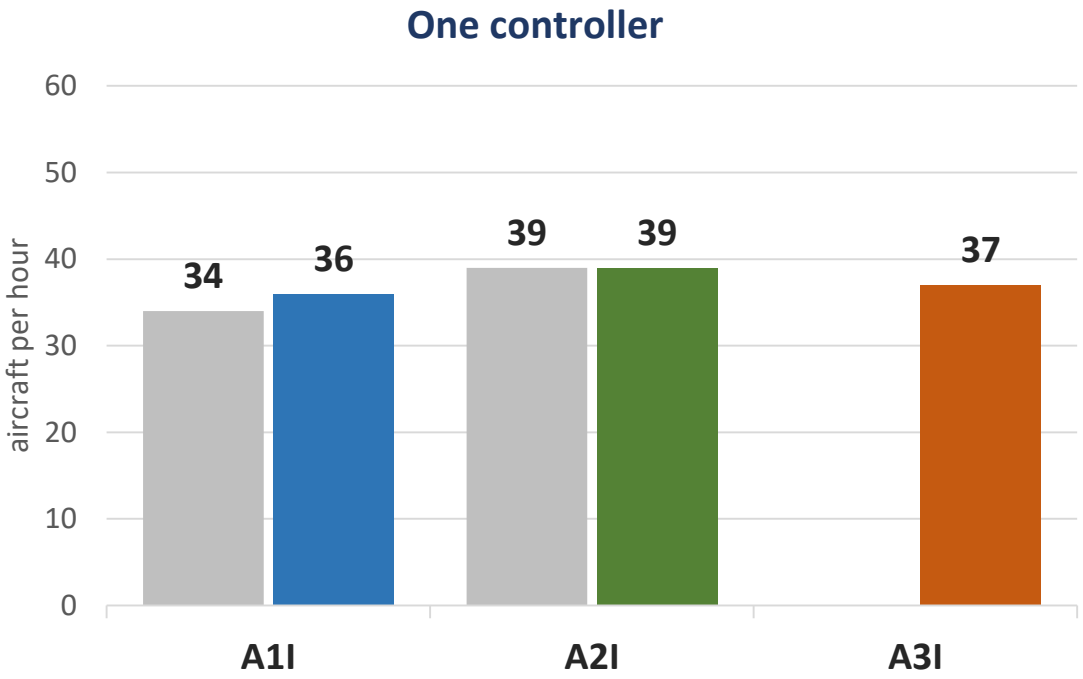
CAT062, 4 – 17 Sep 2026 (14 days)

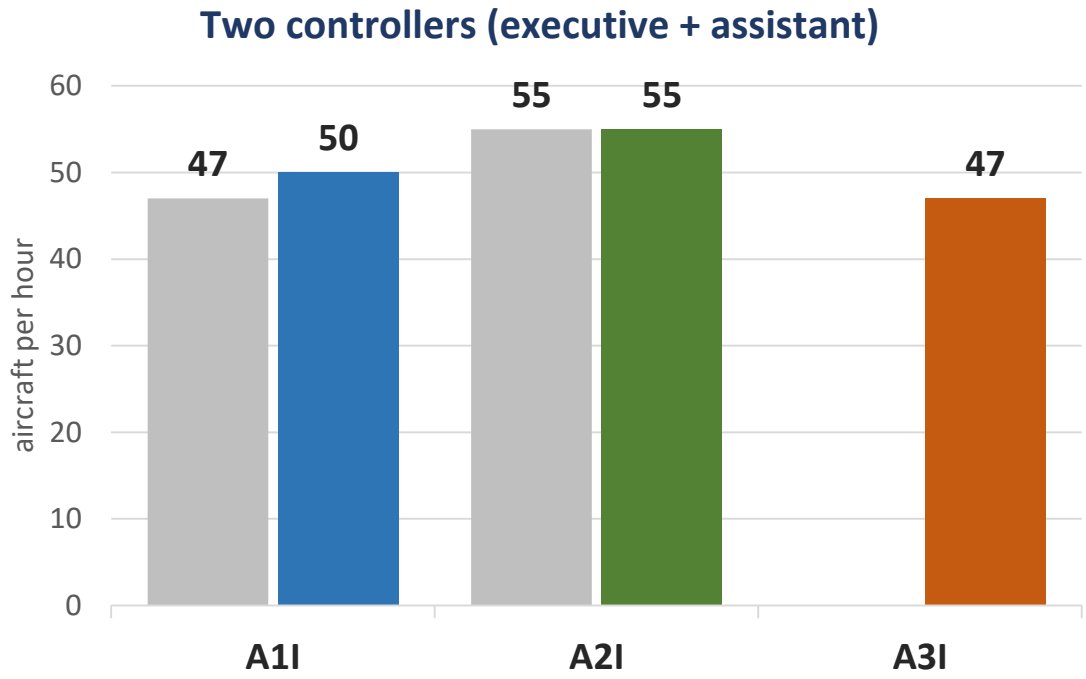
Sector	Flights per day	Peak hour avg / max	Hours above 1-controller value
A1I	308	21 / 27	0
A2I	314	25 / 32	0
A3I	357	25 / 30	0

