

PASSENGER ASSURANCE™

Saudi Sovereign Biometric Journey Intelligence for Airports, Airlines,
Hajj & Umrah

One verified passenger. One continuous journey. Intervention before failure.

Core principle: Saudi controls identity. Passenger Assurance controls journey intelligence.

Prepared as a strategic concept package for Saudi airport passenger experience, aviation operations and Hajj/Umrah journey assurance.

This document describes an independent system concept inspired by proven Positive Boarding principles and extended for biometric-ready, airline-agnostic airport operations.

All examples are illustrative and use simulated data.

Executive Summary

Passenger Assurance™ is a proposed journey-intelligence and intervention platform for airports. It creates a live digital journey state for each participating passenger and continuously answers one practical question: will this passenger successfully reach the aircraft, and if not, what action is needed now?

The platform builds on the proven operational principle of Positive Boarding - linking a passenger's progress through the airport to flight deadlines and airline visibility - but updates the model for a biometric, mobile, multilingual, accessibility-aware airport environment.

The strategic design principle is clear: Saudi Arabia retains full control of biometric identity and facial data. Passenger Assurance receives only authorised journey events, such as a temporary token being recognised at security or clearing immigration, then turns those events into timing, risk and intervention decisions.

For Jeddah, Hajj and Umrah traffic creates a strong use case: high volume, multiple languages, elderly passengers, group travel, reduced mobility and unfamiliar airports. Passenger Assurance can help staff act earlier, improve passenger experience and avoid ambiguous no-show outcomes.

The Opportunity

The commercial opportunity is not facial recognition itself. Major aviation and identity companies already work in biometric recognition. The opportunity is the journey intelligence layer that sits above identity, airport operations and airline systems.

Passenger Assurance would not replace airline software or Saudi biometric infrastructure. It would integrate with them through an airline-agnostic gateway and translate events into a common journey model.

1. The Problem

Airports know a great deal about flights, aircraft and baggage. They often know less about whether an individual passenger is progressing successfully through the airport journey.

A passenger may be checked in, have baggage accepted, and still become delayed at security, immigration, assistance points, or during movement through the terminal. The airline may only realise the journey has failed when boarding is almost complete.

This creates missed flights, baggage offload decisions, passenger complaints, staff searches, poor experience for elderly or anxious travellers, and generic no-show records that may not accurately describe what happened.

Passenger Assurance continuously assesses:

- Where is the passenger in the journey?
- Where should they be now?
- How long remains before the gate closes?

- Can they still reach the aircraft?
- What intervention is required before failure?

2. System Overview

The system separates identity, integration and journey intelligence. This protects sovereign biometric control while enabling operational action.

Layer	Controlled by	Function
Saudi biometric / digital identity	Saudi-approved authority / provider	Verifies passenger at approved touchpoints and emits authorised journey event.
Airline + airport systems	Airlines, airport, ground handlers	Supply flight, gate, boarding, baggage and process events.
Passenger Assurance integration gateway	Passenger Assurance / airport deployment	Normalises different airline and airport events into one journey model.
Passenger Assurance journey engine	Passenger Assurance	Calculates risk, predicted gate arrival, assistance need and intervention.

3. Saudi Sovereign Biometric Architecture

Passenger Assurance should not own, store or process Saudi facial templates. Saudi-controlled systems verify the passenger and generate temporary journey events. Passenger Assurance consumes those events and calculates operational risk.

This gives Saudi stakeholders control over identity while allowing an airport-wide journey intelligence layer to improve passenger flow, assistance and airline coordination.

Example authorised event:

Journey Token: JED-SV123-8F92A7
Event: IMMIGRATION_CLEARED
Time: 07:41:23
Flight: SV123
Gate: A37
Biometric image/template: not shared with Passenger Assurance

4. Airline-Agnostic Integration

The platform must integrate across airline systems. It should not be designed only for one airline or one departure-control environment. The scalable approach is a common integration gateway that translates airline events into a standard Passenger Assurance journey model.

The platform can be implemented through adapters for participating airline environments and existing common-use airport infrastructure. The journey engine then works from one internal event language instead of needing to understand every airline system individually.

Common Event	Meaning
--------------	---------

PASSENGER_CHECKED_IN	Passenger has completed check-in.
BAG_ACCEPTED	Checked baggage accepted and linked to journey.
SECURITY_PRESENTED	Passenger presented at security checkpoint.
IMMIGRATION_CLEARED	Passenger cleared passport/immigration processing.
GATE_PRESENTED	Passenger presented at gate.
BOARDED	Passenger boarded aircraft.
OFFLOADED / BAG_REVIEW	Operational intervention required for passenger/baggage decision.

5. Journey Intelligence Engine

The core intellectual value is not recognition itself. It is what happens after the passenger is recognised or scanned.

- Current journey stage
- Remaining airport processing time
- Walking time to gate
- Assistance or accessibility allowance
- Uncertainty buffer
- Gate closing time

Predicted gate arrival = current time + remaining processing time + walking time + assistance allowance + uncertainty buffer.

