

ARCHIVED REPORT

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ATC - Asia/Pacific Region

Outlook

- ATC modernization and enhancements to continue across the Asia/Pacific region
- ATC concerns in the Asia/Pacific region include the incursion of UAVs in urban and airport airspace
- Space-based ADS-B is being rolled out across the continent

Orientation

Description. This report surveys the efforts to modernize air traffic management and control in the Asia/Pacific region. Area of coverage is from Eurasia eastward to the Pacific Islands and from Mongolia/Russia southward to Australasia.

Status. Ongoing modernization and operation.

Application. The systems, software, hardware, protocols, and institutions used to manage air traffic in the Asia/Pacific region.

Sponsor. The countries of the Asia/Pacific region.

Contractors

Contractor(s) not selected or not disclosed.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

The International Civil Aviation Organization (ICAO) defines the Asia/Pacific region as the area stretching from Pakistan eastward to the United States and from Mongolia to the South Pole. Among the multiple efforts to improve air traffic management (ATM) in this region, the Asia/Pacific nations are using new satellite navigation and digital data communications systems.

This approach to air traffic supervision includes use of Future Air Navigation Systems (FANS) and Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM). FANS refers to a standard developed by the air transport industry to allow more aircraft to fit into a given volume of airspace.

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The Air Traffic Control Tower at Beijing Capital International Airport, China

Source: Wikimedia Commons, Kentaro Iemoto

Program Review

In March 2005, Thales achieved site acceptance for its Automatic Dependent Surveillance-Broadcast (ADS-B) ground stations that were to be delivered to Airservices Australia for the Australian nationwide Upper Airspace Program. (Airservices Australia is a corporation owned by the Australian government that provides ATC management and related services to the aviation industry.) In the same month, Thales received a contract from Korean company Nousnet to supply an ATM system that manages both international and domestic air traffic for Muan Airport in the Republic of Korea.

In June 2005, Telephonics Corporation received two contracts from the Civil Aviation Administration of China (CAAC) to supply ATC automation systems for the cities of Zhanjiang and Zhengzhou. Also in June, Thales successfully completed site acceptance of the Eurocat ATM system that it had developed for Vietnam. This system is used in the Ho Chi Minh Flight Information Region.

In January 2006, the Air Traffic Management Bureau (ATMB) of the CAAC successfully began full

operational use of the new Thales-supplied North East and South Area Control Center (NESACC) system.

On May 18, 2006, the Civil Aviation Administration of Vietnam inaugurated the new Vietnam Ho Chi Minh ATM system supplied by Thales. In November 2006, Thales announced that Thales ATM Pty Ltd in Australia had been awarded a contract by the Air Navigation and Weather Services division of the Civil Aeronautics Administration of Taiwan (ROC) for the supply of a fully integrated nationwide ATM system.

In November 2007, Thales Australia announced that it had received a \$28 million contract to upgrade the Australian Advanced Air Traffic System with new air traffic control functionality. In February 2008, Airservices Australia announced it had installed a simulator in Melbourne for its ATC trainees. The simulator, called the Tower Visual Simulator, creates a 360° training environment and can create conditions not usually experienced in normal training – such as snow at Melbourne Airport.

ATC - Asia/Pacific Region**2009**

In December 2009, Thales Australia announced that Airservices Australia and Thales had delivered performance and safety enhancements to Australia's ATM system as part of a program to continuously improve the reliable, efficient, and safe management of the country's airspace. The latest improvements, known as The Australian Advanced Air Traffic System (TAAATS) V12, were subjected to testing to ensure the highest standards of reliability and safety. According to Thales, TAAATS V12 encompasses enhancements to support the introduction of new radar surveillance tracking, safety-net monitoring, and radar bypass services.