Sector entries per clock hour (UTC). One-controller calculated values: 36 / 39 / 37 aircraft/hour. No hour exceeded the two-controller values.

- FIR: 637 flights per day (–2%): demand broadly unchanged
- Same pre-change traffic on the new boundaries: 309 / 335 / 376 flights per day – the split follows the boundaries
- To monitor: A1I/A3I interface (about 189 transfers per day) and the A3I night peak, 00–03 UTC

SECTOR CAPACITY BEFORE AND AFTER IMPLEMENTATION





Change	One controller	Two controllers
A1I	+2 aircraft/hour (+5.9%)	+3 aircraft/hour (+6.4%)
A2I	Unchanged	Unchanged
A3I	New sector	New sector

- Grey: before (two sectors). Colour: after (three sectors)
- Sector-specific calculated values; not additive

OPERATIONAL CONCEPT FOR DCT IMPLEMENTATION IN ASTANA FIR

Current Practice

The controller issues a direct clearance to an individual aircraft in flight, subject to the current traffic situation.

DCT Project

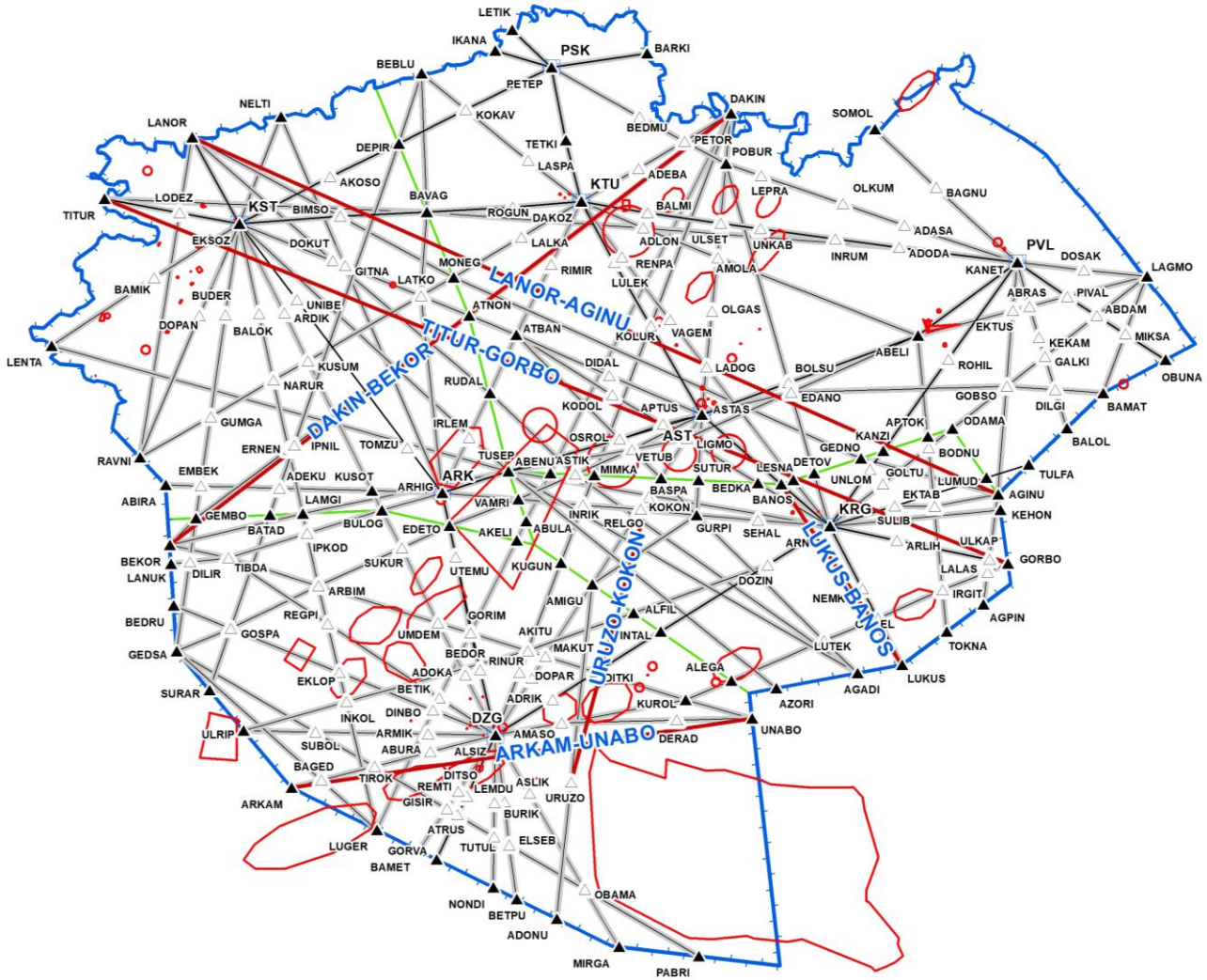
The operator includes the authorised segment in Item 15 of the FPL in advance and plans it in accordance with the published conditions.

