I2C PROTOCOL: MESSAGE FRAME
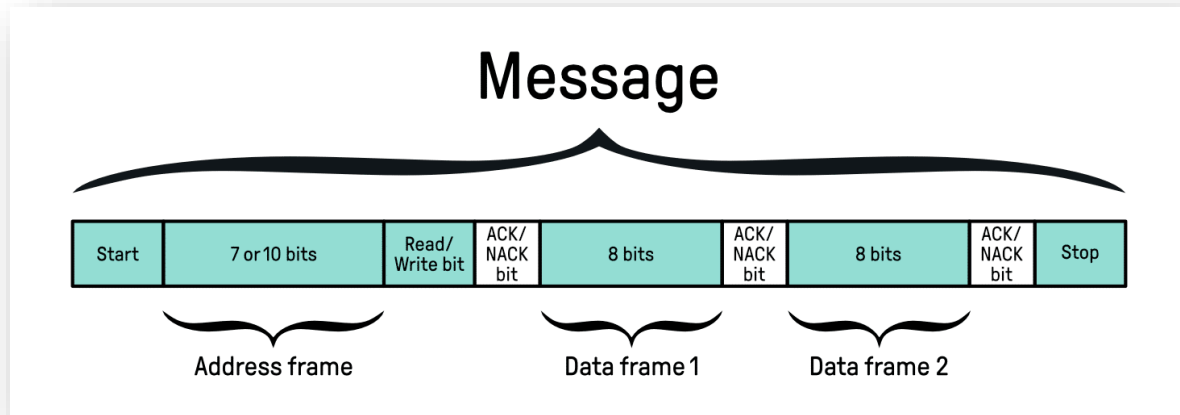
Description of the Message Frame of I2C Protocol

Message Frame

The I2C communication protocol, data is transmitted in messages. Each message is broken up into frames of data. A message will begin with the ***start condition***, which is the transition of SDA line from an Idle state (logic high level) to an activate state (logic low level) while the SCL line is idle. This condition is always initiated by the master and signifies the beginning of the transmission.

Then, we have the address frame made by 7 or 10 bits. This address frame is used to identify the slave or controller that we want to talk. Each controller has its own address.

After this, we have the read/write process, here we are going to say if we want to read (1) or to write(0). When the controller is sending data (write), it operates with a low voltage level. Meanwhile, when the controller is requesting data from then peripheral or the slave (read), it operates at high voltage level.

After that, we are going to wait for the acknowledge bit or not acknowledge that is sent by the slave. If the peripheral successfully received a sent address or a data frame, an ACK (0) bit will be sent back. If the data was not successfully, we will receive a NACK (1).

Once the controller receives its first ACK from the slave, it's time for data frame to be sent. Unlike the address frame which can be 7 or 10 bits, the data frame is always 8 bits long. The data bits are sent in order of importance, with the most significant being sent first, and the least last. After every data frame, an ACK/NACK bit is sent to verify if the frame was successfully acknowledged. The ACK bit must be received before the next data frame gets sent.

To finish we have the stop condition that is the transition of the SDA line from an active state to an idle state while the SCL line is idle. The master will issue a Stop condition when it has completed its transactions and is ready to release control of the bus.