Also in December, Airservices Australia announced that it had completed constructing the first satellite-based air navigation system delivering radar-like coverage of aircraft movements across Australia. Airservices Australia reported that the system involved the deployment of a satellite-technology-based ADS-B network and a new digital communications backbone to support it. The ADS-B system and the communications system became operational on December 18, 2009. (ADS-B is a satellite-based technology enabling aircraft to be accurately tracked by air traffic controllers and other pilots without the need for conventional radar.)

2010

In August 2010, Northrop Grumman announced that its Europe-based air traffic management subsidiary, Northrop Grumman Park Air Systems, had been awarded a contract from China Aviation Supplies International Tendering Co (CASITC) to supply VHF radio communications systems for the Chengdu-area ATC center. A total of 110 communications channels will be operated from the control center. Northrop Grumman reported that the contract represented the largest ATC VHF system delivered to China to date.

In December 2010, Airservices Australia announced that it had commissioned a new secondary terminal area radar near Darwin Airport to provide improved surveillance of air traffic up to 256 nautical miles (474 km) around the city. The radar will provide air traffic controllers working at Airservices' Brisbane center with an improved picture of aircraft moving in upper-level airspace across the territory.

2011

In December 2011, Northrop Grumman announced that Northrop Grumman Park Air Systems had been granted temporary certification by the CAAC for its NOVA 9000 airport surface movement guidance and control system (the company obtained the CAAC

Temporary Certificate in November 2011). According to Northrop, Park Air Systems was the first, and was then the only, supplier of Advanced Surface Movement Guidance and Control Systems (A-SMGCS) to obtain this certification from the CAAC. Under CAAC regulations, all communication, navigation, and surveillance products serving the Chinese civil aviation market require certification as a compulsory prerequisite to site acceptance and operation at airports or en route.

As a key supplier of A-SMGCS in China, Park Air Systems has delivered NOVA 9000 systems to Beijing, Guangzhou, Macau and Shenzhen airports.

2012

In November 2012, Airservices Australia announced that it had completed upgrade work on the instrument landing systems at Perth Airport. The ILS is a course-forming radio navigation aid that supports the safe and efficient movement of air traffic into and out of the airport by guiding pilots to the runway during low visibility and bad weather conditions. The upgrade work began in August 2012 and included the replacement of the localizer antenna arrays at each end of the main runway (Runway 03/21). The localizer antenna provides pilots with lateral guidance to the runway during an instrument approach.

2013

In February 2013, Boeing and Commercial Aircraft Corporation of China (COMAC) announced that the Boeing-COMAC Aviation Energy Conservation and Emissions Reductions Technology Center would conduct two new research projects on air traffic management to support the long-term efficiency, capacity, and safety of China's air traffic system. The Boeing-COMAC Technology Center would work with Civil Aviation University of China (CAUC) to forecast the 30-year capacity of China's national airspace system. This research will develop tools to predict future airspace development trends and provide recommendations for improving the national airspace system.

The Boeing-COMAC Technology Center will also work with Nanjing University of Aeronautics and Astronautics on development of an air traffic decision support system to optimize in-bound air traffic flow at airports. Successful outcomes from this project will help air traffic controllers determine the most efficient arrival sequences and enhance flight safety by providing better situational awareness.

In September 2013, Airservices Australia announced it had begun upgrade work on the existing ILS installed

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on the main runway at Melbourne Airport to enable enhanced navigation for pilots during low visibility conditions. The upgrade work included increasing the size of the localizer antenna array at the southern end of the main runway (Runway 16). Work was scheduled to conclude by mid-November 2013, with re-certification to occur in two phases by mid-May 2014. The localizer, one of two key transmitters of an ILS, provides pilots with lateral guidance to the runway.

In September 2013, Airways New Zealand, a state-owned enterprise (SOE) providing air traffic management of New Zealand airspace, announced it was installing multilateration surveillance technology on the peaks of New Zealand's South Island. Specifically, it was installing nine multilateration sites in remote mountainous regions throughout Otago and Southland. Airways New Zealand says this would provide Airways' air traffic controllers with visibility into valleys and behind mountains, areas that are out of the reach of radar surveillance.