Further Development

Experience with planned DCTs provides a practical foundation for the subsequent implementation of FRA elements.

The project does not replace the existing ATS route network. Airspace users receive an additional planning option, while controllers retain the authority to amend a clearance when the traffic situation changes.

SIX ANALYZED DCT OPTIONS IN ASTANA FIR



Analysed Segment	Planned saving, km/flight	Actual median saving, km/flight	Planned estimate, km/year	Actual estimate, km/year
ARKAM–UNABO	3.1	3.1	114 883	104 894
LUKUS–BANOS	3.8	0.0	44 052	8 269
DAKIN–BEKOR	0.5	0.5	4 440	10 395
ADONU–KOKON	10.2	8.9	77 042	56 026
TITUR–GORBO	12.5	9.7	68 926	50 876
LANOR–AGINU	3.4	3.3	11 488	14 494

DIRECT ROUTING AIRSPACE (DRA) AND DCT AVAILABILITY

DRA

Horizontal limits
within the Astana FIR

Vertical limits
FL265–FL510

IFR flights
RNAV 5 navigation specification

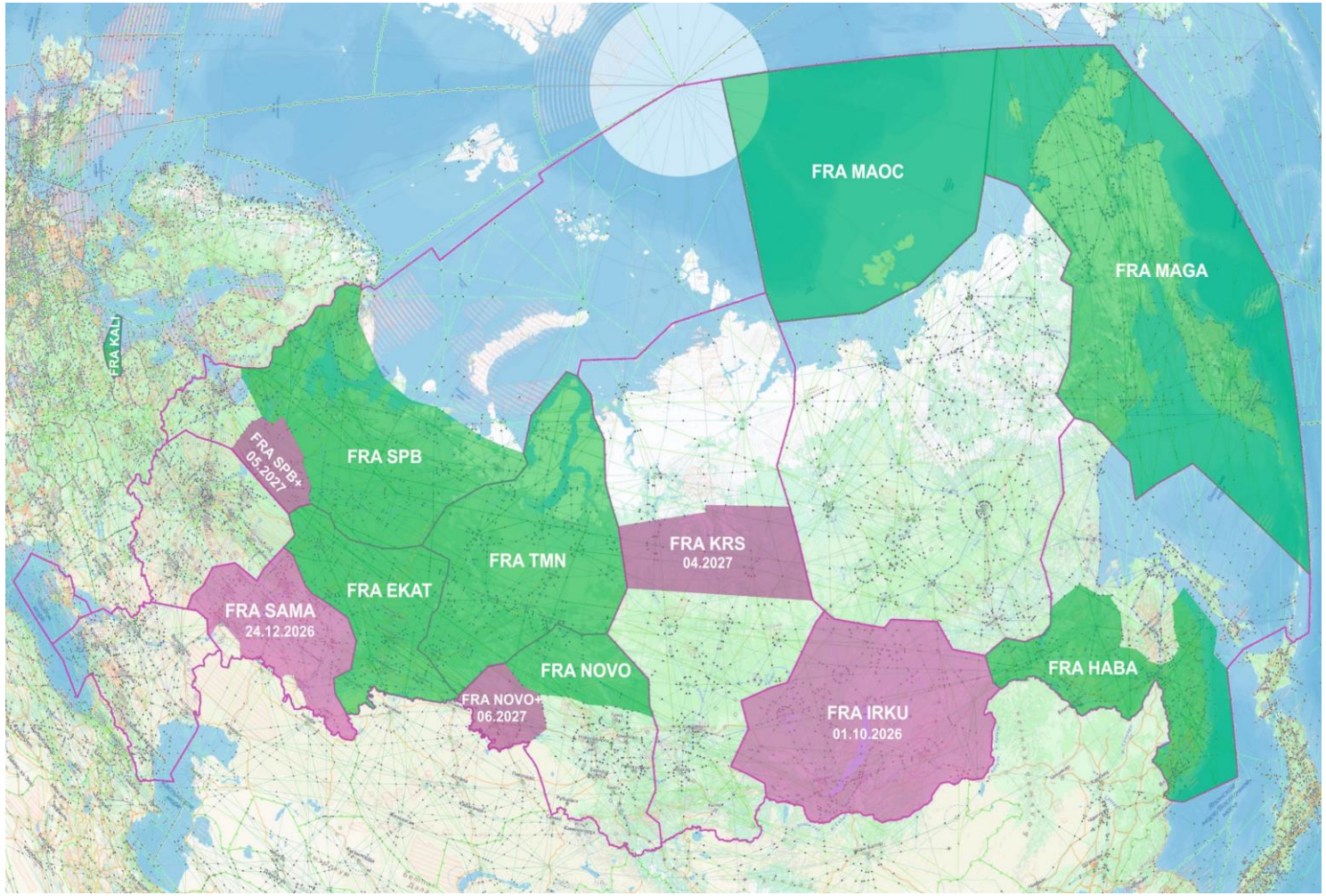
Conditions for Each DCT

Direction	One-way or two-way use
Flight Levels	Authorised range within the DRA
Time	Published availability period
Restrictions	Airspace activity, temporary arrangements and technical conditions
Workload	Number of aircraft, conflicts and workload in affected sectors

Final conditions will be determined following simulation, coordination with ATS units and consultation with airspace users.

INTERFACE WITH FRA IN THE RUSSIAN FEDERATION

Russian FRA from FL265 to FL540



- Implementation of SAMA Free Route Airspace in the Samara FIR is planned for 24 December 2026

- Expansion of NOVO FRA to the sectors of the Novosibirsk FIR **adjacent to the Astana FIR boundary** is planned for June 2027.

PROCEDURE FOR USING A PLANNED DCT

From publication of conditions to the provision of ATS to the aircraft

1. Publication

The DCT and its conditions are published in ENR 3.5

2. Flight Planning

The operator enters POINT DCT POINT in Item 15 of the FPL

3. Validation

Direction, flight level, time and applicable restrictions are checked

4. Data Distribution

