

# ARCHIVED REPORT

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## ATC - Africa

### Outlook

- ASECNA has launched space-based ADS-B coverage for its flight region, increasing safety capabilities and enhancing the availability and quality of flight information data
- Adoption and implementation of SAATM has accelerated, with 34 nations now signed on to the air transportation liberalization and unification effort
- As in most regions, the air transportation industry in the African region has struggled with fallout from the COVID-19 pandemic. With vaccine passports becoming a growing trend, African countries are concerned about impediments to travel due to the poor availability of vaccines in the region

### Orientation

**Description.** This report surveys efforts to modernize air traffic management on the continent of Africa.

**Sponsor.** The countries of the continent of Africa.

**Status.** Ongoing modernization.

**Application.** To manage air traffic control in the continent of Africa.

### Technical Data

**Characteristics.** Regional organizations control Africa's airspace, as no centralized ATC system exists. The struggling African economic and political structure is reflected in the various nations' management of commercial air traffic: some countries have modern systems similar in design and capability to those of the United States or Western Europe, but most have systems inadequate for substantial air traffic.

**Operational Control.** The organization developed to monitor and regulate the growing ATC concerns of

Africa is the African Civil Aviation Commission. Formed in the 1990s, AFCAC is experiencing the growing pains of a new organization and exercises little control over its members. Membership in the International Civil Aviation Organization (ICAO) of the United Nations brings the promise of technological assistance to the region, though funding remains a great concern. Regional organizations like the Agency for the Safety of Aerial Navigation in Africa and Madagascar (ASECNA) are beginning to facilitate the integration of ATM systems throughout the continent.

### Program Review

**African Civil Aviation Commission (AFCAC).** The AFCAC functions as a civil aviation coordination body for the African Union. Of the 55 AU members, 53 have either signed on to the AFCAC or ratified/acceded to its charter. As of June 2020, the only AU members yet to join the AFCAC in an official capacity are Cape Verde and the Sahrawi Arab Democratic Republic

(Western Sahara), a disputed territory that is claimed by Morocco.

As of 2017, the U.S. recognized Moroccan control of Sahrawi, but the territory remains independently recognized by the AU.

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**Agency for the Safety of Aerial Navigation in Africa and Madagascar (ASECNA).** ASECNA has 17 members in Africa, including: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo, Equatorial Guinea, Gabon, Guinea Bissau, Ivory Coast, Madagascar, Mali, Mauritania, Niger, Senegal, and Togo. ASECNA also welcomes coordination with nations outside the region as a participant in the Civil Air Navigation Services Organization (CANSO). France is the only member outside of Africa to have joined ASECNA, entering the organization as a founding member in 1959.

In 2001, ASECNA contracted for a communication, navigation, and surveillance/air traffic management (CNS/ATM) center in Madagascar. The same year, ASECNA awarded contracts for construction of a Thales Eurocat center in N'Djamena, Chad, and for Thales ATM navigation aids for five airports, located in Burkina Faso, Cameroon, Mali, Mauritania, and Niger. Also in 2001, Thales supplied VHF Omnidirectional Range (VOR) and distance measuring equipment (DME) systems to airports in Burkina Faso, Cameroon, Mauritania, and Niger.

In 2004, ASECNA awarded a \$24 million contract to Thales for four Eurocat systems – one each for Democratic Republic of the Congo, Ivory Coast, Niger, and Senegal. Each system comes with RSM 970 Mode S monopulse secondary surveillance radar (MSSR). The four systems would share a common database and flight information. Thales would supply Niger with an ATM training center.

In 2004, ASECNA purchased nine Thales CVOR (Conventional VHF Omnidirectional Range) and three DME systems. The CVOR is a short-range, en route navigation aid that provides pilots with azimuth information. The airports that received the new CVOR systems were Toamasina, Madagascar; Pointe-Noire, Congo; Dirkou, Niger; Ziguinchor, Senegal; Gao, Mali; Mvengue, Gabon; Bouake, Ivory Coast; and Antananarivo and Mahajanga, Madagascar.

