Traffic Control Systems

# ASTRO - AIRSPACE STRATEGICAL & TACTICAL REAL-TIME OPTIMIZER

Recognising the paramount importance of managing a fast-growing air traffic demand scenario, Leonardo has developed an innovative solution for balancing the demand against the airspace capacity.

ASTRO is a comprehensive and flexible Air Traffic Flow Manager (ATFM) platform, covering the need for demand versus capacity balancing analysis from the Strategic to the Post-Operation phases. ASTRO has been designed to be natively interoperable with ATC Automation systems and other collaborative ATFM Units.

**Strategic planning for demand vs capacity balancing**
Processing up to one year of traffic planned to cross the Controlled Airspace, ASTRO allows to strategically anticipate eventual bottlenecks or controllers' overload.

The ASTRO Strategic Analysis provides the Flow Manager with the following information:
- Graphical representation of ATC Sectors workload vs capacity in any timeframe over the pre-defined
- Strategic Horizon. In case of capacity violation, ASTRO automatically suggests the optimal ATC Sectors arrangement to avoid controllers' overload

- Graphical representation of the forecasted departure and arrival operations at controlled airports compared to the relevant capacities.

The Flow Manager can also run specific what-if sessions to verify how alternative ATC scenarios could potentially affect the Demand vs Capacity Balancing. The ANSP (Air Navigation Service Provider) can hence define well in advance optimized sectors' planning and controllers rostering. In this phase the ANSP can also involve airlines and other stakeholders in a collaborative process to agree an optimized flights' scheduling and routing.

**Pre-tactical planning for demand vs capacity Balancing**
ASTRO allows to refine and validate the long-term strategic analysis for the next one or two days. The ANSP can hence anticipate and implement corrective actions to prevent bottlenecks at airports (e.g. planning to open an additional runway for arrivals) or controllers' overload (e.g. planning to split a collapsed sector).

**LEONARDO**
SECURITY & INFORMATION SYSTEMS

leonardocompany.com

# ASTRO

The results of the ASTRO Pre-Tactical Analysis include:
- Graphical representation of ATC Sectors workload vs capacity in any timeframe over the pre-defined Pre-Tactical Horizon. In case of capacity violation, ASTRO automatically suggests the optimal ATC Sectors arrangement to avoid controllers' overload.
- Graphical representation of the forecasted departure and arrival operations at controlled airports compared to the relevant capacities.
- Graphical representation of the forecasted departure and arrival operations at each runway of each controlled airport compared to the relevant capacities.
- Advisories for expected infringement of Active SUAs (Special Use Aerospace).

The Flow Manager can also run specific what-if sessions to verify how alternative ATC scenarios could potentially affect the Demand vs Capacity Balancing.



**Tactical measures for demand vs capacity balancing**
By automatically importing live flight data from the ATC Automation System, ASTRO allows to tactically act to prevent any violation of sectors, airports and runways capacity inside the controlled airspace.
In case of predicted unbalancing, ASTRO automatically creates a Delay Program including all flights involved in the affected ATC scenario.

ASTRO also recognises inbound flights that are eligible to absorb delays while still on ground at the departure airport. Eligible inbound flights are then inserted in a Ground Delay Program by associating a suggested CTOT (Calculated Take-Off Time) for any involved flight. All ATFM Measures approved by the Flow Manager are then dispatched to the departure airports to be tactically applied.

Airborne inbound flights are included in the Delay Program as well to provide the ANSP with a clear suggestion of corrective action to be taken to avoid bottlenecks. ASTRO is capable of automatically dispatching suggested delays for airborne flight to an

external AMAN (Arrival MANager) system in order to setup an effective pre-sequencing of the arrival traffic. ASTRO is also capable of receiving CTOTs for outbound flights and to submit them to the Flow Manager for the required validation. Approved ATFM Measures are then automatically dispatched to the ATC Automation System. The following facilities dealing with live flight data are always available:
- Graphical representation of ATC Sectors workload vs capacity in any timeframe over the pre-defined Pre-Tactical Horizon. In case of capacity violation, ASTRO automatically suggests the optimal ATC Sectors arrangement to avoid controllers' overload.
- Graphical representation of the forecasted departure and arrival operations at controlled airports compared to the relevant capacities.
- Graphical representation of the forecasted departure and arrival operations at each runway of each controlled airport compared to the relevant capacities.
- Advisories for expected infringement of Active SUAs
- Delay Program for all flights involved in an ATC Scenario provoking an unbalancing between Demand and Capacity.
- TFM Measures management panel.

The Flow Manager can also run specific what-if sessions to verify how alternative ATC scenarios could potentially affect the Demand vs Capacity Balancing. Being based on a standard Web Interface, ASTRO Human Machine Interface can be accessed from any standard browser and is natively integrated in the Leonardo Controller Working Position to provide Flow Managers and ATC Controllers with a comprehensive situation awareness of the expected traffic demand scenario. A reliable user access control facility prevents any unauthorised access to ATFM Data.

**Post-operations analysis**
ASTRO allows the Flow Manager to open any archived Demand vs Capacity Analysis and to apply alternative What-If scenarios on them. The Post-Operation Analysis aims at facilitating the continuous improvement of the overall airspace organization and ATC procedures optimization.