

Note: It is beyond the scope of this MOPS to specify the method by which a TIS-B service provider would assign track file identifiers for those TIS-B targets for which the ICAO 24-bit address is unknown.

2.2.4.5.1.3.5 Surface Vehicle Address

An “ADDRESS QUALIFIER” value of FOUR (binary 100) is used to indicate that the “ADDRESS” field holds the address of a surface vehicle authorized to operate in the airport’s surface movement area.

Note: It is beyond the scope of this MOPS to specify the method by which ADS-B surface vehicle addresses are assigned.

2.2.4.5.1.3.6 Fixed ADS-B Beacon Address

An “ADDRESS QUALIFIER” value of FIVE (binary 101) is used to indicate that the “ADDRESS” field holds the address assigned to a fixed ADS-B beacon or “parrot.”

Note: It is beyond the scope of this MOPS to specify the method by which ADS-B beacon addresses are assigned.

2.2.4.5.2 STATE VECTOR Element

Format for the STATE VECTOR element is defined in [Table 2-11](#). This encoding **shall** apply to ADS-B Messages with PAYLOAD TYPE CODES of “0” through “10,” when the ADDRESS QUALIFIER value is “0,” “1,” “4” or “5.” Each of the fields shown is defined in §2.2.4.5.2.1 through §2.2.4.5.2.10.

Table 2-11: Format of STATE VECTOR Element

Payload Byte #	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
5	(MSB)							
6	LATITUDE (WGS-84)							
7							(LSB)	(MSB)
8	LONGITUDE (WGS-84)							
9							(LSB)	Alt Type
10	ALTITUDE							
11	(MSB)				(LSB)	(MSB)	NIC	(LSB)
12			(MSB)	A/G STATE	Reserved			
13	HORIZONTAL VELOCITY							
14	VERTICAL VELOCITY or AIRCRAFT LENGTH/WIDTH CODE							
15					UTC		Reserved	
16								
17								

2.2.4.5.2.1 “LATITUDE” and “LONGITUDE” Field Encoding

- The “LATITUDE” field is a 23-bit (bit 1 of byte 5 through bit 7 of byte 7) field used to encode the latitude ~~of~~ **provided to** the ADS-B Transmitting Subsystem in WGS-84. The encoding of this field **shall** be as indicated in [Table 2-12](#). Also see [Figure 2-5](#).

- b. The “LONGITUDE” field is a 24-bit (bit 8 of byte 7 through bit 7 of byte 10) field used to encode the ~~latitude of~~ longitude provided to the ADS-B Transmitting Subsystem in WGS-84. The encoding of this field **shall** be as indicated in [Table 2-12](#). Also see [Figure 2-5](#).
- c. The encoding of ALL ZEROS in the “LATITUDE” and “LONGITUDE” and “NIC” (§2.2.4.5.2.4) fields **shall** indicate that Latitude/Longitude information is “unavailable.”

Note: *Since the encoding of ALL ZEROS is a valid location on the earth, ADS-B Receiving Subsystems will interpret this as Latitude/Longitude information “unavailable” only if the NIC field is also set to ZERO.*

If either the Latitude Input or the Longitude Input is “unavailable” for the “Data Lifetime” value listed for this input in [Table 2-64](#), then the LATITUDE, LONGITUDE and NIC fields **shall** default to a value of ALL ZEROS.

Table 2-12: Angular Weighted Binary Encoding of Latitude and Longitude

Quadrant	“LATITUDE” or “LONGITUDE” bits		Meaning	
	MSB	LSB	Latitude	Longitude
			$LSB = \frac{360}{2^{24}} = 0.00002146 \text{ }^\circ$	
	0000 0000	0000 0000 0000 0000	ZERO degrees (Equator)	ZERO degrees (Prime Meridian)
1 st quadrant	0000 0000	0000 0000 0000 0001	LSB degrees North	LSB degrees East