In 2006, ASECNA signed a multimillion-dollar contract with Intelsat for greater satellite capacity in support of its existing civil aviation network. ASECNA will use additional capacity on Intelsat's 10-02 satellite to support airline navigation control and provide technical and traffic information, weather forecasting, and guidance to airplanes. The additional capacity will be used for voice and data traffic.

Beginning in October 2011, the air traffic zones administrated by ASECNA received a large boost in their capabilities. At that time, ASECNA awarded Thales a contract for the harmonization and modernization of ATC centers in Chad, Congo, Ivory

Coast, Madagascar, Niger, and Senegal. The modernized systems are to incorporate a Multi-Sensor Tracking System (MSTS), allowing integration of a wide range of sensors – from radars to ADS-B and ADS-C to multilateration and wide area multilateration. The upgrade puts ASECNA in compliance with International Civil Aviation Organization standards, including ICAO Flight Plan 2012.

In May 2012, ASECNA was designated to ensure the completion of a Sub-Saharan Africa-wide GNSS / EGNOS (Global Navigation Satellite System / European Geostationary Navigation Overlay Service) implementation program, which will make aerial satellite navigation available to operators. The effort is being developed in partnership with Egis-Avia, the European Satellite Services Provider, and Pildo Labs. During the initial two years of the program, EUR2.8 million (\$3.6 million) was allocated. System commencement was to take place in January 2013.

At the AFI FPP convention held in November 2012, the ASECNA director general, Amadou Ousmane Guitteye, signed an agreement with Thales Communication Belgium, the ICAO, and INEO Engineering and Systems to provide for the purchase and installation of ATM systems and Mode S-enabled MSSRs. The plans factored in the creation of 11 ATC centers over a 21-month period with \$35 million of initial funding. The MSSRs will be installed at the following locations: Cotonou, Benin; Ouagadougou, Burkina Faso; Douala, Cameroon; Bangui, Central African Republic; Moroni, Comoros; Libreville, Gabon; Bissau, Guinea Bissau; Antananarivo, Madagascar; Bamako, Mali; Nouakchott, Mauritania; and Niamtougou, Togo. Meanwhile, the ATM systems will be installed at Cotonou, Benin; Ouagadougou, Burkina Faso; Douala, Cameroon; Bangui, Central African Republic; Moroni, Comoros; Malbao, Equatorial Guinea; Libreville, Gabon; Bissau, Guinea Bissau; Bamako, Mali; Nouakchott, Mauritania; and Lome, Togo.

### Single African Air Transport Market (SAATM).

The SAATM is an African Union-led organization, launched as a flagship project of Agenda 2063 to liberalize and unify the African air transportation market. It was created on January 28, 2018, with 23 countries signing a "solemn commitment," including: Benin, Botswana, Burkina Faso, Cape Verde, the Republic of Congo, Egypt, Ethiopia, Gabon, Ghana, Guinea (Guinea Conakry), the Ivory Coast (Cote d'Ivoire), Kenya, Liberia, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo, and Zimbabwe.

According to the IATA, as of 2021, Cameroon, the Central African Republic, Chad, the Democratic Republic of the Congo, Equatorial Guinea, Gambia,

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Guinea Bissau, Lesotho, Morocco, Namibia, and Niger had joined the SAATM initiative, growing the organization to 34 members.

The SAATM is a key component of an overhaul of Africa's air transportation market, designed to expedite implementation of the Yamoussoukro Decision, a treaty that became binding in 2002. The Yamoussoukro Decision's purpose is to open transnational competition in air markets and deregulate air services.

At the time of its signing, 44 African Union members had committed to the Yamoussoukro Decision.

Some countries and air services have claimed that this effort will allow larger air transportation services to overwhelm, outcompete, and eliminate smaller providers.

***Economic / Political Communities***

The continent of Africa contains several mostly regional economic and political communities, whose members share economic strategies and collaborate on economically sensitive matters such as air traffic management and visa control.

