1 QStates Classification Output Socket

When QStates is used in real-time mode, it opens a client socket that will connect to a data stream server on port 8844. QStates also opens an output socket, as a server, that streams the classifications results data on port 8944. When a client connects to the server socket, QStates:

- sends a Greeting packet,
- waits to receive a Data Start packet on its data in socket
- sends a Model Names packets,
- then begins streaming Classification Results packets every two seconds.

The byte structure of the packets is described in the following sections.

1.1 Packet structure

All packets have the same header structure. The purpose of the header is to have a delimiter to define the beginning of the packet and to define the packet type, length of the packet and the packet number. The header consists of 12 bytes. The packet data follows the header.

All number data is in **big-endian format**, this applies to unsigned integers and floating point numbers.

The "Byte Offset" indicates the byte number in the packet where the given packet element starts. Notice that the Packet Start element begins at byte offset = 0 and 5 bytes long. That means that the Packet Start element is the first 5 bytes of the packet. Also notice that the byte offset plus the element length is the byte offset of the next element.

	Field	Byte Offset	Element Length	Data Type	Description
Header	Packet Start	0	5 bytes	ASCII	All packets start with "@ABCD "
	Packet Type	5	1 byte	Unsigned Integer	1 Classification Results 2 Model Names 3 Greeting
	Packet Length	6	2 bytes	Unsigned Integer	Number of bytes in the packet after the header.
	Packet Number	8	4 bytes	Unsigned Integer	The packet number starts at 0. The server increments for every packet it sends.
Data		12	Packet Length number of bytes	Depends on Packet Type	Packet payload

2   Greeting Packets

The greeting packets, like all other packets start with the 12 byte header that is described in the proceeding section. The greeting packet will be identified by having a value of 3 in the packet type byte (fifth byte) of the packet header. The greeting packet contains a greeting message that is simply an ASCII sting of the length indicated in the packet header. The greeting string ends with a <return> character and <newline> character (\r\n). The hexadecimal representation of these two characters is 0x1310.

Field	Byte Offset	Element Length	Data Type	Description
Header	0	12 bytes	Mixed	Described in previous section.
Greeting Text	12	"Packet Length" bytes	ASCII	QStates Version x.y \r\n

3   Model Names Packet

The model names packet contains a list of the models selected on the QStates GUI. For a single model selected there may be as many as four models listed in this packet. QStates reports the classification results using an MVNPDF and a Linearized approach to determining the likelihood of being in the high state. If the PSM is present, the results each model will be reported as HEADonly and HEADPSM. The final element in the model list is Quality of Data (QOD). The model list is delimited by \r\n (0x1310).

Field	Byte Offset	Element Length	Data Type	Description
Header	0	12 bytes	Mixed	Described in previous section.
Model Names	12	"Packet Length" bytes	ASCII	\r\n delimited list of the model names. The last element will be "QOD".

4 Classification Results Packet

Once the Data Start packet is received from the data stream, QStates begins classifying and reporting the classification results in two second epochs. The results for each model are given in the same order as given in the Model Names packet.

Field	Byte Offset	Element Length	Data Type	Description
Header	0	12 bytes	Mixed	Described in previous section.
Timestamp	12	4 bytes	Float	The timestamp of the first data point in the epoch.
Classification Result for Model #1	16	4 byte	Float	Likelihood that the subject is in the high state.
Classification Result for Model #2	20	4 bytes	Float	Likelihood that the subject is in the high state.
…	…	4 bytes	Float	Likelihood that the subject is in the high state.
Classification Result for Model #N	4*N + 16	4 bytes	Float	Likelihood that the subject is in the high state.
Quality of Data	4*N + 20	4 bytes	Float	Likelihood that the data is reliable.