FIT Globs

ABSTRACT

Glob messages provide a simple, uniform means of representing large binary objects using the FIT File format.

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1   Introduction

Glob messages are used to represent large data objects ('globs') in the existing .FIT format. Due to design tradeoffs to mitigate resource requirements in the C decoder, the maximum size of a FIT message is 255 bytes. This application note describes the recommended usage of glob messages to represent data that exceeds this size constraint.

2   Relevant Documents

It is strongly recommended that the following documents be reviewed prior to using this application note. To ensure you are using the current versions, check the ANT+ website at www.thisisant.com or contact your ANT+ representative

- Flexible and Interoperable Data Transfer (FIT) Protocol

3   Usage

Users manually split their content into appropriately sized blocks and generate the required number of glob messages, incrementing the part_index appropriately. The final message will probably need to be redefined since it may be a different size than the previous messages. Each glob must be completely encoded before a new one is started. Glob messages for different user globs may not be interlaced even if they are uniquely identified by different combinations of message_number and message_index.

During decode the user concatenates the data fields to reconstruct the original glob content. It is not possible to know in advance the size of the glob contained in a FIT file. Since decoded globs may be replaced by subsequent globs with the same message_number and message_index, the file must be fully decoded (read until end of file) before the data should be used.

4   Glob Variants

A specific glob message is defined for each supported type of content. In this way the format is implied for each message simplifying usage by the decoder. This section defines the currently supported types. New glob types are available on request.

4.1   Memo Glob

Memo_glob messages are intended for representing free form UTF-8 text. The memo field of individual glob messages should not be interpreted until the entire glob has been reassembled since characters could span two messages.

5   Glob Fields

5.1   Part Index

Part Index is a common field used to indicate the sequence of glob messages and to indicate the start of a new glob. When globs are decoded they are concatenated in order of part_index starting from 0. Whenever part_index = 0 is encountered it indicates the start of a new glob. It is not possible to know if the current glob is complete until a new glob is encountered or the end of the file is reached.

5.2   Data

The message specific data should be reconstructed (concatenated) before attempting to use or interpret.

5.3   Message Number

Message Number is used to relate the glob to another FIT message type contained in the file. For example if the glob represented user comments for a particular lap, the message number would be set to '19' for 'lap'.

5.4   Message Index

Message Index may be used in conjunction with message_number to relate the glob to a particular message in the file. For example if message_number = '19' and message_index = '1' relates the glob to lap 1.

Message _index may also be used as an identifier by not including the message_number field or setting it to 'MESG_NUM_MEMO_GLOB'. In this case message_index should be interpreted as an identifier. If multiple globs with the same message_number/message_index combination are encountered, newer ones are regarded as superseding previous ones.

6 Example

The following example demonstrates the intended usage of glob messages.

An example application allows the coach to enter comments pertaining to each lap of a training run. In order to preserve the coach's comments, the application generates glob messages and stores them in the FIT activity file.
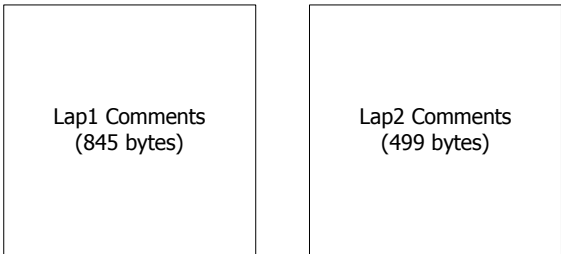
Lap1 Comments (845 bytes)	Lap2 Comments (499 bytes)

Figure 1. User Glob Data

Since the user data is larger than the maximum single message size (of 255 bytes), it must be encoded into a number of glob messages. The Lap1 comments are chosen to be encoded first and a convenient block size of 200 bytes is selected. Since 8 bytes are used for the other 3 fields in the memo_glob message (part_index, message_number and message_index) the memo field may be no larger than 247 bytes. A message definition is created defining the format of the glob data messages to follow.

The data is meant to relate to the lap1 message found elsewhere in the activity file so the mesg_num field is set to '19', the message number for 'lap'. The mesg_index is set to '1' corresponding to the mesg_index of the desired lap message. The user data is divided into 200 byte blocks and memo_glob messages are created incrementing part_index each time.

mesg defn1 memo_glob			

part_index 0	mesg_num 19	mesg_index 1	data (bytes 0-199)

part_index 1	mesg_num 19	mesg_index 1	data (bytes 200-399)

part_index 2	mesg_num 19	mesg_index 1	data (bytes 400-599)

part_index 3	mesg_num 19	mesg_index 1	data (bytes 600-799)

Figure 2. Full block messages

There are not enough data bytes to create a data message for part_index 4 so the message must be redefined to reflect the new size. Padding with NULL or other values is not permitted. A new message definition is created indicating the size of field0 will now be 45 bytes. Now the final memo_glob data message may be generated.

mesg defn2 memo_glob			

part_index 4	mesg_num 19	mesg_index 1	data (bytes 800-844)

Figure 3. New data block size requires redefinition

Now that Lap1's comments have been completely written to the FIT file, the 2nd glob relating to Lap2 may be encoded. A block size of 200 is again chosen and the process is the same. Mesg_num remains set to 19 ('lap'), but mesg_index is now set to 2. The part index also resets and again starts counting up from 0.
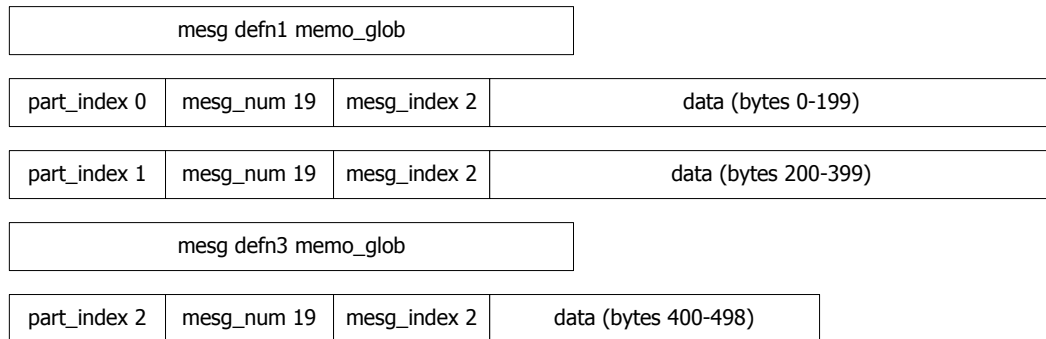
mesg defn1 memo_glob			
part_index 0	mesg_num 19	mesg_index 2	data (bytes 0-199)

part_index 1	mesg_num 19	mesg_index 2	data (bytes 200-399)

mesg defn3 memo_glob			
part_index 2	mesg_num 19	mesg_index 2	data (bytes 400-498)

Figure 4. Encoding 'Lap2 Comments'

7   Closing Remarks

This application note describes FIT glob messages and their intended usage.

If any of the concepts presented in this application note are unclear or for any further inquiries, please use the developer forum at www.thisisant.com.