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AIR TRAFFIC CONTROL

Table of Contents

1. The Air Traffic Control Mission

1.1.
The mission of Air Traffic Control can be stated by several definitions that include task that a controller is expected to follow every time he/she performs their job. The most commonly used definition is:

"Controllers shall provide Air Traffic Control Services in accordance with international standards and regulations as well as providing Flight Information Services and Alerting Services to ensure safe, convenient and expeditious air travel. The role also includes coordinating search and rescue operations."

1.2.
Simply spoken, the air Traffic Controller has to take care that aircrafts don't crash into each another. He has to make sure that they get where they're supposed to go quickly, efficiently and safely. In addition to its primary function, the ATC system has the capability to provide additional services. The ability to do so is limited by many factors such as the controller workload, higher priority duties and pure physical inability to scan and detect those situations that fall in this category.

2. ATC Positions and Functions

2.1. Types of control facilities
There are three basic types of ATC facilities:
- Control Towers (Aerodrome Control Service),
- Approach Controllers (Approach Control Service),
- Air Route Traffic control Centers (Area Control Service or Enroute Service).

Within each facility there are individual operating positions. Here is a basic summary of where each position is and what it does:

2.2. Clearance Delivery (DEL)
Clearance delivery (located in the Control Tower) is often combined with Ground Control. It issues IFR clearances into Controlled airspace. VFR clearances are usually issued by Ground Control.

2.3. Ground Controller (GND)
Ground (located in the Control Tower) takes control over taxing aircraft and vehicles. It issues departure information, weather conditions, and airport advisories. Ground also maintains a general surveillance of the airport including taxiways and inactive runways.

2.4. Tower Controller (TWR)
This controller (located in the Control Tower) is in control of all arriving and departing planes on the runways and in the air at e.g. a 5-mile radius up to most 2000 or 2500 ft AGL and selects the active runways. The Tower Controller provides also service to VFR aircraft in the pattern.

2.5.1. Approach Controller (APP) or Approach Control Service
The primary position located in the approach control. It controls all IFR aircraft in its delegated airspace. This airspace will include the primary airport and included satellite airports. Approach provides also vectors to the airport and issues approach clearances. Very busy Approach Controls may be divided into multiple positions (sectors) such as e.g. Departure, Arrival, East Approach, West Approach and High Approach. Each sector is then responsible for a piece of the Approach control's overall airspace. When a sector's airspace includes Class C airspace the position also controls VFR aircraft in the sector.

2.5.2 Departure Controller (DEP)
Another position located in the Approach Control. Departure also controls all IFR aircraft within its portion of the Approach Control's delegated airspace. While this portion is primarily the airspace used by aircraft departing the primary airport, Departure may also have satellite airports within its airspace and it would perform the approach controller function for those airports also.

2.6. Center Controller (CTR) or Area Control Service, located in the FIR
The Center Controller provides ATC services to all aircraft operating on IFR flight plans with in controlled airspace principally during the enroute phase of flight. Like Approach controls, the FIR may also be broken into smaller sectors and each sector is responsible for its piece of the airspace.

3. National Airspace System

3.1. Controlled and Uncontrolled

The first level of airspace classification in Thailand is Controlled and Uncontrolled. Controlled airspace is that airspace where air traffic services are provided. All commercial airports in Thailand are controlled. Uncontrolled airspace pilots have to provide their own separation and avoid conflicts with other aircraft. Thailand airspace can be broken down into 7 category s. The airspace classification can be found in the Thailand AIP ENR 1.4 ATS Airspace classification.

3.2. Class A airspace

That is the airspace starting at FL290 and above (along ATS routes). Only IFR flights are permitted in class A airspace and are subject to air traffic services and are separated from each other.

3.3. Class B airspace

Is the airspace from FL280 and below (along ATS routes). IFR and VFR flights are permitted in class B airspace and are subject to air traffic services and are separated from each other.
VFR aircraft operating in class B airspace require the following conditions:

- 8km visibility and clear of clouds above 10,000 ft AMSL
- 5km visibility and clear of clouds below 10,000 ft AMSL

3.4. Class C airspace

is that airspace that surrounds controlled airports and is known as the Approach Control Services area. This airspace can extend anywhere from 10 to 50 miles out from the airport and extend from the surface up to FL160. The class C airspace designation is used for the busiest airports. IFR aircraft are separated from IFR and VFR aircraft. VFR aircraft are separated from IFR aircraft. All aircraft operating below 10,000 ft in class C airspace must maintain airspeed of 250 IAS or less.
VFR aircraft operating in class C airspace require the following conditions:

- 8km visibility; 1500m horizontal; 300m vertical distance from clouds above 10,000 ft AMSL
- 5km visibility; 1500m horizontal; 300m vertical distance from clouds below 10,000 ft AMSL

