SharedLink Protocol Specification Overview

SharedLink consists of two lists that are shared between two computers. It is primarily a point-to-point protocol but does have some addressing capability.

The protocol is a message format with open and close characters and line termination characters.

'['   Open channel character
']'   close channel character
crlf   End of line character pair

Shared link messages are contained between the open and close characters as shown.

[header addressing message_body] crlf

The spaces shown in this, and subsequent examples, are for clarity only. The actual SharedLink message does not have any spaces placed intentionally, unless part of a message body.

The header is a colon character ':' and the addressing is the character 'A' through 'P' assigned to addresses 1 – 16.

The destination character is followed by the source character.

[: A B message_body] crlf

This message is addressed to node 1 sent from node 2. Sent to A from B.

The message_body begins with a pipe character and ends with the close channel character "]".

Fields within the message_body are separated by the pipe character "|".

The message_body consists of many fields based upon the mode of the packet. The shared link message ends with a checksum field.

Each field begins with a field type character 'D' for Data, 'C' for checksum etc.

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Each field ends with a pipe character "|" or the close channel character ']'.

It is assumed that a valid message_body ends with a checksum field.

[: A B |message fields| C xx] crlf

where 'xx' is the calculated checksum.

As mentioned, the message fields are mode sensitive based upon the sequence of messages.

The checksum is a simple modulo 8 addition of the ASCII values of all the characters from the header ":" to the checksum field indicator "C" inclusive. The following pseudo formula indicates the checksum approach.

(ASCII(:) + ASCII(A) + ASCII(B) + ASCII(|) + ... + ASCII(|) + ASCII(C)) MODULO 8

Initially it is easiest to assume that both the inbound and outbound shared variable lists are known a priori. The Inbound and Outbound list on an individual node do not need to be the same. However, the Inbound list on the receiving node (e.g., node A) needs to be the same as the Outbound list on the sending node (e.g., node B) and visa versa.

Each end of the serial stream or node sends a SharedLink message consisting of a 'D' field for each Shared Variable in the outbound list.

The message body starts out with an 'N' field that indicates which shared variable 'Set' is being transmitted. A message can contain a subset of previous messages' shared variables. If a subset is being transmitted the N field is used to indicate the starting position of the subset (i.e. the array index). If sending a full set 'N' field will have a value of 0. This is used to break up long lists of shared variables into smaller message_body sizes.

[: A B | N 0 | message_body | C xx] crlf

The 'D' or data field contains the string representation of the value of the Shared Variable assigned to that position of data fields. There is a single data field for each shared variable in the outbound shared variable list.

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Assume an outbound SharedVariable list has the following four(4) entries:

> AutoGpsLat
> AutoGpsLon
> AutoGpsHead
> AutoGpsVel

A simple message to send would be:

> [: A B | N 0 | D 40.12345678 | D -113.12345678 | D 85.6 | D 22.1 | C xx] crld

Where: AutoGpsLat = 40.12345678 degrees
           AutoGpsLon = -113.12345678 degrees
           AutoGpsHead = 85.6 degrees
           AutoGpsVel = 22.1 mph

The other end of the SharedLink connection would receive this message into the same SharedVariable list as the inbound shared variable list.

This is a very simple method and a simple example of the shared link protocol.

Additional elements are as follows:

If the 'D' has not changed from the last transmission, the value can be eliminated for save bandwidth. This is called shared variable compression.

If shared variable compression is used, then the full data must be transmitted periodically, even though it has not changed, usually once per second.

The 'Q' field represents a query for a specific shared variable name. The receiving node responds with 'R' and 'D' fields. This provides the ability to request and respond with specific ad hoc shared variables.

A single shared variable's value can be sent with the 'R' and 'D' fields. The 'R' field indicates which the shared variable the following 'D' field value belongs too.

> [: A B | Q AutoGpsLat | C xx] crld
> [: B A | R AutoGpsLat | D 40.12345678 | C xx] crld