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2022 ANNUAL PRIVATIZATION REPORT: AVIATION

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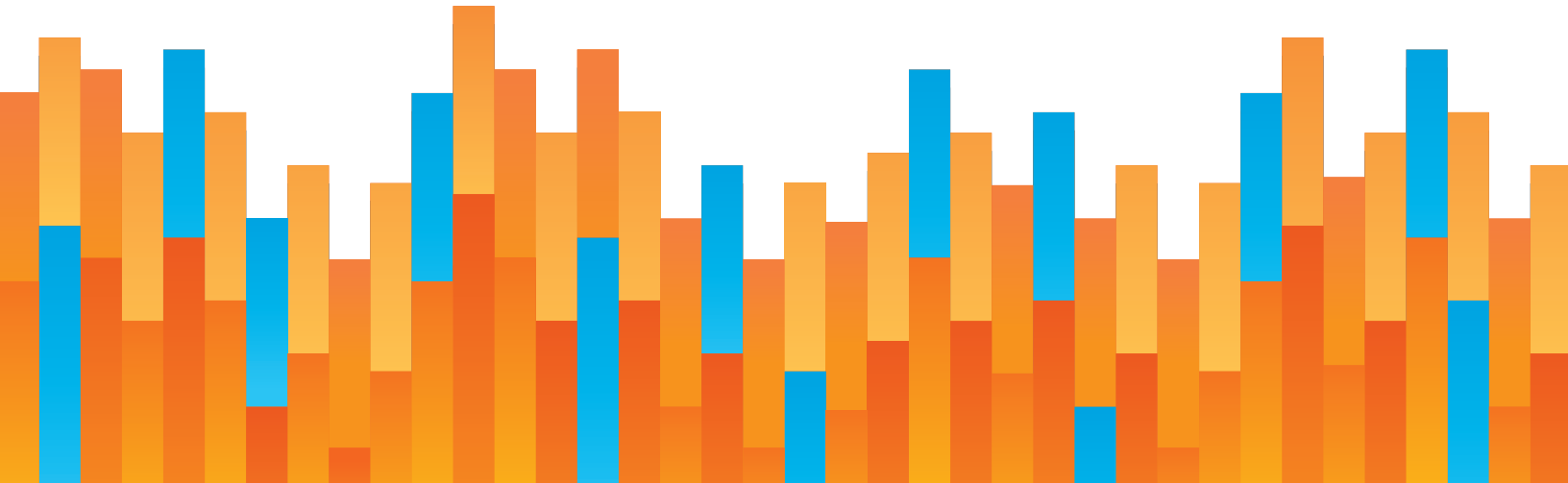

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PART 1

INTRODUCTION

In the second half of the 20th century, the world's airports and air traffic control (ATC) systems were essentially all departments of governments. Two events in 1987 launched an ongoing wave of organizational and government reforms. Those events were the privatization of the British Airports Authority (BAA) and the corporatization of the New Zealand government's ATC functions as Airways New Zealand.

BAA was privatized as a single entity comprising the three major London airports plus several other airports in the United Kingdom. Later government policy decisions led to selling Gatwick, Stansted, and two Scottish airports to new private owners. The improved performance of the privatized airports inspired a global wave of airport privatization and long-term public-private partnerships (P3s) that has resulted in over 100 large and medium-size airports being either sold to investors or long-term leased as revenue-based P3s—in Europe, Asia, Latin America, and elsewhere. The outlier has been the United States, which has only one P3-leased airport (San Juan International) and a small number of P3 arrangements for airport terminals and other individual facilities.

The corporatization of Airways New Zealand in 1987 also led to a global trend under which more than 60 countries subsequently separated their ATC systems from the government's transport ministry and set them up as self-supporting corporations, regulated for safety at arm's length from the government. Within the first decade of this trend, the leading ATC providers organized a trade association called the Civil Air Navigation Services Organization (CANSO). Today CANSO has 86 full members (providers of ATC services) and

88 associate members (mostly supplier companies).[1] CANSO is the ATC counterpart of the global organizations for airlines (IATA) and airports (ACI).

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This report reviews developments in the United States and worldwide regarding private-sector participation in airports, air traffic control, and airport security. While the United States remains an outlier when it comes to airport and ATC organization and governance, interest in airport privatization via long-term P3 leases continues.

[1] Civil Air Navigation Services Organization, "CANSO - Home," CANSO website, https://canso.org/ (last accessed 18 April 2022).

PART 2

AIRPORTS

2.1 AIRPORT PRIVATIZATION OVERVIEW

The term "airport privatization" refers to several different kinds of change from traditional 100% government ownership and operation. The most sweeping form is the sale of the airport's ownership (as in the original BAA privatization) via a public offering of shares. A more common model in most of Europe is the sale of either a majority or minority stake in the airport. In Australia, much of Asia, and Latin America, the most common model is the long-term lease as a public-private partnership (P3). Lease terms typically vary from as low as 25 years to as much as 99 years (Australia). The P3 model is also used for components of an airport, such as a new terminal (or even a new runway, as occurred in Bogotá, Colombia). In the U.S., the P3 model is permitted under federal law for entire airports as well as airport components.

"The term "airport privatization" refers to several different kinds of change from traditional 100% government ownership and operation."

In 2018, trade association Airports Council International released a policy paper on worldwide airport privatization trends.[2] As Table 1, which was recreated from the report, shows, Europe led the way in the fraction of passenger traffic (75%) at airports with majority or near-majority or greater private-sector investment, with Latin America and the Caribbean next at 66%. North America was lowest, at 1% of airports. For the world overall, 43% of all passenger air traffic moves through airports with significant private ownership.

TABLE 1: AIR PASSENGER TRAFFIC BY REGION AND AIRPORT OWNERSHIP

Region	Percent Private	Percent Government
Europe	75%	25%
Latin America & Caribbean	66%	34%
Asia-Pacific	47%	53%
Middle East	18%	82%
Africa	11%	89%
North America	1%	99%
World	43%	57%

Source: Airports Council International, 2018

More than three decades of growth in airport privatization have led to the emergence of global airport companies, some of which began with airports that were privatized early on, such as London Heathrow and Germany's Frankfurt. When new opportunities arise to bid on shares in airport equity or to develop a new airport or terminal via a long-term P3 agreement, these companies are generally among the bidders, sometimes in partnership with infrastructure investment funds and/or public pension funds.

Table 2 lists the largest investor-owned airport companies, ranked according to their 2020 revenue, derived from airport group financial statements. The total 2020 revenue of the investor-owned airport companies is $24.6 billion, representing 37.1% of 2020 total world airport revenue of $66.3 billion.[3] While 2020 revenue was much lower across the board due to the pandemic-caused collapse in air travel, the share of total world airport revenue collected by investor-owned airport companies increased from 2019. In 2019, investor-owned airport companies collected $47.3 billion—or 27.5%—of $172 billion total global airport revenue.

[2] Airports Council International, "Policy Brief: Creating Fertile Grounds for Private Investment in Airports," Jan. 2018.

[3] Airports Council International, "Advisory Bulletin: The impact of COVID-19 on the airport business—and the path to recovery," 1 Nov. 2021. https://aci.aero/2021/11/01/the-impact-of-covid-19-on-the-airport-business-and-the-path-to-recovery-3/ (22 March 2022).

TABLE 2: LARGEST INVESTOR-OWNED AIRPORT COMPANIES BY REVENUE, 2020

Airport Company	HQ Country	Main Airport(s)	Privatiz. Status	2020 Revenue ($M)	2019 Revenue ($M)
Aena Aeropuertos	Spain	Madrid	Partial	$2,740	$4,977
Aeroports de Paris	France	Paris—DeGaulle	Partial	$2,611	$5,264
Fraport	Germany	Frankfort, Lima	Partial	$2,049	$4,150
Heathrow Airport Holdings	U.K.	Heathrow	Full	$1,652	$4,083
Manchester Airports	U.K.	Manchester	Partial	$1,261	$1,183
Vinci Airports	France	Gatwick, Lisbon	Full	$1,209	$2,947
Airports of Thailand	Thailand	Bangkok	Partial	$1,039	$2,024
GMR Airports	India	Delhi	Partial	$919	$746
Guangzhou Baiyun	China	Guangzhou	Partial	$800	$1,193
Flughafen Zurich	Switzerland	Zürich	Partial	$694	$1,218
Australia Pacific Airports	Australia	Melbourne	Full	$629	$728
Sydney Airport	Australia	Sydney	Full	$619	$1,140
Corporacion Americas	Argentina	Buenos Aires	Full	$607	$1,558
Brisbane Airport Corp.	Australia	Brisbane	Partial	$570	$584
Beijing Capital Airport	China	Beijing	Partial	$549	$1,565
New Kansai Intl. Airport	Japan	Kansai	Full	$525	$2,084
Airports. Co. S. Africa	South Africa	Cape Town	Partial	$486	$494
GAP	Mexico	Guadalajara	Full	$474	$759
Malaysia Airport Holdings	Malaysia	Kuala Lumour	Partial	$462	$1,259
ASUR	Mexico	Cancún	Full	$451	$826
Flughafen Wien	Austria	Vienna	Full	$408	$961
Auckland Intl. Airport	New Zealand	Auckland	Partial	$407	$490
TAV Airports	Turkey	Antalya	Full	$368	$856
SEA Group	Italy	Milan	Partial	$349	$849
Atlantia	Italy	Rome	Full	$332	$1,067
Perth Airport	Australia	Perth	Full	$331	$346
Brussels Airport Co.	Belgium	Brussels	Full	$268	$738
Copenhagen Airports	Denmark	Copenhagen	Partial	$259	$652
Dusseldorf Airport	Germany	Düsseldorf	Partial	$229	$530
Athens Intl. Airport	Greece	Athens	Partial	$227	$581
Birmingham Airport Holdings	U.K.	Birmingham	Partial	$219	$214
OMA	Mexico	Acapulco	Full	$207	$401
Aeroports dela Cote d'Azur	France	Nice	Partial	$161	$325
Hamburg Airport	Germany	Hamburg	Partial	$146	$308
Budapest Liszt Airport	Hungary	Budapest	Full	$142	$370
AGS Airports	U.K.	Glasgow	Full	$98	$289
Edinburgh Airport	U.K.	Edinburgh	Full	$93	$294
SAVE Group*	Italy	Venice	Partial	n.a.	n.a.