The route is distributed to the operational systems in use

5. ATS

The controller monitors the flight and amends the clearance when necessary

Inter-sector and inter-centre coordination continues under the existing procedures. If a DCT changes a transfer-of-control point or OLDI parameters, the relevant agreements and operating procedures will be amended before implementation.

CAPACITY AND SIMULATION

Simulation results will provide the basis for the final DCT conditions

Sector	Main position, aircraft/h	With assistant controller, aircraft/h	Typical maximum actual workload
A1C	28	38	Night period 02:00–05:00
A2C	27	36	06:00–07:00; one-off maximum of 40 entries
A3C	24	32	Evening period 18:00–19:00
A4C	25	34	20:00–21:00

Simulation Scenarios

1. **typical traffic from June to September**
2. **FIR evening peak, 17:00–20:00**
3. **A1C night-time peak, 02:00–05:00**
4. **short-term redistribution of traffic flows**

Following the simulation, the capacity of the affected sectors will be recalculated.

CONSULTATION WITH AIRSPACE USERS

Initial responses confirm interest in ARKAM–UNABO, although estimates vary by route network and aircraft type

Airline	Application	Preliminary Estimate
Trinity Airways	Republic of Korea–Europe, westbound, FL360–FL400	2–4 flights/day; approximately 2 NM and 1 minute
Lufthansa	Germany–China, Korea and Japan, FL370/390/410	10–20 flights/day; estimated 7 NM
SAS	Copenhagen–Tokyo/Seoul	5 NM; 1 minute; 88 kg fuel
KLM	Flights via ARKAM–UNABO in both directions	2 NM; 1 minute; trial operations proposed
Air Astana	Air Astana ARKAM–UNABO, LUKUS–BANOS and URUZO–KOKON; all RVSM flight levels without restrictions	Savings of 1 NM, 2 NM and 5 NM respectively; negligible impact on flight time, fuel, CO_2 emissions and air navigation charges

Airline feedback is used to determine priorities, directions, flight levels and availability periods. Economic benefits are assessed against the route actually planned, not solely against the great-circle distance.

KAZAERONAVIGATSIA

THANK YOU FOR YOUR ATTENTION

QUESTIONS AND FEEDBACK ARE WELCOME