**African Union.** As of 2021, the African Union comprised 55 member nations, including: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, the Democratic Republic of the Congo, Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini / Swaziland, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sahrawi Arab Democratic Republic (Western Sahara), São Tomé and Príncipe, Senegal, the Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.

**COMESA.** As of 2021, the Common Market for Eastern and Southern Africa (COMESA) comprised 21 member nations, including: Burundi, Comoros, the Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Eswatini / Swaziland, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, the Seychelles, Somalia, Sudan, Tunisia, Uganda, Zambia, and Zimbabwe.

**EAC.** As of 2021, the East African Community (EAC), an international organization of six member states in the eastern section of Africa, includes: Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda.

**SADC.** As of 2021, the Southern African Development Community comprised 16 member nations, including: Angola, Botswana, Comoros, the Democratic Republic

of the Congo, Eswatini / Swaziland, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, the Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe.

***Country News***

**Algeria.** In 2005, Thales supplied Eurocat with a voice communication control system to provide full coverage of Algerian airspace. An en route ATC center in Algiers was installed, along with four approach control centers. Equipped with an online data interchange, Algeria is able to coordinate air traffic with Spain and France. Simulators and training facilities were also included in the package.

**Angola & Namibia.** In 2008, Thales signed a contract with the Angolan air traffic services provider ENANA to provide a Eurocat center and a Mode S radar for Luanda Airport. At the start of 2009, Thales was awarded a contract to provide a Eurocat center and one co-mounted primary and Mode S secondary radar for Hosea Kutako International Airport, in Namibia.

**Cameroon.** In February 2012, Thales announced that ASECNA had purchased Cameroon a new VOR/DME navigational aids system with solar power for Moruya Airport. Under the deal, delivery of the full turnkey installation was completed in July 2012.

**Congo, Democratic Republic of.** The Democratic Republic of the Congo has had a spotty safety record in recent years, and the United Nations felt it necessary to lend a helping hand with an infusion of new gear. In February 2012, the United Nations Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) handed over a set of equipment, including air traffic control radios and meteorological data collection devices, to outfit 23 meteorological stations throughout the country. MONUSCO was responsible for installing the equipment and training operators in its use.

**Gambia.** Cooperation in the ASECNA group was increasing in December 2011. ASECNA announced that it had signed an accord with Gambia, renewing an expiring agreement and reaffirming the country's commitment to the regional body. Under the deal, CNS/ATM was to be implemented by ATC providers, including mutual staff training and exchanges, and overall coordination.

**Ghana.** According to an April 2012 report, the U.S. Trade and Development Agency was providing \$322,560 to fund plans for the construction of a new ATC center at Kotoka International Airport, in Accra, Ghana. Additionally, the aid would help to identify goods and services necessary for the project. LPA Group Inc is providing technical assistance.

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**Kenya.** In November 2008, SELEX Sistemi Integrati signed a nearly EUR25 million (\$33.3 million) contract with the Kenya Civil Aviation Authority to supply primary and secondary radars, an automated system for land-based movement management, and navigation aids. The systems would be installed in the international airports of Nairobi and Mombasa, as well as the airports of Kisumu, Eldoret, Machakos, Poror, and Wajir. This solution covers the entire country's airspace.

**Morocco.** In 2003, Morocco ordered three Raytheon MSSR systems for connection to the ATC center in Nouasseur. In 2005, Morocco awarded Indra a EUR2.3 million contract for the deployment of a satellite communications network for ATC management. The network would include one main station located in Casablanca and six remote stations.

**Namibia.** New functionality and capability arrived in Namibia in January 2012 as the country inaugurated a new Eurocat ATC system at Hosea Kutako International Airport in Windhoek. The Namibian Directorate of Civil Aviation (NDCA) had signed the contract for the system three years earlier. The Eurocat enabled the NDCA to reduce aircraft separation while fusing data from a range of sensors, including primary radars, secondary radars, and wide area multilateration technology.