Source: Individual airport group financial statements for FY 2020.

***Financial statements from FY 2019 and FY 2020 could not be found for this airport group.**

It is also interesting to note how the privatized airports on this list score on the annual Skytrax survey of airline passengers' airport preferences. The majority of the 38 companies in Table 2 have one or more major airports selected by Skytrax passengers as among the world's 100 best airports. Among those included in the top 25 Skytrax airports are Zürich (#7), London Heathrow (#8), Kansai (#9), Guangzhou (#14), Paris de Gaulle (#15), Frankfurt (#16), Copenhagen (#18), Madrid (#20), Melbourne (#22), and Vienna (#23). By contrast, only five U.S. airports rank in the top 50 Skytrax airports: Houston George Bush (#25), Cincinnati/Northern Kentucky (#42), Denver (#44), Atlanta (#46), and Houston Hobby (#49).[4]

Skytrax respondents also gave high scores to airports in Europe and Asia that have been "corporatized," which means reorganized as a government-owned commercial entity, operating under normal accounting rules and sometimes paying taxes like any other business. Among high-scoring airports of this type were Tokyo Haneda (#2), Singapore Changi (#3), Munich (#6), and Amsterdam Schiphol (#12).

2.2 AIRPORT INDUSTRY CHANGES IN 2021

The COVID-19 pandemic imposed unprecedented financial stress on airports worldwide. In 2019, Price Waterhouse Coopers issued a report on rising airport valuations, including a map showing near-term airport privatization/P3 opportunities in 15 countries.[5] Little more than a year later, the concern shifted to the economic survival of airports in the face of unprecedented declines in air travel. Air travel remained depressed through 2021, although recovery noticeably picked up in the second half of the year.

> *"In 2020, a number of privatized airport companies began refinancing existing debt to take advantage of historically low interest rates, thereby reducing annual debt service costs."*

[4] Skytrax, "World's Top 100 Airports 2021," https://www.worldairportawards.com/worlds-top-100-airports-2021/ (22 March 2022).

[5] Romil Radia, et al., "Airport Valuations Have Taken Off—The Question Is Where Will They Land?" PwC, Feb. 2019.

In 2020, a number of privatized airport companies began refinancing existing debt to take advantage of historically low interest rates, thereby reducing annual debt service costs. This refinancing trend continued through 2021. Table 3, from data collected by *Inframation News*, provides examples.

TABLE 3: SELECTED 2021 AIRPORT DEBT REFINANCINGS

Airport	Country	Date of Financial Close	Amount
Brussels Airport	Belgium	January 21, 2021	$363 million
Gatwick Airport	U.K.	January 31, 2021	$349 million
Birmingham Airport	U.K.	February 11, 2021	$ 25 million
Delhi Airport	India	March 18, 2021	$450 million
Mactan-Cebu Airport	Philippines	May 7, 2021	$498 million
Edinburgh Airport	U.K.	July 6, 2021	$484 million
Canberra Airport	Australia	October 29, 2021	$300 million

Source: InframationNews.com

The airport industry's post-pandemic future looked brighter when **Sydney Airport** shareholders approved a $22.8 billion buyout offer in February 2022.[6] This successful deal followed several previous offers that had been rejected by the airport's board of directors. The airport, Australia's largest, was privatized in 2002 via a 50-year public-private partnership lease with a 49-year renewal option. The purchase was approved by 96% voting shares and equates to 23 times the airport's 2019 earnings before interest, taxation, depreciation, and amortization (EBITDA). The buyer is a consortium including IFM Investors, three Australian public pension funds, and New York-based Global Infrastructure Partners. The buyout reached financial close in March 2022.[7]

Heathrow Airport enjoyed rebounding traffic in 2021, allowing it to reopen Terminal 3 in July.[8] It had suspended operations at Terminals 3 and 4 early in the pandemic. Virgin America and its partner Delta Air Lines are the largest Terminal 3 carriers, but shifted their reduced operations to Terminal 2 and Terminal 5 during the pandemic. While closed to normal commercial traffic, Terminal 3 was used for arrivals from "red list" countries with high infection rates. Terminal 4 reopened in June 2022 in time for summer holiday travel.

6 Shaun Drummond, "Sydney Airport Shareholders Approve Takeover," *Inframation News*, 3 Feb. 2022.

7 Lakshmi Iyer, "IFM-led Group Completes Sydney Airport Acquisition," *Inframation News*, 9 March 2022.

8 Siddharth Vikram Philip and Christopher Jasper, "Heathrow Reopens Runway, Terminal in Sign of Travel Optimism," *Bloomberg*, 5 July 2021.

Germany's **Frankfurt-Hahn Airport** entered insolvency proceedings in October.[9] The secondary airport 75 miles from Frankfurt is 82.5% owned by bankrupt Chinese firm HNA Group. It served 1.5 million passengers in 2019, significantly below the peak of four million in 2017. In November, the insolvency administrator issued investors a request for expressions of interest in acquiring the airport or its various assets.

Aéroports de Paris (ADP) announced in February 2021 that it would cancel its planned Terminal 4 project at Charles de Gaulle Airport and instead will "submit a new project for the evolution of the Paris Charles de Gaulle platform."[10] This move came at the request of the French government, which owns 50.6% of ADP. The previous plan to privatize ADP was put on hold in 2019 prior to the pandemic. The Terminal 4 plan had an estimated cost of €7-9 billion ($7.6-9.8 billion).

In other developments, after rejecting the winning proposal from China Communications Construction Co. (CCCC) in January 2021 to develop Greater Manila's new $10 billion airport at Sangley Point on the grounds that CCCC's documentation was "deficient in three or four items," the Philippines provincial government in Cavite attempted to re-tender the project through an auction. This failed to attract any interest from bidders.[11] In November 2021, a consortium of domestic and international firms submitted a new proposal for Sangley airport, which was then accepted in January 2022.[12] The new consortium includes Philippines conglomerate Yuchengco, Cavite roadbuilder Cavitex, South Korean developer Samsung C&T Corporation, and German airport operator Munich Airport International.

2.3 GLOBAL AIRPORT PRIVATIZATIONS AND P3 CONCESSIONS

Due to the decline in global air traffic, airport privatization and P3s were far less active in 2020 than in 2019. While air travel is recovering, it remained depressed along with worldwide airport privatization and P3 activity in 2021.

9 Rory Gallivan, "Frankfurt Hahn Administrators Launch Airport Sale," *Inframation News*, 17 Nov. 2021.

10 Hugh Schofield, "Charles de Gaulle: Plans for huge new airport terminal in Paris scrapped," *BBC News*, 11 Feb. 2021.

11 Eduard Fernández, "Philippines Sangley Airport PPP Fails to Attract Bidders," *Inframation News*, 25 Oct. 2021.

12 Sonu Mohanty, "Philippines' Cavite Accepts Sangley Airport Proposal from Consortium," *Inframation News*, 12 Jan. 2022.

2.3.1 EUROPE

Bulgaria's first airport privatization reached agreement in July 2019 and began operating in April 2021. Due to the pandemic, the Meridiam, Strabag, and Munich Airport consortium sought and received an addendum to the concession agreement to defer annual concession payments for 10 years. The requirement to construct a new Terminal 3 by 2030 reportedly remained in place.[13] Bulgaria's other airport concession of the Plovdiv airport did not fare as well, with the Bulgarian government in July 2021 canceling the tender for the second time in less than three years after receiving no satisfactory bids.[14]

The government of **Greece** announced in 2018 that it would sell its remaining 30% stake in Athens International Airport, after renegotiating and extending the concession with the original developer of the airport. Early in 2020, the Hellenic Republic Asset Development Fund announced nine shortlisted candidates, including major players ADP, Ferrovial, Macquarie, Global Infrastructure Partners, and Vinci Airports.[15] Prior to the pandemic, analysts had expected the stake would be valued based on an EBITDA multiple of 15 to 20 times. With the pandemic suppressing demand for air travel and the value of the airport, the government put the sale on hold, but it may resume later in 2022.[16]

In the **U.K.**, privately owned London Gatwick Airport announced the launch of a public consultation process in August 2021 as the initial step in its plan to upgrade its parallel taxiway to a complete second runway.[17] The project would require moving the taxiway's centerline 12 meters (39 feet) to the north to comply with current dual-runway separation standards. London Gatwick hopes to obtain planning permission by 2024 and to complete construction by 2029.

2.3.2 LATIN AMERICA AND CARIBBEAN

On September 1, 2021, the **Bahamas** published a Request for Qualifications seeking private partners to help finance, redevelop, operate, and maintain six airports.[18] The Bahamian government seeks a concessionaire to repair damage from a 2019 hurricane and

13 Nicholas Krause, "Bulgaria Agrees to 10-Year Deferral of Meridiam's Sofia Airport Fees," *Inframation News*, 9 April 2021.

