with the left-most bit transmitted first.

Note: *Because of the close relationship between the synchronization sequences used for the ADS-B and Ground Uplink Messages, the same correlator can search for both simultaneously.*

2.2.3.2.2 Payload (Before Interleaving and After De-interleaving)

The Payload consists of two components: the first eight bytes that comprise UAT-Specific Header and bytes 9 through 432 that comprise the Application Data as shown in Table 2-4. Bytes and bits are fed to the interleaving process with the most significant byte, byte #1, transmitted first, and within each byte, the most significant bit, bit #1, transmitted first.

Table 2-4: Format of the Ground Uplink Message Payload

Byte #	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
1	(MSB)							
2	GROUND STATION LATITUDE (WGS-84)							
3							(LSB)	(MSB)
4								
5	GROUND STATION LONGITUDE (WGS-84)							
6							(LSB)	P Valid
7	UTC Coupled	Reserved	App Data Valid	(MSB)	Slot ID			(LSB)
8	(MSB)	TIS-B SITE ID		(LSB)	Reserved			
9	Application Data							
432								

The Ground Uplink Payload is composed of an eight-byte UAT-Specific Header, followed by 424 bytes of Application Data. The Application Data field is further composed of one or more *Information Frames (I-Frames)* of uplink service data, as shown in Figure 2.2.3.2.2.

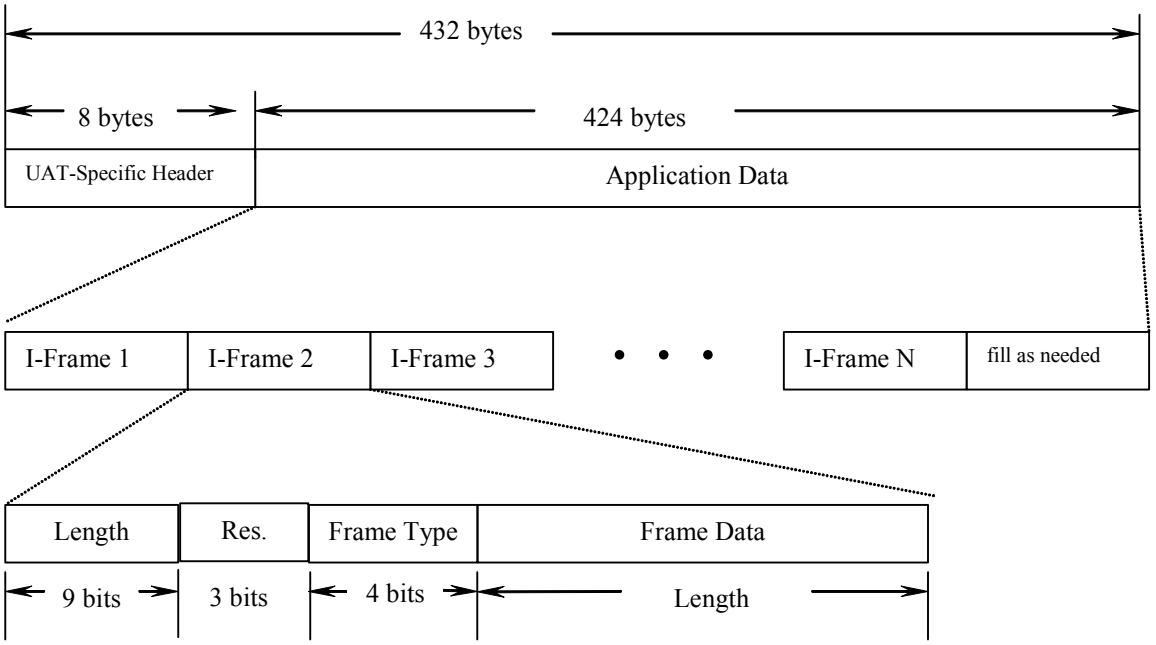

Figure 2.2.3.2.2: Ground Uplink Information Frame

2.2.3.2.2.1 UAT-Specific Header

The UAT-Specific Header is an 8-byte field that contains information on the location of the uplink site, the time slot used to send the present message, validity flags for position, time, and application data, as described in the subparagraphs that follow.

2.2.3.2.2.1.1 "GROUND STATION LATITUDE" Field Encoding

The "GROUND STATION LATITUDE" field is a 23-bit (bit 1 of byte 1 through bit 7 of byte 3) field used to identify the latitude of the ground station. The encoding of this field by the ground station will be the same as defined for latitude information in the ADS-B Message (§2.2.4.5.2.1).