Status	Meaning	Action
GREEN - ON TIME	Passenger has sufficient buffer.	No intervention.
AMBER - PROCEED NOW	Buffer is reducing.	Passenger instruction.
ORANGE - AT RISK	Journey may fail without action.	Notify staff and passenger.
RED - INTERVENTION REQUIRED	Predicted arrival exceeds gate closure.	Assistance / gate / airline escalation.

6. Hajj & Umrah Journey Assurance

Jeddah has a unique strategic use case because of Hajj and Umrah passenger movements. Large groups, elderly passengers, reduced mobility, language diversity and unfamiliar terminals create a strong need for journey visibility and assistance coordination.

Passenger Assurance Hajj™ could provide group progress views, missing group-member alerts, multilingual instructions, mobility assistance, buggy/escort dispatch and gate-risk prediction.

Group	Boarded	Approaching	Assisted	Before immigration	Critical
Pilgrim Group 417	81	11	4	2	1

7. Passenger Experience Extensions

Module	Purpose
Assisted Journey Mode	Personalised timing for elderly passengers, reduced mobility, visual/hearing impairment, hidden disabilities and cognitive support. Includes “I need assistance”, staff tasking and handover from check-in to aircraft.

Calm Journey Mode	For anxious or overwhelmed passengers: simple instructions, “You are on time”, “What happens next?”, earlier less-alarming alerts and companion milestones.
Home Journey / Door-to-Aircraft	A secure mobile webpage/PWA can calculate leave-home time using traffic/public transport, airport arrival targets and assistance needs, then switch to in-airport deadlines.

8. Prototype and Deployment Roadmap

Phase 1 - Positive Boarding replica: Boarding pass scan, flight identification, gate deadline, passenger decision and airline visibility.

Phase 2 - Airline integration gateway: Connect participating airline systems through common event adapters.

Phase 3 - Saudi biometric journey events: Use Saudi-controlled biometric touchpoints to generate authorised journey events.

Phase 4 - Predictive intervention: Add queue data, walking times, assistance allowance and staff intervention workflows.

Phase 5 - Hajj & Umrah Journey Assurance: Group management, multilingual support and assistance prioritisation.

Phase 6 - Door-to-aircraft intelligence: Home traffic/public transport and full journey continuity.

9. Production Build Requirements

Workstream	Role
Backend / integration engineering	Journey API, event ingestion, airline adapters, rules engine, audit logs.
Frontend engineering	Passenger screens, staff dashboards, checkpoint displays, command centre.
Airport integration expertise	DCS, common-use systems, baggage systems, boarding, security checkpoint processes.
Cloud / security / DevOps	High availability, logging, observability, deployment automation.
Data governance	Tokenisation, data minimisation, retention rules, Saudi sovereign identity separation.
Operational design	Staff workflows, escalation rules, training, pilot KPIs and incident procedures.

10. Strategic Positioning

Passenger Assurance should not be positioned as a facial-recognition company or a standalone passenger app. The strongest proposition is an intelligence layer between Saudi-controlled identity, airport operations and airline systems.

The immediate commercial buyer is likely to be the airport or airport group, with airlines integrated through agreed interfaces. Saudi-wide deployment through a national aviation/airport group could be more powerful than selling airline by airline.

The first demonstrator should focus on the proven Positive Boarding model. Advanced biometric, Hajj/Umrah, accessibility, calm journey and door-to-aircraft modules should be presented as the roadmap, not as launch dependencies.

**Passenger Assurance™: One verified passenger. One continuous journey.
Intervention before failure.**

16. Universal Passenger Communication Layer

Passenger Assurance should not depend on a single passenger channel. The same Journey Engine should drive consistent messages across SMS, WhatsApp, Apple Wallet, Google Wallet, airline apps, airport apps, private checkpoint displays, public airport screens and staff dashboards.

This ensures passengers, airport staff and airlines see one consistent version of the journey status: ON TIME, PROCEED NOW, AT RISK or INTERVENTION REQUIRED.

Public airport screens should communicate flight-level instructions without exposing personal data. Private channels such as SMS, WhatsApp, Wallet passes, app notifications and biometric/checkpoint displays can provide individual journey instructions.

Channel	Purpose	Example message	Privacy approach
SMS / WhatsApp	No-app passenger alerts	Proceed through immigration now. Gate A37 closes 07:55.	Sent only to opted-in passenger number.
Apple / Google Wallet	Boarding-pass level updates	Gate A37. You are on time. Proceed by 07:20.	Uses existing pass/update mechanism where airline supports it.
Airline / airport app	Rich journey guidance	Flight at risk. Request assistance or proceed directly to gate.	Authenticated passenger session.
Private checkpoint display	Immediate instruction after scan/biometric verification	Identity verified. Proceed directly to Gate A37.	Shown only at private passenger touchpoint.
Public airport screens	Flight-level guidance	SV123 passengers should proceed to Gate A37.	No names or individual journey status.
Staff dashboard	Operational intervention	Journey JED-8F92A7 at risk. Notify gate and assistance.	Temporary journey token and role-based access.

Design principle: Journey event -> decision -> right message -> right person -> right channel -> right time.

Wallet integration note: Apple Wallet and Google Wallet should be treated as delivery channels for journey-status updates, not replacements for the airline boarding pass. Where supported by the airline, Passenger Assurance can update or enrich the existing pass with live journey guidance and gate-risk instructions.