14 Alexander MacLeod, "Bulgaria Cancels Plovdiv Airport Concession for Second Time," *Inframation News*, 7 July 2021.

15 Fernando Moncada Rivera, "Shortlist for Athens Airport Sale," *Inspiratia*, 3 Feb. 2020.

16 Antonio Fabrizio, "Greece Readies to Relaunch Athens Airport Sale," *Inframation News*, 16 Nov. 2021.

17 Robert Poole, "Gatwick Under Way on Second Runway Plan," *Aviation Policy News*, 23 Sep. 2021.

18 Eva Llorens, "Bahamas Publishes Airport PPP RFQ," *Inframation News*, 2 Sep. 2021.

accommodate anticipated future air traffic growth, with costs estimated at $400 million. The package deal contains the Grand Bahama International Airport as well as smaller airports on the Out Islands. A new government paused the P3 process on September 15th but resumed it later in the year following a formal review. In March 2022, the government issued a Request for Prequalification.[19] Companies that satisfy qualifying criteria will be shortlisted to participate in the Request for Proposals stage expected later in 2022.

Brazil continued an aggressive program of P3 concessions in airports, toll roads, and other infrastructure. Following concessions for three groups of mid-size airports in 2019, which yielded $630 million in up-front fees, the government offered 22 more airports in three regional groups in early 2021. In a sign of continuing interest from airport companies and investors, the government raised another $600 million in up-front fees. Brazilian infrastructure company CCR won two of the three sets of airports (15 airports, including Curitiba) while the third group of seven airports was won by Vinci Airports.[20] The win increased Vinci's airport portfolio to 52. In January 2022, the Ministry of Infrastructure announced another round of concessions for 16 terminals grouped into four packages.[21] It expects to attract $1.6 billion in additional investment.

The first airport P3 in **El Salvador** received legislator approval in August 2021.[22] In a vote of 64 to 15, El Salvador's Legislative Assembly approved the Oscar Arnulfo Romero International Airport cargo terminal expansion concession. Honduran developer Alutech, and Munich Airports Group as a subcontractor, won the concession auction in October 2020. The project consists of two phases, beginning with an $11.8 million expansion of terminal capacity from 26,600 tons to 52,000 tons over a 15-year term. If the consortium meets certain thresholds, phase two would expand the terminal to 73,000 tons with an additional $44 million investment.

In **Panama**, the government expects to launch the concessions of four regional airports in 2022.[23] The airports in the Colón, Chiriquí, Coclé, and Panamá Oeste provinces would be tendered individually under long-term P3s to redevelop, expand, and manage the facilities. The President's Public Private Partnership Office has reportedly completed the analysis required under Panama's P3 law.

19 Press Release, "Grand Bahama International Airport Public-Private Partnership Initiative Release," The Bahamas Department of Aviation, 28 March 2022.

20 Aluisio Alves, "Brazil Raises $600 Million in Privatization Auction of 22 Airports," *Reuters*, 7 April 2021.

21 Press Release, "Brazil to Launch Airport Concessions Round," *Inframation News*, 2 Feb. 2022.

22 Jonathan Carmody, "El Salvador's First PPP Receives Key Government Approval," *Inframation News*, 18 Aug. 2021.

23 Eva Llorens, "Panama to Tender Regional Airports Package as Concession," *Inframation News*, 4 March 2022.

2.3.3 ASIA AND PACIFIC

Australia privatized another airport in September 2021 with the $946 million sale of general aviation Jandokot Airport in Perth.[24] The buyers were investment fund Dexus and property group APN Industria REIT, with Dexus having two-thirds of the ownership. While not the primary commercial airport in Perth, Jandakot is one of the busiest airports in Australia by aircraft movements. Dexus manages a portfolio of properties valued at $23 billion. In other Australia news, privatized Melbourne Airport, the country's second largest, announced in February 2022 that it plans to build a third runway to accommodate an anticipated doubling of passenger volume over the next 20 years.[25]

In August 2021, **India**'s government announced a plan to open 25 airports to long-term P3 leases over the next four years.[26] The airports would remain owned by the Airports Authority of India, with six to be leased in 2022, eight in 2023, six more in 2024, and the remaining five in 2025. The largest of these airports is at Chennai, which served 22 million passengers in 2019. The airport P3 program is part of a larger National Monetization Plan aiming to raise a total of $81 billion over four years, of which 4% would come from the airport leases ($3.24 billion).

Indonesia's state-owned airport operator canceled the concession of Lombok International Airport in April 2022.[27] The $717 million concession called for expanding and operating the airport. Initial bids had been due March 31 and an official said the government planned to re-tender the project in the near future without providing a reason for the cancellation. The concession to expand and operate Indonesia's Kualanamu International Airport in Medan fared better, with Indian firm GMR Infrastructure being awarded a 25-year concession in a 49%/51% partnership with Indonesia's state-owned airport operator.[28] Medan handled over 10 million passengers in 2018, more than twice as many as Lombok.

Following a pandemic-related delay, **Japan**'s privatization of the Hiroshima Airport commenced in July 2021. The 30-year concession was won by MTHS Consortium, led by real estate developer Mitsui Fudosan.[29] Japanese interest in airport concessions appears to be rebounding. In October 2021, the Ishikawa prefecture government sought expressions of

24 Robert Poole, "Another Australian Airport Privatized," *Aviation Policy News*, 26 Oct. 2021.

25 Press Release, "Melbourne Airport's proposed third runway on public exhibition," Melbourne Airport, 1 Feb. 2022.

26 Robert Poole, "India Launches Airport P3 Lease Program," *Aviation Policy News*, 23 Sep. 2021.

27 Eduard Fernández, "Indonesia Cancels Lomok Airport Upgrade Tender," *Inframation News*, 1 April 2022.

28 Sonu Mohanty, "India's GMR Lands Project to Expand Indonesia's Medan Airport," *Inframation News*, 19 Nov. 2021.

29 Hiroyuki Kachi, "Mitsui Fudosan in Pact on Hiroshima Airport Concession," *Inframation News*, 16 Nov. 2020.

interest for a potential concession of Komatsu Airport.[30] In December, city and prefecture officials announced they were considering offering Niigata Airport up for a P3 lease.[31]

2.3.4 MIDDLE EAST AND AFRICA

Turkey's $11 billion New Istanbul Airport, procured as a 25-year P3 concession, opened to traffic in April 2019 and celebrated its first anniversary as the pandemic began. In July 2021, the consortium closed on a $6.9 billion refinancing of existing debt with a new maturity date in 2033. In April 2022, two shareholders of IGA, the original concessionaire of the New Istanbul Airport, sold their shares to the remaining two equity investors. As a result, Kalyon and Cengiz will own 55% and 45% of the concessionaire, respectively.[32] In other Turkey news, the Antalya Airport retender concession reached financial close in March 2022 after being frozen in 2020 due to the pandemic.[33] TAV Airports and Fraport, the incumbent concessionaire, won the retender. The consortium plans to nearly double the size of the international and domestic terminal areas over the next three years to accommodate up to 65 million annual passengers.

In **Madagascar**, Meridiam may become the sole owner of the country's first airport concessionaire, Ravinala Airports, following the World Bank's decision in January 2022 to sanction co-investors for "fraudulent" and "collusive" practices linked to this concession.[34] In February 2022, Meridiam, which held 45% of the shares in Ravinala, agreed to buy the shares of Bouygues (10%) and Colas (10%) and is reportedly in negotiations to purchase the remaining 35% of shares held by ADP.

2.4 U.S. AIRPORT PRIVATIZATION AND PUBLIC-PRIVATE PARTNERSHIPS

European-type sale of government-owned airports is not legal in the United States (except for general aviation airports that serve private planes). The original 1996 federal Airport Privatization Pilot Program permitted a limited number of long-term P3 leases of commercial airports. Under that law, only two airports were leased. Stewart Airport 60 miles north of New York City was leased in 2000 to a U.K. company that failed to make that

30 Hiroyuki Kachi, "Government Starts Market Sounding for Komatsu Airport Concession," *Inframation News*, 1 Oct. 2021.
31 Hiroyuki Kachi, "Niigata Aiport Deal Decision Likely in Next Business Year," *Inframation News*, 1 Dec. 2021.
32 Antonio Fabrizio, "Istanbul Airport Shareholders Sell Shares to Co-Investors," *Inframation News*, 5 April 2022.
33 Antonio Fabrizio, "TAV, Fraport Close EUR 1.8BN Antalya Airport Deal," *Inframation News*, 28 March 2022.
34 Antonio Fabrizio, "Meridiam Agrees to Buy Bouygues' Madagascar Airport PPP Stake," *Inframation News*, 15 Feb. 2022.

airport financially viable; Stewart was subsequently acquired by the Port Authority of New York and New Jersey. The P3 lease of San Juan's Luís Muñoz Marín International Airport in 2013, however, was a success, leading to large-scale refurbishment and increased airline satisfaction.[35]

As recommended in the White House's 2018 infrastructure proposals, Congress replaced the pilot program with a new Airport Investment Partnership Program (AIPP) as part of the Federal Aviation Administration (FAA) reauthorization law enacted in October 2018. Rather than the limit of 10 airports in the pilot program, long-term P3 leases are now available to all commercial airports. In addition, the AIPP provides for planning grants of up to $750,000 for any jurisdiction that wants to make use of the program to lease its airport. But the original pilot program's provision giving a super-majority veto to an airport's incumbent airlines remains in place.

