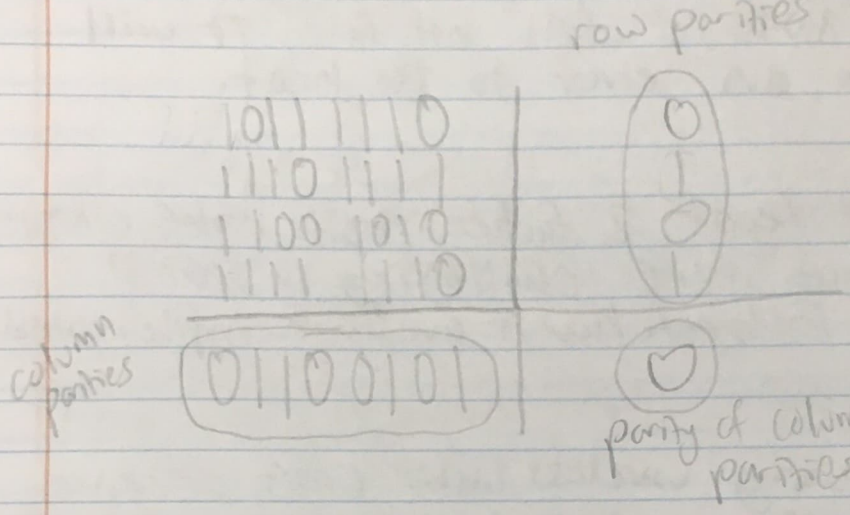
Sprint 2 Deliverables Questions

- 0xBEEFCAFE = 1011 1110 1110 1111 1100 1010 1111 1110



13 extra bits

Link Layer Protocols

Explain briefly how Ethernet manages access to link to ensure transmissions don't interfere.

Since Ethernet is CMSA/CD, it is able to detect collisions and manage multiaccess use.
Each sender is able to determine when a collision is in progress and the sender is able to send a 32 bit jamming sequence and stop transmission. Then, an adaptor will wait some time and try transmitting the data again. After each attempt to send the data, the time waiting for the link to be idle doubles according to the concept of exponential backoff.

Basically, the max waiting time will double but each wait time is a multiple of 51.2 μs. The adaptor may try this technique for up to 16 times and if the link is still not idle, it will send an error to the host.

Describe at least 2 factors that make collision avoidance more challenging in 802.11 than in Ethernet. How is avoidance implemented?

1. Nodes using wireless links can't receive every other node's transmissions. Basically, there may be obstacles in the way or another node of interest might be too far away. This is also related to the problem of hidden nodes being outside the ranges of each other but still running into collisions if they send to a node present in both ranges.

2. Nodes cannot transmit and receive packets at the same time. The power generated by a transmission will be higher than receiving transmissions and overwhelm the circuits involved with receiving.

Sprint Questions

How is avoidance implemented?

When data is sent, a sender will first check to hear any other transmissions before transmitting the data to another node. However, even if there are no other signals, the hidden node problem can still occur so the sender will send out an RTS signal indicating the sender is ready to send, and if it reaches the destination node successfully, then the destination node sends a clear to send signal. The CTS will likely notify any hidden nodes to not interact with the sender's destination node. If two RTS signals collided, then the two nodes would need to wait before trying to send an RTS again and this follows the rule of exponential backoff like Ethernet. After successfully exchanging RTS and CTS frames, the sender will send the packet and expect an ACK in response.

MAC Addresses

Significance of MAC addresses. How is a MAC Address set?

A MAC address is a unique identifier for every Ethernet host that is 48 bits in length and burned into ROM. MAC Addresses are needed for transmitting data over a wired link to a specific host. A host's adapter will receive every frame traveling on the link but will only accept the frames if they contain the host's address as a part of the Destination address section of the frame. MAC helps to control access to a shared Ethernet link and is thus necessary for links that contain many hosts sending data onto the link.

MAC Addresses are assigned by the Ethernet device manufacturers. Each manufacturer has its own prefix sequence of bits that it can use for all of the devices it creates and these prefixes are placed at the beginning of an adapter's address. The rest of the address is made unique for each adapter that is produced by the manufacturer.