3.5. Class D airspace

is that airspace that surrounds controlled airports and is known as the Approach Control Services area. This airspace can extend anywhere from 10 to 50 miles out from the airport and extend from the surface up to FL160. The class D airspace designation is used for the less busy airports. IFR aircraft are separated from IFR aircraft. NO separation services are provided to VFR aircraft. VFR aircraft are given traffic information in respect to all other flights. All aircraft operating below 10,000 ft in class D airspace must maintain airspeed of 250 IAS or less.
VFR aircraft operating in class D airspace require the following conditions:

- 8km visibility; 1500m horizontal; 300m vertical distance from clouds above 10,000 ft AMSL
- 5km visibility; 1500m horizontal; 300m vertical distance from clouds below 10,000 ft AMSL

3.6. Class E airspace

is that controlled airspace not designated as Class, A, B, C or D airspace. IFR aircraft are separated for IFR Aircraft and provided with information about VFR flights. No separation services are provided to VFR aircraft. Traffic information is provided to VFR aircraft when practical. All aircraft operating below 10,000 ft in class E airspace must maintain airspeed of 250 IAS or less.

VFR aircraft operating in class E airspace require the following conditions:

- 8km visibility; 1500m horizontal; 300m vertical distance from clouds above 10,000 ft AMSL
- 5km visibility; 1500m horizontal; 300m vertical distance from clouds below 10,000 ft AMSL

3.7. Class F airspace

is uncontrolled airspace. IFR aircraft are separated from IFR Aircraft as far as practical. VFR aircraft are not provided with separation services. All aircraft operating below 10,000 ft in class F airspace must maintain airspeed of 250 IAS or less.

VFR aircraft operating in class F airspace require the following conditions:

- 8km visibility; 1500m horizontal; 300m vertical distance from clouds above 10,000 ft AMSL
- 5km visibility; 1500m horizontal; 300m vertical distance from clouds below 10,000 ft AMSL
- At and below 900m AMSL or 300m above terrain whichever is higher 5km clear of clouds and in sight of ground or water.

3.8. Class G airspace

is uncontrolled airspace not classified as class F airspace. Both IFR and VFR aircraft are not provided with separation services. All aircraft operating below 10,000 ft in class G airspace must maintain airspeed of 250 IAS or less.

VFR aircraft operating in class G airspace require the following conditions:

- 8km visibility; 1500m horizontal; 300m vertical distance from clouds above 10,000 ft AMSL
- 5km visibility; 1500m horizontal; 300m vertical distance from clouds below 10,000 ft AMSL
- At and below 900m AMSL or 300m above terrain whichever is higher 5km clear of clouds and in sight of ground or water.

3.9. Special Use Airspace

Special Use Airspace is airspace that has been defined to support the critical mission requirements of other government agencies, protect vital national facilities, or is otherwise necessary for the safety and security of both the airspace and surface installations. Thailand Special use airspace can be found in Thailand AIP ENR5.1

3.9.1 Danger Areas:

An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified time.

3.9.2 Restricted Areas:

An airspace of defined dimensions above the land areas or territorial waters of a state within which the flight of aircraft is restricted in accordance with certain specified conditions.

3.9.3. Prohibited Areas:
An airspace of defined dimensions above the land areas or territorial waters of a state within which the flight of aircraft is prohibited.

3.10. Air Route System
In the air route system two different types can be separated. There are ATS routes and RNAV routes. Routes are identified by a letter and followed by the route number. Thailand air routes can be found in ENR 3.1-1.

3.10.1 ATS routes
ATS routes are actually standard routes for airplanes using the conventional navigation techniques as VOR and NDB (section 3.11).
ATS routes are further separated into International and Domestic routes

3.10.1.1. International air routes:
The following letters are used for international routes in Thailand:
- A, B, G, R, M.
- Example A1, B202, G473, R215, M751

3.10.1.2. Domestic air routes:
Domestic Routes are identified with the letter “W” and followed by the route number. Domestic airways do not extend beyond the Thailand boundaries. Examples are W1, W26, W31.

3.10.2. RNAV / RNP routes
These routes have been created for the use with GPS navigation systems. It takes a part of the traffic away from the ATS routes and helps to relax the traffic situation. RNAV routes have as identifier also the letter “M” as well as “Y”, e.g. M904 or Y11.

3.11. Components of a route

3.11.1. VOR’s
The first is a VOR (**V**HF **O**mni-directional **R**ange). A VOR is a radio navigation system that broadcasts a VHF radio signal encoding both the identity of the station and the angle to it, telling the pilot in what direction he is from the VOR station as a radial. Many of these stations are equipped with DME what allows in addition to the radial to get the distance to the station. VOR’s are still the primary navigational aids used in Instrument approaches since many of Thailand’s airports do not have ILS / Localizer approaches.

3.11.2. NDB’s
The second is a NDB (**N**on-**D**irectional **B**eacon). NDB’s transmit a radio signal where the station code is included and with the right equipment it is possible to detect the relative direction from the plane to the station. The advantage is that the range in that the signal can be received because of the used frequency’s is much bigger then as from a VOR.

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3.11.3. Fixes
The third component on a route are fixes. Fixes are points on the earth with specified coordinates. Mostly they are plotted at a point where two radials, from two different VORs are crossing, but also many other defined points. A FMS (Flight Management System) in the plane is able to follow those points and can navigate independent from VOR or NDB.