2.4.1 WHOLE-AIRPORT PRIVATIZATION AND P3 LEASES

In September 2021, the New Haven Board of Elders approved a 43-year lease between **Tweed New Haven Airport** and its airport management company Avports.[36] Under the concession, Avports would invest $100 million in capital improvements, including lengthening the Connecticut airport's main runway to accommodate larger aircraft and a new terminal under a long-term design-build-finance-operate-maintain (DBFOM) P3. If the Environmental Assessment and FAA approval under AIPP are successful, it would be the first time in the U.S. that an airport's contract manager became its financial partner.

Other than San Juan, Puerto Rico airport's entry into the pilot program in 2013, only the **Airglades, Florida Airport** privatization has been successful under AIPP. The South Florida general aviation airport received final FAA approval to enter AIPP in October 2019 with the full support of the Hendry County Commission. Airglades International Airport (AIA) LLC has spent years developing a plan to expand the airport into a cargo reliever airport for land-constrained Miami International Airport, 100 miles to the south. AIA built a coalition of agricultural interests, air cargo interests, aviation suppliers, and local organizations in support of its plan to buy and operate the airport in its greatly expanded form. Following the FAA approval, Avports was selected as the new airport manager and Star America Infrastructure Partners was announced as an equity investor. A month later, Star America

35 John Tierney, "Making New York's Airports Great Again," *City Journal*, Winter 2017.

36 Eugene Gilligan, "Connecticut City Board Supports Airport P3," *Inframation News*, 28 Sep. 2021.

dropped out. In March 2020, AIA broke ground on a new U.S. Customs and Border Protection cargo facility to replace the existing general aviation terminal. Pandemic-related disruptions delayed anticipated long-term commitments to the project from regional agricultural shippers, and AIA was still in talks with potential investors in 2021.[37]

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There is continued speculation about why the United States is such an outlier compared with most of the rest of the world on airport privatization and long-term P3s. The Congressional Research Service released a new report on the subject in early 2021. After comparing the global trend with the very limited use of the recent and current federal program, CRS analysts suggested that unequal tax treatment of revenue bonds (tax-exempt municipal bonds for existing airports versus taxable revenue bonds for private partners) could be a causal factor.[38]

A more optimistic outlook is offered in a report from PJ Solomon investment advisors. Their report finds that U.S. airport managers are unable to operate efficiently "due to inefficient procurement policies, lack of flexibility in credit raising, and the bureaucracies that often come from a system with a large and not-always-directly-aligned set of stakeholders."[39] They suggest that the interests of risk-averse muni bond holders generally prevail over those of airlines, who will be at risk for ensuring airports' financial viability. Hence, they suggest that it is in the interest of airlines to support private capital investment in airports via mechanisms such as AIPP. This is in addition to this program being "the only mechanism for an airport sponsor to realize substantial financial benefits that may be used outside the airport environment."

37 Eugene Gilligan, Jonathan Carmody, and Jon Berke, "South Florida Cargo Airport Project in Talks with Potential Investors," *Inframation News*, 26 May 2021

38 Congressional Research Service, "Airport Privatization: Issues and Options for Congress," Report R43545, 11 March 2021.

39 Tim Bath and Shawn Kinder, "Unlocking Value in the Airport-Airline Ecosystem," PJ Solomon, Jan. 2021.

The Atlantic, a major U.S. think magazine, published an article by journalist Joe Guinto that summarized the global trend of airport privatization and P3 leasing and suggested that hard-pressed U.S. airports' governmental owners consider cashing out the asset value of their airports.[40] Guinto had published a cover story in *D Magazine* in 2019 making a case for privatizing the Dallas/Ft. Worth International Airport (DFW).[41] Both articles cited extensive investor interest in acquiring U.S. airports.

The Atlantic, a major U.S. think magazine, published an article by journalist Joe Guinto that summarized the global trend of airport privatization and P3 leasing and suggested that hard-pressed U.S. airports' governmental owners consider cashing out the asset value of their airports.

In a sign of continued investor interest in whole-airport P3 leases, Oaktree Capital Management (which played a key role in the San Juan airport P3) has formed an alliance with global airport company Royal Schiphol Group to focus on investment prospects under the federal AIPP framework. They will also seek opportunities for P3s to develop and operate specific facilities at U.S. airports.[42]

A study released by Reason Foundation in August 2021 suggests there is good reason for continued investor interest.[43] The study used valuations from the sale and lease of airports worldwide in recent decades to estimate the potential market value of 31 large U.S. airports owned by city, county, and state governments. It estimated the potential market value of 31 large and medium U.S. airports at $131 billion, including Los Angeles International ($17.8 billion), San Francisco International ($11.9 billion), Dallas/Ft. Worth International ($11.9 billion), and Atlanta's Hartsfield-Jackson ($9.2 billion). And these estimates are possibly too conservative. The report's high-end valuations are based on 20

40 Joseph Guinto, "Privatizing Airports Is a No-Brainer," *The Atlantic*, Aug. 2020.

41 Joseph Guinto, "Why We Should Sell DFW Airport," *D Magazine*, March 2019.

42 Eugene Gilligan, "Oaktree and Dutch Airport Operator Seek US Opportunities," *Inframation News*, 11 Nov. 2020.

43 Robert Poole, "Should Governments Lease Their Airports?" Reason Foundation Policy Study, Aug. 2021.

times earnings before interest, taxes, depreciation, and amortization (EBITDA), a widely used measure of annual cash flow. The Sydney Airport sale that closed in early 2022 was valued at 23 times its pre-pandemic 2019 EBITDA and 50 times its pandemic-era 2020 EBITDA.

2.4.2 P3S FOR INDIVIDUAL AIRPORT PROJECTS

While whole-airport P3 leases have still not become a U.S. phenomenon, recent years continue to see projects that use long-term DBFOM agreements to add large, costly facilities to airports. Among these are new or expanded terminals, parking facilities, consolidated rental car centers, and in one case, an automated people mover. These projects are financed in one of two ways. If there is an ongoing revenue stream generated by the project itself, the airport owner can base the P3 financing, in whole or in part, on that revenue stream, generally with the P3 company at risk if the revenue comes in below forecast. If there is not such a revenue stream (as in the case of an automated people mover), then the project can be financed by a guaranteed stream of payments from the owner to the P3 entity over the life of the agreement. This kind of DBFOM is typically called an "availability-payment" structure, since the payments are generally somewhat variable based on the facility's up-time.

While whole-airport P3 leases have still not become a U.S. phenomenon, recent years continue to see projects that use long-term DBFOM agreements to add large, costly facilities to airports.

New Terminals

Long-term P3s for new airport terminals have a several-decade U.S. history. Among the earliest are the passenger terminals at Orlando Sanford Airport and Terminal 4 at Kennedy International in New York City. More-recent projects include the renovation of the south terminal at Austin Bergstrom into a no-frills terminal for ultra-low-cost carriers and the replacement of the outdated central terminal at New York's LaGuardia Airport, which

opened to great fanfare in December 2021.[44] These projects are generally financed based on revenues generated by the terminal, so they are considered revenue-risk DBFOM P3s.

These projects are generally financed based on revenues generated by the terminal, so they are considered revenue-risk DBFOM P3s.

Major new terminals at Kennedy International are currently under way. One of the several projects at JFK—Terminal One—is a $9.5 billion DBFOM P3. Originally initiated in 2018, the project was put on hold and more than $7 billion in debt financing lapsed in 2020 due to the pandemic. It was restarted and the Port Authority of New York and New Jersey reached a revised agreement with the P3 consortium in December 2021.[45] The equity investors are Carlyle, Ullico, and JLC Infrastructures, working with airline partners Terminal One Group Association (Air France, Japan Airlines, Korean Air, and Lufthansa). In February 2022, Ferrovial announced it had agreed to purchase 96% of Carlyle's equity stake (51%) in the project.[46] In other JFK news, the $3.9 billion Terminal 6 JetBlue project is expected to reach financial close by mid-June 2022, with design-build work to begin in the summer.[47] Like Terminal One, Terminal 6 was delayed by the pandemic. Finally, Kennedy International's $1.5 billion Terminal 4 project, a joint P3 venture between Delta Air Lines and JFK International Air Terminal, broke ground in December 2021.[48]

Smaller-scale terminal P3s are also showing promise. In February 2022, the Gulf Shores Airport Authority selected Vinci Airports and TBI Airport Management to build, finance, and operate a passenger terminal and ancillary facilities at the general aviation Jack Edwards National Airport in Alabama.[49] The construction cost is estimated at $20 million, plus $4 million to construct a temporary terminal to allow commercial air service to launch shortly

44 Patrick McGeehan, "'From Worst to Best': Gleaming New La Guardia Terminal Opens," *New York Times*, 27 Jan. 2022.

45 Eugene Gilligan, "Consortium Exploring Debt Financing Options for JFK P3," *Inframation News*, 15 Dec. 2021.

46 Press Release, "Ferrovial reaches an exclusive agreement to negotiate with Carlyle its participation in the consortium for the New Terminal 1 at JFK Airport," Ferrovial, 18 Feb. 2022.

47 Liam Ford, "JFK Jet Blue Terminal Project Nearing Financial Close," *Inframation News*, 31 March 2022.

48 I-Chun Chen, "JFK International Airport breaks ground on Terminal 4 modernization," *New York Business Journal*, 16 Dec. 2021.