Note: *The resolution of this field has been selected to support a potential passive ranging function.*

2.2.3.2.2.1.2 "GROUND STATION LONGITUDE" Field Encoding

The "GROUND STATION LONGITUDE" field is a 24-bit (bit 8 of byte 3 through bit 7 of byte 6) field used to identify the longitude of the ground station. The encoding of this field by the ground station will be the same as defined for longitude information in the ADS-B Message (§2.2.4.5.2.1).

Note: *The resolution of this field has been selected to support a potential passive ranging function.*

2.2.3.2.2.1.3 "POSITION VALID" Field Encoding

The "POSITION VALID" field is a 1-bit (bit 8 of byte 6) field used to indicate whether or not the position in the header is valid. An encoding of ONE represents a VALID position. An encoding of ZERO represents an INVALID position.

2.2.3.2.2.1.4 "UTC Coupled" Field Encoding

The "UTC Coupled" field is a 1-bit (bit 1 of byte 7) field used to indicate whether or not the ground station 1 Pulse Per Second timing is valid. An encoding of ONE represents VALID timing. An encoding of ZERO represents INVALID timing.

2.2.3.2.2.1.5 Reserved Bit

Bit 2 of byte 7 is reserved for future use and will always be set to ZERO.

2.2.3.2.2.1.6 "APPLICATION DATA VALID" Field Encoding

The "APPLICATION DATA VALID" field is a 1-bit (bit 3 of byte 7) field used to indicate whether or not the Application Data is valid for operational use. An encoding of ONE represents VALID Application Data. An encoding of ZERO represents INVALID Application Data.

Notes:

1. *Airborne applications should ignore the Application Data field when this bit is set to INVALID.*

2. *This field will allow testing and demonstration of new products without impact to operational airborne systems.*

2.2.3.2.2.1.7 "SLOT ID" Field Encoding

The "SLOT ID" field is a 5-bit (bit 4 through bit 8 of byte 7) field used to identify the time slot within which the Ground Uplink Message transmission took place. This field is encoded as a 5-bit unsigned binary numeral.

Note: *The Slot for certain ground station messages may be continually shifted for maximum interference tolerance to other users sharing the band. Airborne receivers do not need a priori knowledge of this shifting scheme; this is for ground service providers to coordinate. The actual Slot ID in use for each uplink message will always be properly encoded by the ground station.*

2.2.3.2.2.1.8 "TIS-B SITE ID" Field Encoding

The "TIS-B SITE ID" field is a 4-bit (bits 1, through 4 of byte 8) field used to convey the reusable TIS-B Site ID that is also encoded with each TIS-B transmission as shown in Table 2-5 below:

Table 2-5: Encoding of TIS-B Site ID

Encoding	Meaning
0000	No TIS-B information transmitted from this site
0001 through 1111	Assigned to ground stations that provide TIS-B information by TIS-B administration authority

Note: *This field supports TIS-B applications that verify TIS-B transmissions were transmitted from the site located at the Latitude/Longitude encoded in the UAT-Specific Header portion of the Ground Uplink payload. The width of the field was selected based upon analysis of the needs of a potential passive ranging function.*

2.2.3.2.2.1.9 Reserved Bits

Bits 5 through 8 of byte 8 are reserved for future use and will be set to ALL ZEROs.

2.2.3.2.2.2 Ground Uplink Application Data

~~Definition of the Application Data field is beyond the scope of this MOPS document and will be provided by other documents.~~As illustrated in Figure 2.2.3.2.2, the Application Data is a fixed-length field of 424 bytes. The Application Data consists of *Information Frames*, and always consists of an integral number of bytes. Any remaining unused portion of the field will be filled with all ZEROs.

Each Information Frame consists of "**N**" bytes, comprising three fields formatted as described in Table 2.2.3.2.2.2.1a.

Table 2.2.3.2.2.2.1a: The Information Frame

Byte #	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
1	MSB	**Length**						
2	LSB	**Reserved**			MSB	**Frame Type**		LSB
3 - N	**Frame Data**							

Note: *The Byte numbers in Table 2.2.3.2.2.2.1a are relative to the beginning of the current Information Frame.*

2.2.3.2.2.2.1 The Length Subfield Encoding

The **Length** field (Bit 1 of Byte 1 through Bit 1 of Byte 2) is a 9-bit field that contains the length of the Frame Data field in bytes. Values range from ZERO (0) through 422 (decimal). The **Length** value is always equal to "**N**-2."