**Nigeria.** The Nigerian Airspace Management Agency (NAMA) placed a \$70 million order with Thales in 2004 for ATM modernization. Along with ATC centers in Kano and Lagos, four approach ATC centers were installed. Nine RSM 970S MSSR systems support these centers. The system provides total coverage of Nigerian airspace.

In February 2011, the Pan African news agency Panapress reported that the NAMA would be migrating from a terrestrial to a satellite-based navigation system in March 2011. According to local media reports, such a migration would mean that airplanes would stop depending on the ground-based navigation equipment installed at the various airports for landing and takeoffs. The report said NAMA would spend over NGN360 million (\$2.3 million) on the project, which was being handled by the International Air Transport Association (IATA).

The project would enhance safety and make use of the GNSS, giving flight operations flexibility. The project was to begin at four of the country's 22 airports: Murtala Muhammed International Airport, in Lagos; Nnamdi Azikiwe International Airport, in the capital city of Abuja; Port Harcourt International Airport; and Mallam Aminu Kano International Airport.

During 2012, the Global Navigation Satellite System came on line in Nigeria. Pilots from Emirates and KLM flew using GNSS procedures during testing in April. Under the watch of air traffic controllers, successful landings were achieved at Lagos and Kano airports. Nnamdi Azikiwe International Airport, in Abuja, and Port Harcourt International Airport were to be among the first four airports to operate with the new piloting setup.

The GNSS upgrade has been part of a wider Nigerian program called Total Radar Coverage Nigeria (TRACON). Under the program, Nigeria has installed radars, built new ATC centers, boosted radio coverage, and overhauled training and procedures. Nigeria has contracted Thales ATM as the lead for the project with a five-year agreement to conduct training and perform maintenance.

TRACON's test run began in February 2013, and the full system was implemented on April 12, 2013. As part of the effort, Nigeria has also tied the civilian aerospace authority, the Nigeria Airspace Management Agency, with its meteorological authority, the Nigeria Meteorological Agency, to provide up-to-the-second forecasting for all aerial operations.

**South Africa.** The South African Advanced Air Traffic System (SAAATS) features Eurocat ATC centers located in Cape Town and Johannesburg. The entire program is estimated to have cost \$98 million.

In April 2012, South Africa's Air Traffic and Navigation Services (ATNS), the country's lone air traffic operator, unveiled a new air traffic control simulator. The simulator allows three-dimensional modeling of a vast range of flight conditions that the ATNS has said will allow controllers to be certified without having to possess "real-life" operational experience.

**South Sudan.** After proclaiming independence in July 2011, South Sudan joined a regional body to help provide some guidance for its air traffic control direction. ASECNA signed a partnership and assistance agreement with the fledgling country in April 2012, providing a new ATM system. Included in the deal was the training of technicians in air traffic control, weather forecasting, and fire control. Additionally, ASECNA is assisting in setting up the governmental structures with which to manage the civil aviation sector.

**Tanzania.** An ATC upgrade for Tanzania could soon materialize. At the 32nd annual general meeting of the Tanzania Air Traffic Controllers Association, held in November 2011, Tanzania Civil Aviation Authority (TCAA) Director of Air Navigation Services Charles Chacha revealed that the TCAA has plans to replace its current radar tracking system with an ADS-B system.

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The technology will be a vast improvement over the nation's existing radar, allowing 1,000 feet of separation, versus the 2,000 feet currently allowed.

**2014 to 2016**

In May 2014, Thales announced that following an international competitive tender, the Ministry of Transport, Works, Supply and Communication of Zambia had chosen Thales for the supply, delivery, installation, and commissioning of the country's air traffic management and radar surveillance system. Thales' TopSky-ATC will manage the entirety of Zambia's airspace. Thales is supplying its TopSky-ATC to Kenneth Kaunda International Airport, in Lusaka, and Harry Mwanga Nkumbula International Airport, in Livingstone. The Thales solution is being delivered alongside two primary radars and two secondary surveillance radars equipped with full Mode S radar. All systems are fully compliant with the new ICAO Flight Plan 2012 format and EUROCONTROL standards.