In November 2013, Airservices Australia announced that it had commissioned two new ADS-B ground stations, further enhancing air traffic surveillance coverage for aircraft flying in Australian airspace. These two new stations, at Point Lookout, near Coffs Harbour, and Mount Hardgrave on North Stradbroke Island, near Brisbane, will provide a backup to the radar surveillance in the region and enhance the high-level coverage for air traffic from Lord Howe Island to Sydney and Brisbane.

In November 2013, Airways New Zealand announced it had entered into a partnership with a Chinese aeronautical training institution to share Airways' aviation management expertise with Chinese counterparts. The Civil Aviation Management Institute of China (CAMIC) planned to send groups of 20 managers to New Zealand to study airspace planning and related topics with Airways New Zealand over the course of three weeks. These managers would be individuals with engineering and management backgrounds representing organizations across China.

On December 12, 2013, the first "fitment" mandate for ADS-B technology came into effect for all Instrument Flight Rules (IFR) aircraft flying at or above 29,000 feet in Australia's airspace. The announcement was made by Airservices Australia.

2014

In July 2014, Airservices Australia announced that a new aircraft landing system known as SmartPath had been brought into service at Sydney Airport – the first of its type in the southern hemisphere. The SmartPath technology (otherwise known as a Ground-Based

Augmentation System, or GBAS) is a precision approach and landing system allowing suitably equipped aircraft to land within 1 meter of the runway center line in low visibility conditions. If required, SmartPath is capable of providing up to 26 simultaneous instrument approaches within a 42-kilometer radius from the airport. The system will also reduce maintenance and provide more efficient calibration than traditional instrument landing systems.

In July 2014, Airservices Australia also announced plans to install 13 new ADS-B ground stations to enhance its satellite-based air traffic surveillance of Australia's airspace. ADS-B equipped aircraft transmit GPS satellite data to a ground station twice every second to provide air traffic controllers with radar-like surveillance, predominantly in remote areas where there is no conventional radar coverage. Six of the new ground stations will be located in Western Australia, with two in Victoria and Queensland and one each in areas of New South Wales, South Australia, and the Northern Territory.

The new ground stations were to be commissioned into service from 2015, and would bring the total number of ground stations in Airservices' national ADS-B network to 74.

In September 2014, Airservices Australia announced that it would equip the air traffic control towers in the Gold Coast – Perth, Cairns, and Brisbane – with the latest Integrated Tower Automation Suite (INTAS) digital technology as part of the continuing implementation of this technology throughout Australia. This suite of tower technology combines flight and operational data, surveillance, and voice communications in a single, integrated, control tower-specific layout. INTAS provides tower controllers with four customizable touchscreens displaying electronic flight strips, operational information, weather, terminal-area radar images, and, where available, surface surveillance data.

2015

In November 2015, Airways New Zealand signed two agreements with Vietnamese aviation authorities for the provision of air traffic control training and related services to Vietnam-based students.

The first agreement was a five-year Memorandum of Understanding with Vietnam Air Traffic Management Corporation (VATM), announced during a visit to Vietnam of a New Zealand trade delegation led by Prime Minister John Key. In addition to training, the agreement included Airways' ATC candidate selection program SureSelect, e-learning services, and the use of "Total Control" simulators.

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The second agreement was an MoU with the Vietnam Aviation Academy (VAA), an aviation university in Vietnam. Under the agreement, the university's students would complete ATC training in New Zealand toward obtaining their Aviation Management degree.

2016

In January 2016, Australia's deputy prime minister and minister for infrastructure and regional development, the Hon. Warren Truss MP, approved the installation of an ILS at Gold Coast Airport in Australia. Airservices Australia would next begin procurement processes and complete design work.

In February 2016, a contract was signed between Airservices Australia and Thales Australia for advanced work on software design assurance for Australia's future air traffic management system. Also in February, Airservices Australia announced it would conduct a short study in Perth to compare modeled and actual aircraft noise data as part of its ongoing efforts to explore ways to reduce aircraft noise.

