White Paper

Aeronautical

Indra develops new capabilities for its iTEC system based on the Intel® Xeon® Scalable platform

Using virtualization technologies, Indra is developing air traffic management (ATM) tools to fulfil requirements for the launch of the Single European Sky (SES) initiative.

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Air transport is an important driver of economic and social development throughout the world. It generates 65.5 million direct and indirect jobs, transports over 3.9 billion passengers and $6 trillion in cargo, and contributes over $2.7 trillion to the global economy.

Aviation generates revenues for the tourism industry and helps to create new provider networks, enhancing local commerce in the global market. The improvement of infrastructures since the 1970s has led to a doubling in air traffic every 15 years. This growth has brought with it an increase in operational safety risks.

In order to ensure that this development takes place in a safe and sustainable manner, in 2013, International Civil Aviation Organization (ICAO) designed a global air traffic plan, applicable until 2028 and structured into five-year periods.

This plan details the policies to be executed and their timetables, as well as the need to capitalize on existing technologies which may help to successfully tackle future civil aviation challenges. The objective is to create a global airspace that is operationally safe, efficient and protected, as well as financially and environmentally sustainable.

The European SESAR program

The European Commission has been working on this plan since 2007, when the Single European Sky ATM Research (SESAR) program was launched with the aim of modernizing the European ATM system.

This program will reduce the costs and environmental impact of air traffic management and increase its capacity and effectiveness, shortening travelling times and improving safety. The program's objectives are in line with those proposed by the UN through ICAO and its global air traffic plan.

The first phase of the project concluded in 2016, with the second phase in progress. Indra is participating in 25 of the 27 phase two projects, and leading on two.

The first of these two projects aims to advance the development of flight management systems through 4D trajectories. This technology allows aircraft to select the most direct route and plan flights with an error margin of just a few seconds in terms of landing times.

The project builds on the work initiated by the company during the first phase of SESAR. In the second phase, the system will be furnished with more advanced tools, in addition to involving different countries, control centers and aircraft. The goal is to test the systems in an environment with the same dimensions and complexity as the future European Single Sky.

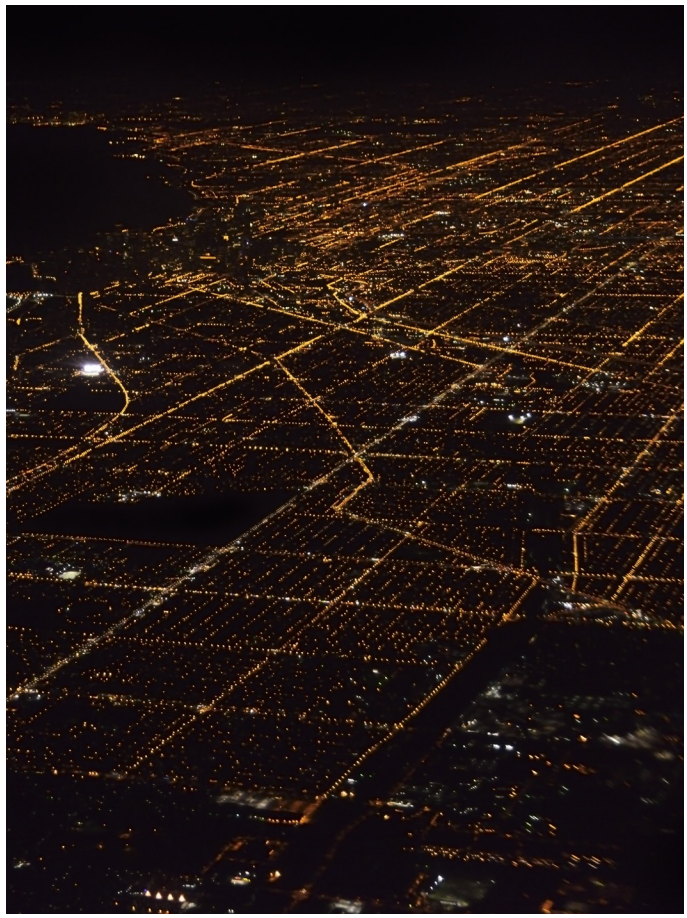
The second project is related to common flight management services which are shared in Europe by both civilian and military flights. This will include tools enabling air traffic controllers to intervene in case of traffic congestion, and prediction of trajectories by air traffic control centers.

These services aim to not only provide more fluid and coordinated ATM, but also reduce costs.

iTEC: a suite prepared for global ATM

In order to successfully complete these projects, Indra is using its Interoperability Through European Collaboration (iTEC) solution as a standard. The Spanish company's proprietary suite offers a complete air traffic management system based on the prediction of aircraft trajectories and global interoperability.

According to Indra, the iTEC suite facilitates an increase in airspace capacity and improves the safety of air traffic through automatic detection of possible losses of separation between aircraft. In addition, Indra says it also contributes to reduce fuel consumption and emissions by facilitating the future introduction of Free Route Airspace above 28,000 ft. This will provide pilots with greater flexibility to follow the most direct and optimal routes, instead of having to follow the existing network, based on fixed points and airways, as is traditionally done which can help reduce flight risks. The iTEC alliance comprises seven European Air Navigation Service Providers (ANSPs): DFS (Germany), ENAIRE (Spain), NATS (United Kingdom), LVNL (Netherlands), AVINOR (Norway), Oro Navigacija (Lithuania) and PANSA (Poland).



All of them are collaborating to integrate into iTEC the two additional components that enable Indra to lead the two SESAR 2020 projects mentioned previously: processing of 4D trajectories and Controller Working Position (CWP).

One of these components is the iTEC Adaptation Platform (iTAP), a tool that will enable each ANSP to define the structure of its airspace and configure other parameters related to its air operations. The system will also allow storage of geographic information and metadata, and provide tools to ensure the integrity of airspace design and 3D visualization.

The second component to be integrated into iTEC will be External System Service (ESS). This testing tool will operate Indra's ATM system in the same way as a human being would, but will do so automatically, thus increasing testing efficiency and facilitating the work of air traffic controllers.

Supported by Intel® Xeon® Scalable processors

Due to its large portfolio of projects and validations, and in order to optimize the number of devices, lab space and energy savings, Indra decided to virtualize its hardware. This has been done using the Intel® Xeon® Scalable processor family and the KVM (Kernel-based Virtual Machine) open source software.

The Intel® Xeon® Scalable platform facilitates the use of artificial intelligence (AI) in data centers to drive the mission critical systems Indra has built. These systems manage massive amounts of data while offering robustness and performance.

In the words of Jose Luis Santiago, Senior Technical Manager at Indra Spain, "The architecture of the latest Intel Xeon processors incorporate multiple features that increase efficiency and performance in inference workloads. This enables a future landscape full of incredible possibilities, like functionalities based on AI, and makes Intel the perfect partner for Indra".

iTEC has already been implemented at two European control centers: NATS in Scotland and DFS in Germany. Once the deployment at the remaining 18 control centers has been completed, the platform will manage seven million flights annually. This system will provide airlines with the necessary tools to accomplish the established goals, which are critical to ensure a correct operation. Pending issues, like increasing capacity, achieving European interoperability, offering more direct routes, reducing fuel consumption and improving safety and timeliness, will become much easier to approach.

Configurable and modular, iTEC Suite will also be capable of responding to the future needs of global air traffic. The system has been designed following European Flight Data Processing (eFDP) specifications, and includes the results of the research and development activities of the SESAR program for the creation of the European Single Sky. In addition, iTEC is fully aligned with ICAO's guidelines and strategy.