49 Eugene Gilligan, "Vinci-led Team to Finance Alabama Airport P3," *Inframation News*, 23 Feb. 2022.

following financial close. Currently, 95% of the area's seven million annual visitors drive, with nearest commercial air service a one-hour drive to the east in Pensacola, Florida, or a one-hour drive northwest to Mobile, Alabama.

Consolidated Rental Car Facilities

Two major airports are developing consolidated car rental centers under long-term DBFOM P3 agreements. At Los Angeles International, Fengate Asset Management and PCL Investments are developing the $2 billion facility, which is financed based on a commitment by LAX to 28 years of availability payments. In February 2022, LAX announced it planned to issue an additional $575 million in bonds to finance the remainder of the project.[50] Across the country, Newark's project is being financed by revenues generated by the new consolidated car rental center itself, in the form of a $7/day rental car customer facility charge. Hence, it is a revenue-risk P3, and its financing is not an obligation of the airport. This project is also under way, being developed by Fengate, Conrac Solutions Capital, and Related Fund Management. The project was the subject of a detailed article in *Airport Business* magazine.[51]

Two major airports are developing consolidated car rental centers under long-term DBFOM P3 agreements.

Cargo Facilities

In November 2021, Miami International received an unsolicited P3 proposal from Brazilian infrastructure investor CCR and aviation developer Airis for a $1.1 billion cargo facility.[52] The project would double cargo capacity while increasing cargo density. Currently, cargo operations at MIA use 34.9% of net operable land but account for only 6.6% of airport revenue.

50 Liam Ford, "LAX Using Green Bonds to Finish Car Rental P3," *Inframation News*, 9 Feb. 2022.

51 Joe Petrie, "Port Authority Embraces P3 Development for Newark's New ConRAC Facility," *Airport Business*, Aug.-Sep. 2020.

52 Gabriela Henriquez Stoikow, "Miami International Airport weighs private deal for five-level cargo hub," *Miami Today*, 23 Nov. 2021.

Chicago-Rockford International Airport began negotiating a development and operations P3 for two new 400,000-square-foot cargo facilities in early 2022.[53] In April, it shortlisted Aviation Facilities Company Management and RockAir LLC for the deal. Chicago-Rockford is currently a hub for parcel carriers UPS and Amazon Air, and aims to accommodate cargo growth with the additional facilities projected to cost $150 million. Cargo volume grew from 2.1 billion pounds in landed weight in 2018 to 3.4 billion pounds in 2021.

Other Airport P3 Facilities

The Port Authority of New York and New Jersey shortlisted four teams in March 2021 for the $2 billion Newark Liberty Airport AirTrain design-build-operate-maintain project.[54] The teams are headed by Skanska, Dragados and Halmar, Kiewit and Tully Construction, and Tutor-Perini and Parsons. The request for proposals was issued to the four teams in May 2021, and the Port Authority hopes to break ground later in 2022.[55] This project would replace the existing AirTrain network that is nearly 30 years old and connect to the new Terminal A and new consolidated rental car facility.

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In January 2022, Philadelphia International Airport paid off the Philadelphia Parking Authority's $54 million bond issue that financed the airport's current parking structures.[56] The airport is seeking to end its nearly 50-year relationship with the city's parking agency and find a new private sector operator of the airport's parking facilities.

53 Liam Ford, "Illinois Airport Selects Preferred Bidder for Cargo Development," *Inframation News*, 5 April 2022.

54 Eugene Gilligan, "Port Authority Shortlists Four Teams for Newark AirTrain Project," *Inframation News*, 26 March 2021.

55 Eugene Gilligan, "RFP Issued for Newark AirTrain Project," *Inframation News*, 5 May 2021.

56 Max Marin, "Philadelphia International Airport is poised to cut ties with PPA after nearly 50 years," *Philadelphia Inquirer*, 30 Jan. 2022.

The Alamo Regional Mobility Authority Board of Directors voted in March 2022 to begin negotiations with Elon Musk's The Boring Company to design, build, and potentially operate the San Antonio Airport Connector.[57] The Boring Company has proposed building two underground tunnels that would use Tesla vehicles to connect downtown San Antonio to the San Antonio International Airport. The project is estimated to cost between $247 million and $289 million.

In San José, the city received two unsolicited proposals in July 2021 for its project to link a downtown rail transit station with Mineta San José International Airport: one from TCE Financial and the other from Plenary Americas and Glydways.[58] In October, San José announced that the P3 project would be procured under a two-phase pre-development agreement.[59] Once the city releases the request for proposals—anticipated in early 2022—it will select two RFP respondents. The first phase of the PDA is expected to last 90 days, during which the city will work with both respondents on their business cases for the project. Following that, the city will select one of the two to proceed to the second phase of the PDA to iron out remaining details, after which it expects to proceed with that consortium for the DBFOM P3 project. In January, the city further specified that any proposed technology must have a minimum maturity level of six (prototype demonstrated in a relevant environment.[60]

"Separate from whole-airport P3 leases is contracting out airport operations and management. This approach has been used for decades, with FAA's blessing…"

Contract Management

Separate from whole-airport P3 leases is contracting out airport operations and management. This approach has been used for decades, with FAA's blessing, most often for

57 Eugene Gilligan, "Boring Company Gets Nod for Airport Connector Project," *Inframation News*, 17 March 2022.
58 Eugene Gilligan, "San José Attracts Unsolicited Proposals for Airport Connector P3," *Inframation News*, 9 Sep. 2021.
59 Eugene Gilligan, "San José Sets Timeline for PDF," *Inframation News*, 28 Oct. 2021.
60 Eugene Gilligan, "California City Outlines Standard for Airport Connector P3," *Inframation News*, 5 Jan. 2022.

general-aviation airports but also for small to medium-size air carrier airports such as Albany, New York and Burbank, California. Several new developments in airport contract management occurred in 2020.

Puerto Rico's Public-Private Partnership Authority announced in early 2021 that it plans to seek a contract operator or operators for its nine regional airports.[61] The P3 Authority has had great success with its 40-year P3 lease of San Juan International, which included a large up-front payment and annual lease payments plus revenue-sharing. The regional airports are far smaller, so Puerto Rico initially sought only operating contracts. The Puerto Rico Ports Authority later expressed interest in a revenue-sharing concession instead due to concern about committing to $10 million in annual management fees. In July 2021, the P3 Authority issued a request for qualifications for advisors.[62] The Ports Authority in August 2021 told *Inframation News* that it expected to know by September if a concession were feasible for the nine regional airports.[63] However, the situation was complicated in September when mayors from 14 southern cities urged the creation of a local airport authority to take over and contract out management for one of the nine, Mercedita Airport in Ponce.[64]

61 "Puerto Rico P3 Authority Searches for Airport Operator," *Inframation News*, 11 Feb. 2021.

62 Eugene Gilligan, "Puerto Rico Issues RFQ for P3 Advisors," *Inframation News*, 14 July 2021.

63 Eva Llorens, "Puerto Rico Nears Conclusion of Regional Airport P3 Review," *Inframation News*, 25 Aug. 2021.

64 Eva Llorens, "Puerto Rico Mayors Pitch Alternative for Mercedita Airport," *Inframation News*, 13 Sep. 2021.

PART 3

AIR TRAFFIC CONTROL

3.1 AIR NAVIGATION SERVICE PROVIDERS (ANSPS)

Historically, most of the world's governments provided air traffic control (ATC) services as part of the transport ministry, whose aviation division served as both the aviation safety regulator and the operator of the ATC system. That remains the organizational form in the United States, with the FAA providing both of those functions, as part of the U.S. Department of Transportation (DOT).

That model has undergone major change since 1987 outside of the U.S., starting when the reformist government of New Zealand removed its ATC system from the transport ministry by "corporatizing" it as Airways New Zealand, a self-supporting government corporation. Within 10 years, more than a dozen other countries had done likewise, and the fledgling industry created a trade association, the Civil Air Navigation Services Organization (CANSO) as its counterpart to the global organizations representing airlines (IATA) and airports (ACI). CANSO introduced a new term to describe these providers: air navigation service provider (ANSP), which has become standard terminology worldwide.

The revenue source for ANSPs is globally accepted ATC user fees, based on the airport and ATC charging principles promulgated by the International Civil Aviation Organization (ICAO), a UN agency. Prior to ATC corporatization, those revenues were nearly always paid by airlines and other airspace users to the respective national governments. In most cases, once an ANSP has been corporatized, the user-fee revenue flows directly to the ANSP as its

primary source of revenue. This makes it possible for the corporatized ANSPs to issue revenue bonds based on their projected revenue streams, just as airports and toll roads do.[65]

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Table 4 provides a list of all full member ANSPs of CANSO, separated into organizational categories. The first four are the ones outside of government. Nav Canada is a nonprofit private corporation to which the Canadian government has delegated all ATC responsibilities for both domestic and oceanic airspace. ENAV is the partly privatized ANSP of Italy, with 49% of its shares traded on stock markets. Serco is an investor-owned U.K. company that provides ATC services to governments on a contractual basis. And NATS is the partly privatized ANSP of the U.K., with 42% of its shares owned by airlines and pension funds, 4% by Heathrow Airport, and 5% owned by employees—with the balance of 49% owned by the government.

TABLE 4: AIR NAVIGATION SERVICE PROVIDERS, BY TYPE OF ORGANIZATION

Country	ANSP	Organizataion Type	Notes
Canada	Nav Canada	Nonprofit corporation	
Italy	ENAV	Part investor-owned	
U.K.	NATS	Part investor-owned	
U.K.	Serco	Shareholder-owned	
Albania	ALBCONTROL	State-owned company	
Argentina	DGCTA	State-owned company	
Armenia	ARMATS	State-owned company	
Australia	Airservices Australia	State-owned company	
Austria	Austro Control	State-owned company	Also regulates
Belgium	Belgocontrol	State-owned company	
Botswana	CAAB	State-owned company	
Bulgaria	BULATSA	State-owned company	

[65] Robert Poole, "Air Traffic Control as a Quasi-Private Corporation," eds. Robert Clark and Simon Hakim, *Public-Private Partnerships*, Springer: 2019.