It was announced in September 2014 that the Tanzania Civil Aviation Authority (TCAA) had marked the completion of its ATC modernization at a technology seminar to highlight the benefits of advanced ATM for Africa. Prior to that point, Tanzania was one of the few remaining African countries yet to use ADS-B surveillance. Simultaneously, TCAA upgraded the way it would transmit flight plans and aeronautical data in the future with an Aeronautical Message Handling System (AMHS).

Also in March 2016, Thales announced that it was modernizing air traffic management at Egypt's Hurgada and Taba international airports. Specifically, the Egyptian National Air Navigation Services Company (NANSC) selected Thales for the replacement and renewal of the ATM systems at those airports. Under the project, Thales would deploy TopSky-ATC, TopSky-Tower, primary and secondary radars, and communication systems.

In September 2016, Thales announced that ATNS, South Africa's air navigation service provider, had selected Thales to supply WAM surveillance equipment, primary and secondary surveillance radars, and DME technology to a number of its sites, and install and commission them.

**2018**

In January 2018, ASECNA signed an agreement with Aireon to provide space-based ADS-B services across the members' airspace. This geographic area covers 16.1 million square kilometers of airspace through six Flight Information Regions: Antananarivo, Brazzaville,

Dakar Oceanic, Dakar Terrestrial, Niamey, and N'Djamena.

Also in January 2018, the African Union began an initiative to launch the Single African Air Transport Market (SAATM) to boost connectivity, improve demand, and enable higher traffic volumes. The SAATM, which the AU has deemed one of the flagships of its Agenda 2063, was signed by 23 African states. It was reported that 32 AU members had yet to come on board.

In March 2018, Tunisia joined the AEFMP (Algeria, España (Spain), France, Morocco, and Portugal) airspace. The group aims to bring the members' technology in line with the Single European Sky program, improving both technology and the ability to operate cooperatively.

COMESA passed new legislation to establish a seamless upper airspace region for a free-trade area for its 21 member states. The organization met in May 2018 to finalize the details.

At the CANSO Africa Conference, held in September 2018, member air navigation service providers (ANSPs) encompassing Kenya, Nigeria, South Africa, Tanzania, and Uganda agreed to create and support a CANSO air traffic flow management and collaborative decision-making initiative. Tanzania followed up on the agreement by hosting an implementation workshop.

A global furor erupted in the aftermath of two aircraft disasters involving the Boeing 737 MAX in 2018 and 2019, respectively – the latter occurring in Africa. In October 2018, Flight 610 of Indonesian airline Lion Air lost control and crashed. Then, in March 2019, Ethiopian Airlines Flight 302 suffered a similar crash. Both aircraft were later determined to have suffered malfunctions of their Maneuvering Characteristics Augmentation System (MCAS), an automated flight control system.

In the wake of these accidents, Boeing 737 MAXs were grounded throughout the world. Eventually, Boeing would incur numerous canceled orders and suffer mass disruptions to its production and delivery schedules.

**2019**

ASECNA further moved toward modernizing its airspace by employing Thales Alenia Space, a joint venture between Thales and Leonardo, to carry out a preliminary design study for a Space-Based Augmentation System. The SBAS, announced in February 2019, is to be modeled on the European Geostationary Navigation Overlay Service, and would improve navigation and surveillance operations across

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all flight phases while bolstering flight safety and efficiency. The European Commission and GSA are involved in the SBAS study, providing technical assistance as part of an agreement between ASECNA and the European Union. The SBAS study was to last 18 months.

In June 2019, representatives of South Africa's ATNS and ASECNA met to facilitate further harmonization of air traffic. A Memorandum of Understanding signed by the groups formalizes interconnectivity of the SADC's Very Small Aperture Terminal (VSAT) and NAFISAT networks managed by ATNS in Northern, Southern, and Eastern Africa and ASECNA's own AFISNET VSAT network for West Africa.