Also in February 2016, India officially launched its Central Command Centre, Air Traffic Flow Management (C-ATM) system, becoming, what it said was the seventh country in the world to implement Air Traffic Flow Management (ATFM) measures. The C-ATFM system would primarily balance capacity against demand to achieve optimum use of airport, airspace and aircraft at every Indian airport where there is a capacity constraint. The system displays weather information along with static information about airports, airspaces and air routes. It processes the demand / capacity information, and provides decision-making tools to the ATFM managers for collaborative decision-making in consultation with airlines, the military, and airport operators to support a regulated flow of traffic at each airport in India.

In September 2016, Airways New Zealand secured a supplier of ground infrastructure for its ADS-B network.

2017/2018

In November 2017, Airways New Zealand demonstrated a prototype digital air traffic control tower at Auckland Airport. Airways New Zealand was assessing how the technology could increase aviation safety, extend the hours of air services at regional locations, enhance resilience, and improve traffic flows in bad weather. A digital tower allows air traffic to be directed by controllers in a remote location watching live footage of the airfield from high-definition video cameras. Under the existing system, controllers manage traffic from a tower that overlooks the runway and use multiple systems to gain a complete picture of the airfield.

At Singapore Air Show 2018, chief executives of three of the world's leading air navigation service providers signed a collaboration agreement to improve the on-time performance of long-haul air traffic. Improved management of long-haul arrivals will help to reduce airspace congestion and delay, enable greater predictability in operations for both the airlines and airports, and help to reduce operational complexity for air traffic controllers.

In January 2018, the Civil Aviation Authority of Singapore awarded Metron Aviation, a division of Airbus, a contract to support the country's Air Traffic Flow Management. Under the contract, Metron will design, supply, deliver, install, integrate, test, and commission the ATFM system over a 23-month period, with an additional 10 years of after-sales support beginning after acceptance of the initial system.

In 2018, Thales signed an agreement concerning Malaysia's ATC space under which the company will work with Novatis Resources to upgrade the Kota Kinabalu flight information region's ATC system; the deal was announced in February 2018. As part of the agreement, Thales will install the TopSky-ATC system, next-generation primary and secondary co-mounted radars, ADS-B ground stations, and DVOR-DME.

In partnership with customer Airways New Zealand, Leidos unveiled the SkyLine-X ATM solution at World ATM Congress 2018. The system includes Time-Based Flow Management (TBFM) and FAA Medium Term Conflict Probe capability, and trajectory-based operations (TBO). The system was customized for Airways New Zealand, but can be modified for any user.

As part of its goal of initiating an advanced, integrated Civil Military ATM System (CMATS) by 2021, as under the OneSKY program, Airservices Australia opened the expansion of its ADS-B services to non-terrestrial-based surveillance solutions, the organization announced in March 2018. After investing significantly in ground-based ADS-B over the past decade, Airservices Australia officials deemed a non-terrestrial solution for airborne-to-ground-level coverage of a flight information region (FIR) to be a requirement.

2019/2020

In January 2019, the Airports Authority of India signed an MoU with Saab for the company to research a pan-Indian ATM automation system for airports under the UDAN Regional Connectivity Scheme, a regional airport development and connectivity plan. Some of Saab's ATM solutions were previously deployed in Ahmedabad, Amritsar, Bhubaneswar, Chennai, Cochin,

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Guwahati, Jaipur, Kolkata, Lucknow, Mumbai, and New Delhi.

Also in January, Papua New Guinea's Air Services Ltd completed the transition to Thales' TopSky-ATC system. The new electronic system marked a significant upgrade over the country's 30-year-old paper strip system.

India's national airspace authority, Airports Authority of India, signed an MoU with the National Institute of Technology, Trichy (NIT-T), to form a joint venture to codevelop air traffic flow management and control technologies.