Country	ANSP	Organizataion Type	Notes
Cambodia	CATS	State-owned company	
Croatia	Croatia Control	State-owned company	
Curaçao	DCANSP	State-owned company	
Czech Republic	ANS CR	State-owned company	
Denmark	Naviair	State-owned company	
Egypt	NANSC	State-owned company	
Estonia	EANS	State-owned company	
Fiji	Airports Fiji Ltd.	State-owned company	
Finland	Finavia Corp.	State-owned company	
Georgia	Sakaeronavigatsia	State-owned company	
Germany	DFS	State-owned company	
Hungary	HungaroControl	State-owned company	Also regulates
Iceland	ISAVIA	State-owned company	
India	Airports Authority of India	State-owned company	
Indonesia	AirNav Indonesia	State-owned company	
Iran	Iran Airports Company	State-owned company	
Ireland	IAA	State-owned company	Also regulates
Israel	Israel Airports Authority	State-owned company	
Kazakhstan	Kazaeronavigtsia	State-owned company	
Latvia	LGS	State-owned company	
Lithuania	Oro Navigacija	State-owned company	
Macedonia	M-NAV	State-owned company	
Maldives	Maldives Airports Co.	State-owned company	
Malta	MATS	State-owned company	
Moldova	MoldATSA	State-owned company	
Mozambique	Aeroportos de Mocambique	State-owned company	
New Zealand	Airways New Zealand	State-owned company	
Nigeria	NAMA	State-owned company	
Norway	Avinor	State-owned company	
Papua New Guinea	PNG Air Service	State-owned company	
Portugal	Nav Portugal	State-owned company	
Romania	ROMATSA	State-owned company	
Russia	State ATM Corporation	State-owned company	Also regulates
Serbia & Montenegro	SMATSA	State-owned company	
Slovak Republic	LPS SR	State-owned company	
Slovenia	Sovenia Control	State-owned company	
South Africa	ATNS	State-owned company	
Spain	ENAIRE	State-owned company	
Sri Lanka	AASL	State-owned company	
Sweden	LFV	State-owned company	
Switzerland	Skyguide	State-owned company	
Thailand	AEROTHAI	State-owned company	
Turkey	DHMI	State-owned company	
Uganda	CAA Uganda	State-owned company	
Ukraine	UkSATS	State-owned company	
Vietnam	VATMC	State-owned company	
Zambia	NACL	State-owned company	

Country	ANSP	Organizataion Type	Notes
Bangladesh	CAAB	Civil aviation authority	Financially autonomous
Cyprus	DCA Cyprus	Civil aviation authority	
Dominican Republic	IDAC	Civil aviation authority	
Ghana	Ghana CAA	Civil aviation authority	
Greece	HCAA	Civil aviation authority	
Japan	JCAB	Civil aviation authority	
Jordan	CARC	Civil aviation authority	Financially autonomous
Kenya	Kenya CAA	Civil aviation authority	
Kingom Saudi Arabia	GACA	Civil aviation authority	
Mongolia	CAA of Mongolia	Civil aviation authority	
Myanmar	DCA Myanmar	Civil aviation authority	
Nepal	CAA Nepal	Civil aviation authority	
Swaziland	SWACAA	Civil aviation authority	
Singapore	CAAS	Civil aviation authority	
Taipei FIR	ANWS	Civil aviation authority	
Tanzania	TCAA	Civil aviation authority	
Trinidad & Tobago	Trinidad & Tobago CAA	Civil aviation authority	
Tunisia	OACA	Civil aviation authority	
United States	FAA	Civil aviation authority	
Azerbaijan	AZANS	Government department	
Brazil	DECEA	Government department	
France	DSNA	Government department	Financially autonomous
Mexico	SENEAM	Government department	
Netherlands	NVNL	Government department	
Poland	PANSA	Government department	
United States	DOD Policy Board, Aviation		
Belgium	MUAC	Intergovernmental	
Honduras	COCESNA	Intergovernmental	6 countries
Senegal	ASECNA	Intergovernmental	17 countries
Angola	ENANA-EP	uncategorized	
Haiti	OFNAC	uncategorized	
Luxembourg	LANA	uncategorized	
Sudan	Sudan ANS	uncategorized	
Dubai	DANS	uncategorized	

Source: Civil Air Navigation Services Organization (2015) plus author analysis

Next in the table are 55 ANSPs that are wholly-owned government corporations, such as Airservices Australia, Germany's DFS, and the pioneering Airways New Zealand. Four of these corporations also have aviation regulatory responsibilities, which conflicts with ICAO's 2001 recommendation that calls for the organizational separation of ATC provision and aviation safety regulation.[66]

[66] ICAO. *Safety Oversight Manual*. Doc. 9734, Part A, Paragraph 2.4.9. 2001

Next in the table are 19 of the old-style civil aviation authorities, usually part of the transport ministry and with aviation safety regulation in the same entity as provision of ATC services. These are nearly all developing countries such as Bangladesh, Kenya, Myanmar, and Swaziland. But also included are several developed countries that have not corporatized ATC, including Japan, Singapore, and the United States. Another seven are self-described as government departments, the largest of which are in Brazil and France. The last five in the table were listed by CANSO as "uncategorized."

Prior to those are three intergovernmental entities that operate as multi-jurisdictional ANSPs for specific airspaces. Maastricht Upper Airspace Control Center (MUAC) provides ATC services at altitudes above 24,500 feet for Belgium, Luxembourg, Netherlands, and northwestern Germany. COCESNA provides ATC services for six Central American countries. And ASECNA provides ATC services for 17 countries in Africa. All three charge ICAO-based user fees and operate as corporatized ANSPs.

Table 4 permits one to answer the question: How many ANSPs operate as corporations funded by user fees? The usual answer is 62, consisting of the non-governmental first four, the 55 government corporations, and the three intergovernmental ANSPs. In terms of *countries* served by such ANSPs, however, the total is higher; adding the two countries from MUAC that lack corporatized national ANSPs (Luxembourg and the Netherlands), the six countries served by COCESNA, and the 17 served by ASECNA brings the net total to 85.

3.2 GLOBAL SPACE-BASED ATC SURVEILLANCE

A basic function of an ATC system is *surveillance*—keeping track of where planes are in real time. Historically, air traffic control over most populated countries has, since World War 2, relied largely on radar, later supplemented by transponders that report altitude and other basic information in real time. But there is no radar in the oceans, in mountainous terrain (e.g., the Alps, the Himalayas, the Rockies), and in polar regions, all of which are traversed by aircraft, including airliners. Surveillance there has long been carried out by "procedural" methods, which means periodic reports from pilots to ATC of their estimated positions based on the plane's inertial navigation system. Since those updates are both imprecise and only periodic, ATC protocols require very large spacing between oceanic flight tracks and between planes flying the same flight track.

This began to change in 2019, when an investor-owned company—Aireon—started offering near-real-time global surveillance via satellite. The company contracted with satellite

company Iridium to place its transponders on all 66 satellites in its new Iridium-Next constellation that was launched mostly in 2018. Since most ANSPs are now implementing ground-based surveillance using a system called ADS-B (automatic dependent surveillance-broadcast), business jets and airliners flying oceanic, mountainous, and polar routes are increasingly equipped with ADS-B transponders that broadcast the plane's identity, GPS position, speed, and other data every three seconds. That signal is detected by the new satellites and retransmitted to domestic ANSP control centers that subscribe to Aireon's services. The space-based information then shows up on controllers' screens, just as do ADS-B transmissions in domestic airspace.

Aireon's service, which went live in March 2019, can now offer radar-like surveillance to the 70% of the globe where this has been lacking. But it is only available to ANSPs that subscribe to the service.

Aireon's service, which went live in March 2019, can now offer radar-like surveillance to the 70% of the globe where this has been lacking. But it is only available to ANSPs that subscribe to the service. With the addition of the Port Moresby Flight Information Region of Pacific airspace in March 2021, Aireon reported that its system is in use in over 248 million sq. km. of the earth's service, nearly 49% of the total.[67] Subscribers include the ANSPs of Canada, Denmark, the Dutch Caribbean, Hong Kong, Iceland, India, Ireland, Singapore, the U.K. and three multi-country providers: Eurocontrol's MUAC, the six COCESNA countries of Central America, and the 17 countries of ASECNA.

Aireon is a joint venture of Iridium and five ANSPs: ENAV, IAA (Ireland), NATS, Nav Canada, and Naviair (Denmark). The first to implement oceanic ADS-B service were Nav Canada and NATS across the North Atlantic. While that is technically a trial, ICAO agreed that the two ANSPs could reduce the lateral spacing (between tracks) and longitudinal spacing (nose to tail on a given track) for the period of the trial, with further reductions likely once performance has been measured and analyzed. Results during 2019 showed significant savings in time and fuel (and hence CO_2 emissions), as well as safety benefits from

[67] Press Release, "NiuSky Pacific Begins Operational Usage of Aireon Data," Aireon, 20 March 2021.

controllers able to quickly identify deviations from assigned tracks or assigned altitudes. Significantly reduced traffic levels during 2020 enabled NATS and Nav Canada to experiment with "free route airspace" rather than restricting traffic to the traditional Organized Track Structure (OTS). In 2021, the two ANSPs operated without OTS for 20 days, on which airlines submitted their preferred flight tracks for approval.[68] The next step is to completely eliminate OTS.