4. Weather

Aviation Weather Reports

There are several ways for pilots and meteorologists of knowing what the weather currently is and what is predicted to be. METAR is one common format for reporting this information. A further used format is TAF. There are only small differences. Here a typical sample for a METAR weather report:

METAR VTBS 132000Z 17008KT 9999 FEW020 SCT300 30/24 Q1006 NOSIG

a. **Type of Report (METAR)**
There are two types of weather reports. One is the routine METAR report that is transmitted every hour. There is another that can be given at any time to update the METAR, SPECI. This is a special report.

b. **Station Identifier (VTBS)**
Each station is identified by the four-letter ICAO code. For example, Suvarnabhumi International, is identified by “VTBS”.

c. **Date and Time of Report (132000Z)**
The date and the time are shown as six-digit group. The first two digits are the date, the last four digits are the time of the METAR. A “Z” is at the end is to express the time is given in Zulu time (UTC).

d. **Winds (17008KT)**
Winds are reported with five digits (17008) unless the speed is greater than 99 knots, in which case it will be with six digits. The first three digits indicate the direction, the last two digits the speed in knots (KT). If the wind is variable, it is reported as “VRB”.

e. **Visibility (9999)**
The ground visibility is reported in Meters.

f. **Sky Condition (FEW020 SCT300)**
Sky condition is always reported in the sequence of amount, height, and type or indefinite ceiling/height (vertical visibility). The heights of the cloud bases are reported with a three-digit number in hundreds of feet above the ground.

g. **Temperature and Dewpoint** (**30/24)**
The air temperature and dewpoint are always given in degrees Celsius (30/24). Temperatures below 0°C are preceded by the letter “M” to indicate minus.

h. **Altimeter Setting (Q1006)**
The air pressure is reported as QNH. It is always preceded by the letter “Q”.

i. **Remarks** (**NOSIG)**
NOSIG means: No Significant change expected.

5. ATC Communications and Coordination

5.1. Communication

Air Traffic Control is truly the art of concise communication. Communication between controller and aircraft or controller and controller is what this is all about. But, it's not just getting on the radio (or in the case of VATSIM, a computer) and saying, "GO THERE!" There is a precise language that Air Traffic Controllers use to communicate their instructions and provide pertinent information. It is essential that controllers understand what proper phraseology is and how it enhances safety and is the mark of a professional controller.

5.2. The Phonetic Alphabet

In aviation there is an own version of the alphabet. It uses the same letters but instead of just saying the letter self it gives each letter a word. This allows a clear communication and minimizes language barriers and misunderstandings.

THE AVIATION PHONETIC ALPHABET

Character	Telephony	Phonic (Pronunciation)
A	Alfa	AL-FAH
B	Bravo	BRAH-VOH
C	Charlie	CHAR-LEE
D	Delta	DELL-TAH
E	Echo	ECK-OH
F	Foxtrot	FOX-TROT
G	Golf	GOLF
H	Hotel	HOH-TEL
I	India	IN-DEE-AH
J	Juliet	JEW-LEE-ETT
K	Kilo	KEY-LOH
L	Lima	LEE-MAH
M	Mike	MIKE
N	November	NO-VEM-BER
O	Oscar	OSS-CAH
P	Papa	PAH-PAH
Q	Quebec	KEH-BECK
R	Romeo	ROW-ME-OH
S	Sierra	SEE-AIR-RAH
T	Tango	TANG-GO
U	Uniform	YOU-NEE-FORM
V	Victor	VIK-TAH
W	Whisky	WISS-KEY
X	Xray	ECKS-RAY
Y	Yankee	YANK-KEY
Z	Zulu	ZOO-LOO
1	One	WUN
2	Two	TOO
3	Three	TREE
4	Four	FOW-ER
5	Five	FIFE
6	Six	SIX
7	Seven	SEV-EN
8	Eight	ATT
9	Nine	NIN-ER
0	Zero	ZEE-RO

Here is the order of things in the message when communicating with an aircraft:

1. Identification of aircraft. The callsign as we call it can be several different things. Mostly the controller calls it simply as Airline Name and Flight Number. E.g. “THA142 is said THAI One-Forty-Two”
2. Controller’s identification - whatever the control position is - spoken as Facility and position e.g. “Bangkok Approach”. After initial contact you don’t need to repeat your position ID again.
3. Your message.

5.3. Controller Coordination

Coordination with other controllers is a key in all air traffic control operations. It makes everything flow smoothly and minimizes problems. Most coordination is nothing more than telling other controllers, who may be affected by your actions, what you have done or plan to do. One Item you should coordinate as TWR controller with other controllers is e.g. runway in use.

5.4. Aircraft Handoff

A handoff is simply the transfer of responsibility for control of an aircraft from one controller to another. You may not handoff any aircraft which is in conflict with another. Solve your own problems rather than try to give them to somebody else. Don’t accept a handoff with a conflict either. The easiest way to do a handoff is with your radar client's automated handoff feature.

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