The Moroccan Airports Authority, Office National Des Aeroports (ONDA) announced in July 2019 that it had contracted ADB SAFEGATE Airport Systems to upgrade its IT services at 22 airports in order to enhance passenger capacity. ADB SAFEGATE Airport Systems will centralize the IT infrastructure at ONDA's headquarters and implement Safety Operational Analysis Methodology (SOAM) at multiple sites, bringing systems more in line with EUROCONTROL's vision of Airport Collaborative Decision Making (A-CDM).

### 2020

In January 2020, ASECNA officially launched space-based ADS-B coverage for its region. This Space-Based Augmentation System allows air traffic managers to reduce aircraft spacing safely while also providing enhanced flight information data.

In May, ASECNA announced that a study for the design of an SBAS for its members had concluded in April. Development of the solution was spearheaded by Thales Alenia Space, a partnership between Thales (67 percent) and Leonardo (33 percent).

In July, ASECNA signed an accord with RASCOM, an intergovernmental organization for communications by satellite. This allows ASECNA to utilize RASCOM's assets for the provision of CNS and air traffic control.

According to a report by South Africa's *Engineering News*, in August 2020, the IATA urged African nations to speed up implementation of the SAATM, which it believed would hasten economic recovery from the COVID-19 pandemic.

The 34 countries that agreed to the SAATM terms account for approximately 75 percent of all African air passenger traffic. However, only 10 countries (Benin, Burkina Faso, Cabo Verde, the Republic of the Congo, Gambia, Ghana, Mozambique, Niger, Rwanda, and Togo) had fully implemented SAATM. Only Kenya and Rwanda had fully met ICAO recommendations, while Ghana and Togo had met more than 90 percent and Gambia had met approximately 81 percent.

ASECNA announced the launch of the first SBAS service in Africa in September 2020, a joint effort between Thales Alenia Space and Nigeria's NIGCOMSAT. Designed by Thales Alenia Space, NIGCOMSAT is operating the SBAS service through its NIGCOMSAT-1R satellite. Service began with pre-operational tests to carry out technical trials, build operational competencies, provide demonstrations, and test additional services under consideration, such as Precise Point Positioning and Emergency Warning Services.

In October 2020, Rwanda joined Mozambique in contracting ENAV's IDS AirNav subsidiary for installation and maintenance of an AMHS and AIS/AIM system. Implementation was expected to be achieved by the first half of 2021. In May 2021, the delivery, installation, and commissioning of the StarCaster D-ATIS system was announced.

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Map of Africa

Source: CIA

## Worldwide Distribution/Inventories

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By definition, the scope of this program is geographically restricted to the **African** continent and its outlying islands.

### Forecast Rationale

#### *African ATC News: 2021*

ASECNA, along with partners Thales Alenia Space and NIGCOMSAT, conducted a series of five flights to test its SBAS in January 2021. All of the test flights were successful and validated the implementation of the SBAS. Full operational status was expected from 2024.

In February 2021, CANSO held a two-day virtual event to discuss the future of air navigation in Africa. Reportedly, around 300 people attended the event, where topics discussed included the benefits and implementation structure of SBAS and GBAS.

In March, Kenya selected Indra to revamp the ATC system at Jomo Kenyatta International Airport, the country's main airport. Jomo Kenyatta will be equipped with the Indra Air Automation system, which includes control towers and a training simulator and provides automation of the control center.

Also in March, after initiating operational deployment of Aireon service in January 2020, ASECNA demonstrated its continued commitment to the Single African Sky initiative with the installation of a third Aireon Service Delivery Point at its Dakar, Senegal, operations center. The new installation allows triple-

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redundant data delivery to all six ASECNA Flight Information Regions, or FIRs (Antananarivo, Brazzaville, Dakar Oceanic, Dakar Terrestrial, Niamey, and N'Djamena). The three data lines also feed data into the ASECNA AFISNET VSAT network, making SBAS available to the region.

### ***COVID-19***

As in all regions throughout the world, the arrival of the COVID-19 pandemic has negatively influenced air traffic in Africa. As the virus spread and affected the frequency of long-range travel, flights decreased across the African continent.