In 2021, the two ANSPs operated without OTS for 20 days, on which airlines submitted their preferred flight tracks for approval. The next step is to completely eliminate OTS.

Aireon's competition until recently has come from Inmarsat, which operates a communications mechanism known as ADS-C. Among other communications services, it has long provided airlines with position reporting at 10- to 14-minute intervals, by contract (the C in ADS-C). Inmarsat has proposed an "enhanced" version that would transmit reports every 3.2 minutes (compared with every 3 *seconds* for space-based ADS-B).[69] Inmarsat was originally an international satellite communications agency, but its commercial services were privatized in 1999, and it was listed on the London Stock Exchange in 2005. In 2019 it was acquired by a joint venture of infrastructure investment funds: Apax Partners and Warburg Pincus plus two Canadian pension funds, CPPIB and OTPP.[70]

This may be changing. It was announced in May 2021 that Spanish ANSP Enaire had teamed with Indra in creating a new company called Startical, whose aim is to develop a space-based system to provide both ADS-B surveillance and VHF communications between pilots and controllers.[71] The plan would make use of a 200-satellite constellation in low-Earth orbit (LEO). Through 2023, the company will focus on technology development and regulatory and market aspects. The next phase, from 2024 to 2027, envisions the launch of

68 Tony Osborne, "ANSPs Start Scaling Back North Atlantic Organized Track Structure," *Aviation Daily*, 9 Feb. 2022.

69 GAO-19-532, "FAA's Analysis of Costs and Benefits Drove It Plans to Improve Surveillance in U.S. Oceanic Airspace," Government Accountability Office, July 2019.

70 "Inmarsat Acquired by Private Equity Consortium for $3.4bn." *Air Traffic Management*, 25 March 2019.

71 Graham Warwick, "Spain Plans Space-Based Surveillance Communications Constellation," *Aviation Daily*, 2 June 2021.

the satellites and the start of commercial services. Startical selected GomSpace to develop and launch three prototype nanosatellites for the project.

In 2019, the FAA signed a research agreement with Aireon aimed initially at exploring the use of its ADS-B data in the Caribbean. This focused on using a modified version of the En Route Automation Modernization (ERAM) system at Miami Center to control traffic between Miami and San Juan, but the FAA also modified the Advanced Technologies and Oceanic Procedures (ATOP) software used in its New York, Oakland, and Anchorage Oceanic Centers for experimental use in their oceanic airspaces. In January 2020 *Aviation Daily* reported that the FAA was developing a one- to-three-year roadmap to expand its use of space-based ADS. And on November 12, 2020, the FAA and Aireon announced an agreement under which the agency will use the company's ADS-B data to analyze possible uses in managing both domestic and oceanic air services.[72]

3.3 DIGITAL, REMOTE AIR TRAFFIC CONTROL TOWERS

In 2007, the FAA research center in Atlantic City, New Jersey, conducted a demonstration project on a new kind of airport control tower. Instead of a tall building with a staffed control cab on top, the FAA evaluated carrying out tower functions using cameras and other sensing devices at various airport locations, with the control cab and large display screens on the ground. Besides saving the cost of constructing and maintaining the tall building, the demonstration showed that controllers would have increased visibility (especially at night and in rain or fog when infrared cameras provided better views) and decreased workload.[73] Despite these very positive results, no further FAA work on the subject has been reported, and no FAA program to implement remote towers materialized.

Drawing on these findings, technology companies and corporatized ANSPs overseas began developing and testing remote tower concepts. LFV in Sweden and Avinor in Norway were among the first to implement remote-tower programs, and the first remote tower to be certified for operational use was developed for LFV by Saab-Sensis Corporation and became operational in 2015. In the years since then, remote towers have been planned or implemented in Australia, Brazil, Denmark, Germany, Hungary, and the U.K., among others. Germany, Sweden, and Norway have subsequently implemented remote tower *centers* in which controllers can manage air traffic at a number of airports from a single location,

[72] Robert Poole, "FAA to Use Aireon Space-Based ADS-B Data," *Aviation Policy News*, Nov. 2020.

[73] Daniel Hannon, et al., "Feasibility Evaluation of a Staffed Virtual Tower," *Journal of Air Traffic Control*, Vol. 55, No. 1, 2013.

providing additional cost savings. Such centers are already in operation in Germany, Norway, and Sweden and are in the planning stages in other countries.

> *Besides saving the cost of constructing and maintaining the tall building, the demonstration showed that controllers would have increased visibility (especially at night and in rain or fog when infrared cameras provided better views) and decreased workload.*

During 2021 there were a number of new remote tower developments in Europe.

- In February, Danish ANSP Naviair and technology provider Frequentis DFS Aerosense announced the completion of proof of concept testing carried out at a Frequentis facility in Austria. The system will be housed in Naviair's first remote tower center at Billund Airport, Denmark's second largest. It combines a digital remote tower with an automated approach control system called PRIMSA APP. This will be the world's first combination of a digital tower and approach control.[74]
- In March, Finland's ANSP Fintraffic ANS and airport operator Finavia announced they had begun planning a project to create remote tower centers able to provide tower services at some or all 21 Finavia airports. The idea is to both improve the service level at the airports in question and reduce the cost of providing tower service in the recovery from the pandemic.[75]
- London City Airport in April became the first major international airport to control all flights by remote tower. Traffic is managed by controllers 72 miles away at NATS's Swanwick Centre. The Saab system uses 16 high-definition cameras and sensors mounted on a 164-foot tower.[76]
- Indra and Micro Nav signed a contract with HungaroControl in December to develop a digital remote tower for Budapest Ferenc Liszt International Airport. While Indra is the prime contractor, Micro Nav will use its Beginning to End Simulation and

[74] "Denmark's Naviair selects Frequentis," *Air Traffic Management*, 28 March 2021.

[75] Robert Poole, "Remote Towers in Northern Europe," *Aviation Policy News*, 22 March 2021.

[76] "London City Airport now fully controlled by remote digital ATC tower," *International Airport Review*, 30 April 2021.

Training (BEST) technology to create a complete simulation of the remote tower's operation to train the controllers who will staff the new facility. When operational, Ferenc Liszt will be one of the largest airports to date with a remote tower.[77]

By contrast, remote tower progress in the United States has been very slow. In the 2018 FAA reauthorization bill, Congress authorized a pilot program under which the agency would develop and test five remote towers at five different locations, but did not provide funding. Two U.S. remote tower projects are awaiting FAA certification, one in Leesburg, Virginia, and the other at Loveland, Colorado. They have been funded by a combination of state funds and private investment, not by the FAA.[78] In addition, the board of Friedman Memorial Airport in Hailey, Idaho, announced in April 2021 that it plans to develop a request for proposals for a digital remote tower and seek FAA approval to enter its pilot program.[79] In January 2022, Friedman Airport selected a Frequentis/Raytheon partnership as the main technology vendor.[80]

In November 2021, the FAA issued an "operational viability decision" on the Saab Remote Tower System at Leesburg authorizing it to continue managing traffic.[81] This is not official certification, but it did trigger the type certification process between Saab and the FAA. Once that occurs, the system will be approved as a non-federal system within the National Airspace System. Congress included $4.9 million in FY 2022 appropriations to fund contract controllers for type certification at Leesburg, as well as fund operational viability testing at Fort Collins.[82]

3.4 U.S. AIR TRAFFIC CONTROL REFORM

Efforts to have the United States corporatize its ATC system, joining the global trend, began in earnest during the Clinton administration. The idea was proposed by Vice President Gore's reinventing government workshop, and then studied in depth by a task force in the Office of the Secretary of Transportation. That effort failed due to lukewarm support from airlines, strong opposition from the private plane community, and lack of a champion in

77 "Micro Nav and Indra sign contract for remote tower," *Air Traffic Management*, 1 Dec. 2021.

78 Robert Poole, "Remote Towers: Europe Many, U.S. Zero," *Aviation Policy News*, 21 May 2021.

79 Robert Poole, "Idaho Airport Seeks a Remote Tower," *Aviation Policy News*, 18 June 2021.

80 Emily Jones, "SUN Takes Step Forward with Remote Tower Project," *Idaho Mountain Express*, 14 Jan. 2022.

81 Robert Poole, "More on FAA and Remote Towers," *Aviation Policy News*, 22 Nov. 2021.

82 Consolidated Appropriations Act, 2022, H.R. 2471, Division L Explanatory Statement, 15 March 2022.

Congress. Various partial reforms were attempted during the George W. Bush administration, but they got no further.

In 2012 the Business Roundtable organized an ATC reform group to develop a business plan for a nonprofit, user-funded, stakeholder-governed ATC corporation, similar to Nav Canada (the world's second largest ANSP, after FAA's Air Traffic Services division).[83] That effort found a congressional champion in Rep. Bill Shuster (R, PA), then chairman of the House Transportation & Infrastructure Committee. The committee held hearings on the subject in 2014, with strong support from Airlines for America and the National Air Traffic Controllers Association. The bill drafted by the Republican majority was approved by the committee in 2016, but it was strongly opposed by private-plane groups Aircraft Owners and Pilots Association (AOPA) and National Business Aviation Association (NBAA), as well as all federal employee unions except the air traffic controllers.

