**NAME**: Shaydon Bodemar

Rename the completed Word document to *yourlastname\_Q7.docx* before emailing it to [tlupfer@sandiego.edu](mailto:tlupfer@sandiego.edu). In other words, my quiz would be named *lupfer\_Q7.docx*.

This is a closed-book, off-grid (no Internet searches) quiz. You have 20 minutes to complete it.

**Reminder**: USD Honor Code: [www.sandiego.edu/conduct/documents/HonorCode.pdf](http://www.sandiego.edu/conduct/documents/HonorCode.pdf)

**All questions are worth 20 points (5 x 20 = 100 points total)**

What are the characteristics of MQTT that make it suitable for IoT devices?

1. **Answer**: lightweight, simple, easy to use, thus ideal for applications where code minimization and data transfer minimization are priorities

Describe the publish/subscribe model and explain the role of the broker in that model.

1. **Answer**: The publishers essentially provide data on certain topics, while subscribers are dealt that data, and the broker acts as the intermediary for serving that data and maintaining that connection, along with a number of other useful features.

How does MQTT differ from a message queue?

1. **Answer**: MQTT does not store until the data is used, if nothing is subscribed it will not retain the data unless flagged to do so. It also does not have to be hard-coded, so MQTT allows on-the-fly topic creation where queues must be implemented in the source code. The last main difference is that MQTT allows multiple subscribers, where a queue typically only has one consumer of the data stream.

Describe the Last Will and Testament (LWT) feature of MQTT? What purpose does it serve?

1. **Answer**: The LWT is a notification that goes out to connected clients, which alerts these connected clients of an “ungraceful” disconnection by another client.

Where are MQTT clients in an IoT implementation? Are they at the edge, are they in the cloud, can they be in both places? Give this some thought before answering and consider how we observed the messages being sent from our development board.

1. **Answer**: In an IoT implementation, the MQTT clients are often on the edge (and the edge devices would never be acting as the broker), but there can be clients in the cloud as well, for instance a subscriber can be implemented in the cloud. Even the cell phone can be considered a subscriber/publisher, which is not necessarily considered an edge device.

Describe the role played by topics in MQTT. Does every subscriber receive every published message? If not, what determines what a subscriber receives? Is there a way a subscriber can receive a subset of messages?

1. **Answer**: Not every subscriber receives every message. What a subscriber receives is determined by the Subscribe messages that are passed to the broker, which in addition to a PacketID contain a list of topic names and the QoS. A subscriber can receive a subset of messages by taking advantage of topic levels, for instance if there was a “home/rooms/kitchen”, a subscriber could subscribe to “home/rooms” indicating a level higher than just the kitchen which could include any other rooms involved.

Do publishers and subscribers ever contact each other directly? What knowledge do they have of each other?

1. **Answer**: Publishers and subscribers only ever have direct contact with the broker, and neither has any knowledge of other publishers/subscribers that are connected to the broker.

Can a device both publish and subscribe to messages?

1. **Answer**: Yes

Does MQTT strictly define the format of the message data? Is MQTT message data always ASCII text or can it be binary data?

1. **Answer**: MQTT is data agnostic, any type of data can be attached to it, just enough information must be provided to enable function.

Once a client subscribes to a topic, is it destined to forever receive all messages to that topic? Explain your answer.

1. **Answer**: No, as a modification to its SUBACK will allow it to change the topics it is subscribed to.