Seeing the impact of the virus on air transportation and critical supply infrastructure, the African Union held a region-wide videoconference for its members' ministers of transport. The meeting was an effort to coordinate protocols for implementation of safety measures and to find ways to mitigate damages to and gaps in supply chains.

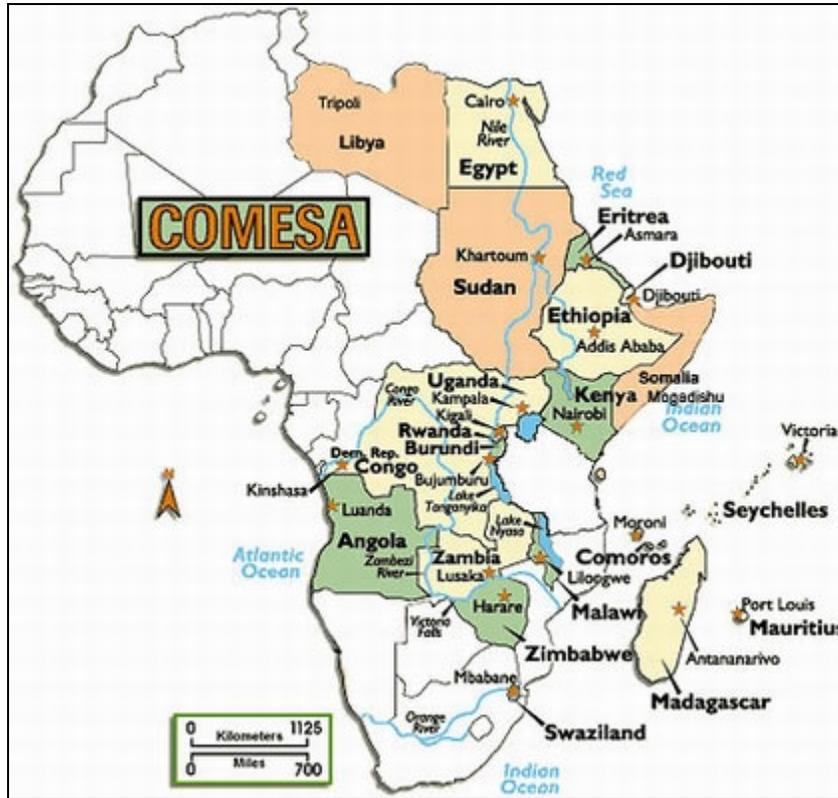
The African Union followed up on the videoconference with a webinar, held in September 2020 to advise members on a regional strategic approach. Participants included the AU Commissioner for Infrastructure and Energy alongside industry leaders Makhtar Diop, World Bank Vice President for Infrastructure, and Abderahmane Berthe, the Secretary General of the African Airlines Association, among other experts. At that time, African airport revenue losses of 51 percent in 2020 were projected, according to Airport Council International. African airline losses were projected at \$6 billion.

In April 2021, the African Union convened an extraordinary meeting to discuss vaccine passports/certificates with the objective of agreeing on a common position and establishing a mechanism to communicate that position to relevant institutions and partners. Countries participating in the meeting included: Algeria, Burkina Faso, Comoros, the Democratic Republic of the Congo, the Republic of Congo, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Lesotho, Madagascar, Mauritania, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Togo, Tunisia, and Uganda. A paper on the proposed common position on vaccine passports and their implication on international travel was presented.

One of the outcomes of the meeting was an agreement to make a call to all countries that have introduced or are contemplating the introduction of vaccine passports to refrain from doing so, since vaccines are not widely available on the African continent. All AU members were encouraged to adopt digital tests to allow for verifiable health credentials.

The long-term effect of the virus on air traffic movement remains to be seen, but for the short term, Africa's air navigation service providers have been updating their operational protocols to match pace with the changes being made across the world. While traffic has decreased, the ANSPs believe that they have made the operational alterations needed to keep the system running efficiently and safely.

# Maps



COMESA Member States

Source: COMESA



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SADC Member States (does not show Comoros)

Source: SADC

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EAC Member States

Source: East African Community (EAC)