The Airports Authority of India (AAI) signed an MoU with the NIT-T to form a joint venture to develop ATFM and control technologies. The objective of the January 2019 deal was to develop a long-term collaborative relationship that would accelerate India's aviation, infrastructure, and ATM capabilities.

In February 2019, Malaysia completed installation of a Frequentis IP network solution at 23 sites within the Kuala Lumpur FIR. Telekom Malaysia signed Frequentis to deliver the ATM-grade radio communication service – based on VCX-IP technology – to integrate its, at the time, new ATC center in Kuala Lumpur with 21 radio sites across the country. The solution complies with relevant ATM standards, such as ED-137, with a network covering 19 peninsular radio sites and two radio sites in Borneo connecting more than 300 ATC radios in a fully redundant system. Operational trials were scheduled for later in 2019.

In May 2019, China's Chengdu Tianfu International Airport signed Rohde & Schwarz to provide 240 R&S Series 4200 VHF/UHF radios and 17 controller working positions. The new airport, which was set to come on line in 2020 and as of January 2021 was conducting test flights, was designed to become China's third largest hub, following Beijing and Shanghai. A total of 120 VHF channels were to be operated from the control center, which were to be distributed across 13 sites in the control area, providing regional, approach, ground, tower, and multiflight airway control.

Japan and the European Commission concluded negotiations on a civil aviation safety agreement in July 2019. The agreement would enhance safety cooperation and ease market access between Japan and the European Union's aeronautical sector. Activities performed within the framework of the agreement were to be delivered through the EC's Aviation Strategy for Europe program.

Thales and the Civil Aviation Authority of Singapore (CAAS) formed an agreement to set up an SGD30

million Joint Aviation Innovation Research (AIR) Lab, based in Singapore, to drive innovation in new ATM technologies. An early goal for AIR Lab was development of an Open ATM System architecture "minimum viable product," which was hoped to be a key aspect of the CAAS's next-generation ATM system. In February 2018, the two bodies signed an MoU, which was followed by a second agreement in March 2019, at Madrid's World ATM Congress.

On October 10, 2019, the new airspace design at Tan Son Nhat International Airport – Ho Chi Minh's main airport – entered into service. Under the project's guidelines, NAVBLUE, a subsidiary of Airbus, designed new performance-based navigation standard instrument departures (PBN SIDs) and standard arrivals (STARs), and resectorized the terminal maneuvering area and a neighboring sector's TMA.

In February 2020, AIRNAV Indonesia extended its collaboration with ERA, which would install new multilateration systems at Soekarno-Hatta International Airport in Jakarta. Under the deal, ERA was to install 12 new ground-based stations for surface guidance, joining 32 multisensor surveillance ground stations and 213 SQUID vehicle tracking units currently in operation at the airport.

In March 2020, the new air traffic management tower park was inaugurated at Taiwan Taoyuan International Airport. It replaces a tower that began operation in 1979.

In June 2020, NAVCANATM announced that it would supply an Integrated Tower System to support operation of the interim two-runway system and eventual three-runway system at Hong Kong International Airport. The new tower, expected to arrive in 2022, will join two existing towers. The three-runway system was expected to come online in 2024.

In July 2020, the Indian Ministry of Defence, as part of its Modernization of Air Field Infrastructure program, awarded Indra a contract to supply navigational aids to 37 of the country's military airfields. Under the contract, 24 ILSs and 29 DVOR guidance systems were to be delivered over three years.

In the same month, the Republic of Korea Ministry of Defense also selected Indra for military air navigation support, with the company to supply and implement air traffic surveillance and management systems at 11 air force bases. Deliveries were to be carried out over four years, and to include provision of S-band primary surveillance radars.

Fiji awarded the Czech company ERA a contract to deliver an ADS-B system in the same month. Under the

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contract, deliveries were to include 10 new ADS-B stations and one central processor.