The bill was revised in 2017 to address concerns raised by small airports and private plane groups, and it was approved by the T&I Committee in 2018. But House GOP leadership did not bring it to the floor, lacking the votes to ensure passage, due in part to an unfilled White House commitment to lobby wavering GOP members.[84] There was also no companion ATC provision in the Senate bill, due to intense lobbying of rural-state senators by the anti-corporatization coalition led by private-plane groups AOPA and NBAA. The overall FAA reauthorization bill was enacted later in 2018 with no ATC reform section.

[83] Robert Poole, "Air Traffic Control as a Quasi-Private Corporation," eds. Robert Clark and Simon Hakim, *Public-Private Partnerships*, Springer: 2019.

[84] Lauren Gardner, "How ATC Got Grounded," *Politico*, 2 April 2018.

PART 4

AIRPORT SECURITY

When Congress mandated the federal takeover of airport security in late 2001, in the wake of the 9/11 terrorist attacks, it allowed room for some degree of private-sector provision (besides the role of producing equipment like walk-through screening devices and baggage scanners to be procured by security providers). One concerned the provision of passenger and baggage screening; the other concerned assisting the new Transportation Security Administration (TSA) with implementing a "trusted traveler" program.

4.1 CONTRACT SCREENING

In response to an emphasis in the 2001 House bill on using federally certified security companies rather than a new cadre of federal employees, the Senate compromised on its preference for 100% federal employees by allowing some airports to opt out, with TSA approval, by hiring TSA-approved security companies to do the screening. The first step was a five-airport pilot program under which only San Francisco, Kansas City, Rochester, Tupelo, and Jackson Hole could use approved security screening companies. After the pilot program was judged successful (by the DHS Office of Inspector General and the Government Accountability Office), the program was opened up to other airports. TSA created the Screening Partnership Program (SPP), under which the 21 airports in Table 5 currently provide passenger and baggage screening using TSA-approved contractors.

TABLE 5: AIRPORTS WITH PRIVATE SCREENING UNDER SPP, APRIL 2022

Airport	State
Atlantic City International Airport	New Jersey
Bozeman Yellowstone International Airport	Montana
Charles M. Schulz-Sonoma County Airport	California
Dawson Community Airport	Montana
Glacier Park International Airport	Montana
Greater Rochester International Airport	New York
Havre City-County Airport	Montana
Jackson Hole Airport	Wyoming
Kansas City International Airport	Missouri
L.M. Clayton Airport	Montana
Orlando Sanford International Airport	Florida
Portsmouth International Airport	New Hampshire
Punta Gorda Airport	Florida
Roswell International Air Center	New Mexico
San Francisco International Airport	California
Sarasota-Bradenton International Airport	Florida
Sidney-Richland Municipal Airport	Montana
Sioux Falls Regional Airport	South Dakota
Tupelo Regional Airport	Mississippi
Wokel Field/Glasgow International Airport	Montana
Yellowstone Airport	Montana

Source: Transportation Security Administration

While that number has grown a bit since the conclusion of the pilot, March 2022 saw Key West International Airport withdraw from the program, leaving 21 airports with private screeners. Many observers and a growing number of airports point to a complicated and time-consuming process in which the TSA holds all the cards. The normal situation for contract provision of services is that the government agency wishing to contract issues a request for proposals (RFP) and reviews bids from competing firms. In the case of airport screening, the normal process would be that airports would send their RFP only to firms that have been certified by the TSA (which maintains this list on its website), and the airport would select the one that best meets its needs. The TSA might then have final approval authority, in addition to its ongoing role as the aviation security regulator.

Instead, the airport must go hat in hand to the TSA stating its desire to change, and in response to the airport's detailed request, the TSA decides which company it thinks is the

best fit and assigns it to the airport—take it or leave it. Also, the contract is between the TSA and the company, rather than between the airport and the company.

In 2018, Sen. Mike Lee (R, UT) introduced a bill to reform the Screening Partnership Program. His Screening Partnership Reform Act (S.3441) would have shortened the time allowed for the TSA to review an airport's request to switch to contract provision from 120 days to just 30 days. That would be reasonable, since the TSA would no longer be tasked with figuring out which company to assign to the airport. The airport would do that itself, subject to subsequent approval by the TSA. Also, the bill required the TSA to include the full cost to the federal government of its screening operation when comparing the cost-effectiveness of contract screening with TSA screening at that airport. Currently, the TSA does not include employee benefits such as insurance and pension fund contributions, which are real costs for the private companies.

> *"Many observers and a growing number of airports point to a complicated and time-consuming process in which the TSA holds all the cards."*

Sen. Lee's bill did not get very far, but he reintroduced it in 2020 (S.4937) and again in 2021 (S.1184), where it remains pending without a committee hearing. Despite Sen. Lee's most recent legislative attempt garnering only one cosponsor in Sen. Marsha Blackburn (R, TN), there would be real benefits from an expanded contract screening effort. Tracy Miller of the Mercatus Center at George Mason University pointed some out of the benefits in an op-ed distributed by Tribune News Service in the wake of the January 2019 federal government shutdown (during which TSA screeners did not get paid, but contract screeners did).[85] These include:

- Better screening performance, as attested by red-team tests by the DHS Office of Inspector General and the GAO;
- Ease of firing low-performing screeners;
- Staffing properly to meet peaks and valleys in checkpoint passenger volume; and,

[85] Tracy Miller, "Why Should a Government Shutdown Affect Airport Security?" Tribune News Service, 24 January 2019.

- Cost savings, due to better matching staffing to demand, as documented in a comparison of LAX (TSA screening) and SFO (contract screening).[86]

4.2 TRUSTED TRAVELER

The 2001 legislation creating the TSA also called for the government to initiate a trusted traveler program, under which air travelers who volunteered could be pre-screened (analogous to getting a low-level security clearance). Those who succeeded would be recognized when they arrived at the airport checkpoint and subjected to streamlined screening compared with ordinary travelers.

For nearly a decade, the TSA resisted creating such a program. In 2003, in hopes of jump-starting the process, a group of private investors created a company, CLEAR, intending to recruit would-be participants and obtain biometric identifiers for them (iris scan and/or fingerprints). The business plan called for the company to submit applications to the TSA from people it had signed up, which it expected the TSA to send to the FBI for review, as it was already doing with airport employees who needed regular access to secure portions of the airport. The TSA refused to do this, so the company tried to market itself as simply verifying passenger identity. But without actual clearance to get streamlined screening, the value proposition was poor, and the company filed for bankruptcy.

When the TSA finally introduced PreCheck in 2011, investors under the name Alclear had recently bought the assets of the bankrupt company CLEAR, this time offering to supplement PreCheck by allowing its members to skip the long lines at checkpoints and then receive either PreCheck or regular screening, depending on their membership status. The TSA agreed to this, and the new CLEAR began marketing it to individual airports. That was slow going when only a few airports offered the service, but a critical mass appeared to be reached by 2019, when CLEAR announced an agreement with St. Louis as its 35th airport with this service. By the end of 2021, CLEAR service was available at 40 U.S. airports.

TABLE 6: AIRPORTS OFFERING CLEAR SERVICE, 2021

Airport Code	Airport Name
AUS	Austin Bergstrom
ATL	Hartsfield-Jackson Atlanta International

[86] House Transportation & Infrastructure Committee, "TSA Ignores More Cost-Effective Screening Model," 3 June 2011.

Airport Code	Airport Name
BWI	Baltimore/Washington International
BHM	Birmingham
BOS	Boston Logan
ORD	Chicago O'Hare International
MDW	Chicago Midway
CVG	Cincinnati/Northern Kentucky
CLE	Cleveland Hopkins
CMH	Columbus John Glenn
DAL	Dallas Love Field
DFW	Dallas/Ft. Worth International
DEN	Denver International
DTW	Detroit Metro
FLL	Fort Lauderdale-Hollywood
IAH	Houston Intercontinental
HOU	Houston Hobby
LAS	Las Vegas
LAX	Los Angeles International
MIA	Miami International
MSP	Minneapolis/St. Paul
BNA	Nashville
EWR	Newark Liberty
MSY	New Orleans
JFK	New York, Kennedy International
LGA	New York, LaGuardia
HPN	New York, Westchester
OAK	Oakland International
MCO	Orlando International
PBI	Palm Beach International
PHX	Phoenix
SAC	Sacramento
STL	St. Louis Lambert
SLC	Salt Lake City
SAT	San Antonio
SFO	San Francisco
SJC	San Jose Mineta
SEA	Seattle-Tacoma International
IAD	Washington Dulles International
DCA	Washington Reagan National

Source: CLEAR website, accessed 24 March 2022.

A decade after being bought out of bankruptcy, CLEAR filed paperwork for an initial public offering (IPO) in June 2021. The company issued its IPO in July and raised approximately $400 million in gross proceeds to expand its service footprint.[87]

Shortly before the pandemic began, in February 2020, the TSA announced that PreCheck membership had reached 10 million. PreCheck reached 11 million enrollments by July 2021, 12 million by October 2021, and 13 million by March 2022. While impressive, that number was far below the agency's long-time goal of 25 million by 2019.

In another PreCheck-related development, the TSA finally opened up the market for PreCheck recruitment to two additional companies besides long-time monopoly provider Morpho Trust (recently renamed IDEMIA). Joining it as of 2020 were Alclear and Telos Identity Management Solutions. The TSA acted after Congress mandated, in the 2018 FAA bill, that it use at least two companies to market PreCheck and vet applicants.

[87] News Release, "CLEAR Secure, Inc. Announces Pricing of Initial Public Offering," CLEAR Secure, Inc. 29 June 2021.

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