2.2.3.2.2.2.2 The Reserved Subfield Encoding

The **Reserved** field (Bites 2-4 of Byte 2) is a 3-bit field that is reserved for future use, and will be set to ZERO (binary 000) in equipment that complies with these MOPS.

2.2.3.2.2.2.3 The Frame Type Subfield Encoding

The **Frame Type** field (Bits 5 through 8 of Byte 2) is a 4-bit field that contains the indication for the format of the Frame Data field. The Frame Types are defined in Table 2.2.3.2.2.1b.

Table 2.2.3.2.2.2.1b: Frame Types

MSB **Value** (binary) LSB	**Frame Data Format**
0 0 0 0	FIS-B APDU
0001 - 1111	Reserved

2.2.3.2.2.2.4 The Frame Data Content

Each **Frame Data** format is described in the following paragraphs. The Frame Data field is always an integral number of bytes in length.

2.2.3.2.2.2.4.1 FIS-B APDU

When the Frame Type is ZERO (binary 0000), the Frame Data contains an APDU Header, followed by the APDU Data, as described in §3.6, Appendix D, and Appendix E of RTCA DO-267.

2.2.3.2.2.2.4.2 Other Potential Future Frame Data Content

Fifteen (15) reserved values remain for future use. Examples of possible use include Frame Types for the following functions:

- TIS-B Management Information that describes such items as service boundaries and target counts
- TIS-B target information in a compressed format as an alternative to the standard approach that conveys TIS-B target information in an ADS-B Message format
- Frames of differential GPS information
- Frames of addressed (unicast) data

2.2.3.2.3 FEC Parity (Before Interleaving and After De-interleaving)

2.2.3.2.3.1 Code Type

The FEC Parity generation is based on a systematic RS 256-ary code with 8 bit code word symbols. FEC Parity generation for each of the six blocks is per RS (92,72) code.

2.4.3.2.2.1.8 Verification of "TIS-B SITE ID" Field Encoding (§2.2.3.2.2.1.8)

No specific test procedure is required to validate §2.2.3.2.2.1.8.

2.4.3.2.2.1.9 Verification of Reserved Bits (§2.2.3.2.2.1.9)

No specific test procedure is required to validate §2.2.3.2.2.1.9.

2.4.3.2.2.2 Verification of Ground Uplink Application Data (§2.2.3.2.2.2)

No specific test procedure is required to validate §2.2.3.2.2.2.

2.4.3.2.2.2.1 Verification of The Length Subfield Encoding (§2.2.3.2.2.2.1)

No specific test procedure is required to validate §2.2.3.2.2.2.1.

2.4.3.2.2.2.2 Verification of The Reserved Subfield Encoding (§2.2.3.2.2.2.2)

No specific test procedure is required to validate §2.2.3.2.2.2.2.

2.4.3.2.2.2.3 Verification of The Frame Type Subfield Encoding (§2.2.3.2.2.2.3)

No specific test procedure is required to validate §2.2.3.2.2.2.3.

2.4.3.2.2.2.4 Verification of The Frame Data Content (§2.2.3.2.2.2.4)

No specific test procedure is required to validate §2.2.3.2.2.2.4.

2.4.3.2.2.2.4.1 Verification of FIS-B APDU (§2.2.3.2.2.2.4.1)

No specific test procedure is required to validate §2.2.3.2.2.2.4.1.

2.4.3.2.2.2.4.2 Verification of Other Potential Future Frame Data Content (§2.2.3.2.2.2.4.2)

No specific test procedure is required to validate §2.2.3.2.2.2.4.2.

2.4.3.2.3 Verification of FEC Parity (Before Interleaving and After De-interleaving) (§2.2.3.2.3)

No specific test procedure is required to validate §2.2.3.2.3.

2.4.3.2.3.1 Verification of Code Type (§2.2.3.2.3.1)

No specific test procedure is required to validate §2.2.3.2.3.1.

2.4.3.2.3.2 Verification of Generation and Transmission Order of FEC Parity (§2.2.3.2.3.2)

No specific test procedure is required to validate §2.2.3.2.3.2.