Also in July, the Civil Aviation Authority of Singapore (CAAS) launched a new aviation safety reporting system. While the use of the service is completely voluntary, the CAAS hoped that the system would improve safety. The reporting system is administered by an independent, third-party entity, KPMG Services.

In September 2020, Aireon announced that the Hong Kong Special Administrative Region's Air Navigation

Service Provider (ANSP) had selected the company to provide space-based ADS-B services. Implementation was expected in first quarter 2021.

Rohde & Schwarz announced in December 2020 that it had been awarded a contract by Aeronautical Radio of Thailand (AEROTHAI) to deliver VoIP-capable ATC communications and a remote monitoring and control solution. The products were to come from R&S's CERTIUM product line.



The Air Traffic Control Tower at Sydney Airport, Australia

Source: Wikimedia Commons, Alan Kenneth Dicker

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Worldwide Distribution/Inventories

The **Asia/Pacific region** – the area stretching from Pakistan eastward to the United States and from Mongolia to the South Pole.

Forecast Rationale

The critical need to modernize legacy ATC systems and procedures is driving efforts to update air traffic management in the Asia/Pacific region.

Recent Events in the Asia/Pacific ATC Area

The Airport Authority Hong Kong (AAHK) has contracted Nokia Shanghai Bell to deploy the high-bandwidth Nokia IP/MPLS network to support tower operations at Hong Kong International Airport. Nokia was also to support and manage migration of legacy non-IP aviation applications to the new network. The contract was announced in January 2021, and full deployment is expected by the end of the year.

In February 2021, Airports Authority India (AAI) announced that Aireon's space-based ADS-B system was being utilized successfully across the oceanic airspaces of Mumbai, Chennai, and Kolkata. The announcement came 18 months after the two organizations signed a contract to implement the service.

In March 2021, Indra announced that it had exceeded the milestone of 1,000 ATM systems deployed in China. These assets include nav aids, control centers, towers, and radars, covering a reported 60 percent of the country's airspace.

Also in March, Papua New Guinea's sole ANSP, NiuSky Pacific Ltd (fka PNG Air Services Ltd) announced the deployment of Aireon's space-based ADS-B capability.

The next month, in April, ERA announced that it would be providing Bhutan with ADS-B capabilities under a contract awarded by the Department of Air Transport of the Ministry of Information and Communications of the Royal Government of Bhutan. ERA said that Bhutan was the 67th country to be added to the company's list of users.

In another piece of April news, Searidge Technologies announced that the Airport Authority of Hong Kong had selected the company to deploy a single digital tower and apron platform to support the transformation and large-scale expansion of Hong Kong International Airport. Under the contract, Searidge will deliver a Digital Apron Management System to the airport and Digital Tower Facilities to Hong Kong's ANSP.

In other activity in April 2021, Adacel, along with Fiji Airports, commissioned an Aurora Air Traffic Management system for surveillance control of Fiji's airspace. The solution would deliver Fiji's controllers at the Nadi ATM Centre and Nadi and Nausori Towers with a complete technical refresh.

Elsewhere, ANRA Technologies, leading a consortium, was tapped by the Indian Ministry of Defence, Directorate General of Aviation, and Ministry of Civil Aviation to begin trials of BVLOS operation in India. The ANRA flight team conducted its first test sortie in June 2021.

In the same month, ENAV, through its subsidiary IDS AirNav, announced that Airservices Australia had awarded the company a EUR1 million contract in advance of Aeronautical Information Management (AIM). Specifically, IDS AirNav will provide AIM modules related to electronic aeronautical publication (WePub system) and Integrated Aeronautical Charting, with a solution based on GIS Technology (ICE system).

Finally, in September 2021, L3Harris Technologies was awarded a potential \$343 million, 10-year contract for initial planning and design work in support of modernization of Airservices Australia's enterprise-wide telecommunications network. In the first phase of the contract, L3Harris will design an organization-wide voice and data networking, VHF radio communications, and ADS-B surveillance capability for Australia's air navigation system.

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