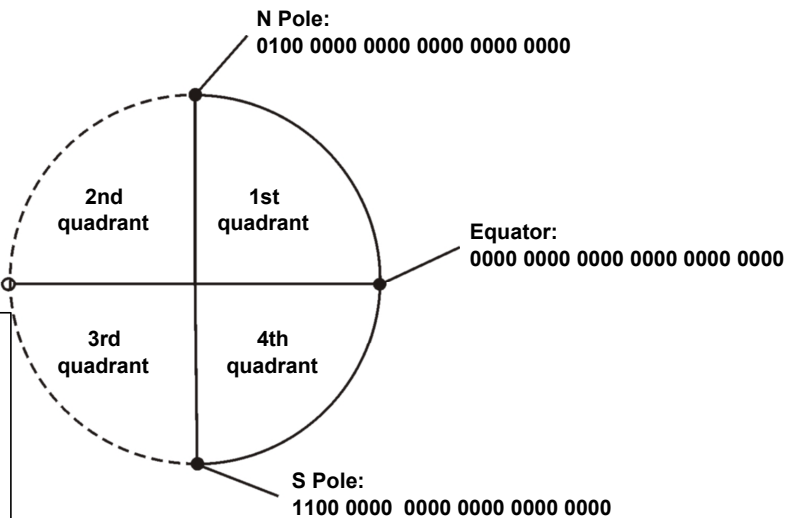
	0011 1111	1111 1111 1111 1111	(90-LSB) degrees North	(90-LSB) degrees East
	0100 0000	0000 0000 0000 0000	90 degrees (North Pole)	90 degrees East
2 nd quadrant	0100 0000	0000 0000 0000 0001	<Illegal Values>	(90+LSB) degrees East
	...		<Illegal Values>	...
	0111 1111	1111 1111 1111 1111	<Illegal Value>	(180-LSB) degrees East
	1000 0000	0000 0000 0000 0000	<Illegal Value>	180 degrees East or West
3 rd quadrant	1000 0000	0000 0000 0000 0001	<Illegal Value>	(180-LSB) degrees West
	...		<Illegal Values>	...
	1011 1111	1111 1111 1111 1111	<Illegal Values>	(90-LSB) degrees West
	1100 0000	0000 0000 0000 0000	-90 degrees (South Pole)	90 degrees West
4 th quadrant	1100 0000	0000 0000 0000 0001	(90-LSB) degrees South	(90-LSB) degrees West

	1111 1111	1111 1111 1111 1111	LSB degrees South	LSB degrees West

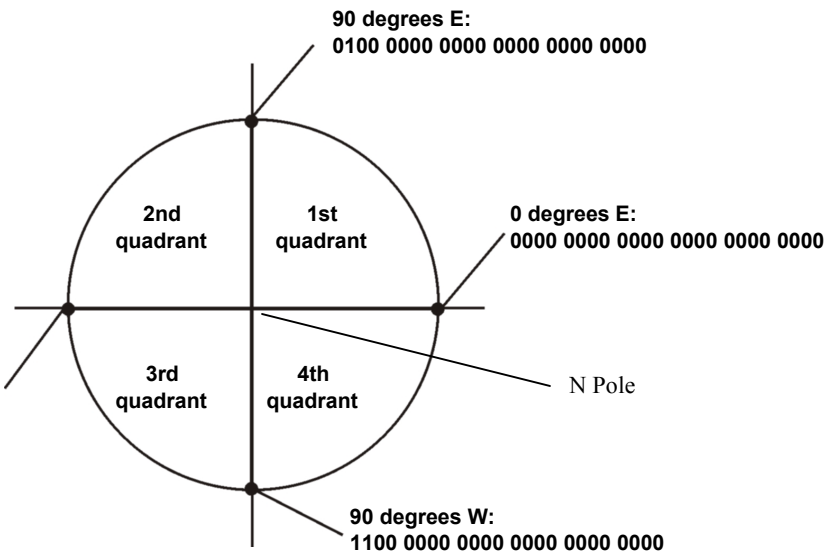
Notes:

1. The most significant bit (MSB) of the angular weighted binary “LATITUDE” is omitted from the transmitted message. This is because all valid Latitudes, other than the Latitude of the North pole (exactly 90 degrees North), have the same value in their 2 most significant bits. The application using the ADS-B reports has the responsibility to differentiate the North and South Poles.
2. Raw data used to establish the Latitude or Longitude fields will normally have more resolution (i.e., more bits) than that required by the Latitude or Longitude fields. When converting such data to the Latitude or Longitude subfields, the accuracy of the data shall be maintained such that it is not worse than +/- 1/2 LSB where the LSB is that of the Latitude or Longitude field.

Latitude Encoding
 Values from
 0000 0000 0000 0000 0000 0000
 to
 0100 0000 0000 0000 0000 0000
 And from
 1100 0000 0000 0000 0000 0000
 to
 1111 1111 1111 1111 1111 1111



180 degrees E = 180 degrees W:
 1000 0000 0000 0000 0000 0000



Longitude Encoding
 Values from
 0000 0000 0000 0000 0000 0000
 to
 1111 1111 1111 1111 1111 1111