

SANTA CLARA UNIVERSITY
Electrical and Computer Engineering Department

Real-Time Embedded Systems - ECEN 121
Assignment - Week 8
(20 points)

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Answer the following questions about USB.

1. What is the virtual connection between a host and a device endpoint called?

Pipes or a pipe.

2. What is the most appropriate transfer type to use for USB headphones?

Isochronous transfer because we just need the data to be delivered.

3. How many hosts are supported in the USB protocol?

Just one.

4. How many frames are transmitted per second (maximum) in a USB 1.1 system?

USB 1.1 is also known as USB 1.0 Full Speed which can transfer 12 Mbps. Factoring in the size of these frames, the frames per second ends up being around 1000fps.

5. How many bits in a packet are used to describe the device address?

Seven bits

6. What type of transfers do not require an ACK response for a successful transfer?

Isochronous transfers.

7. What is the difference between a DATA0 packet and a DATA1 packet?

It's the same type of data packet, but one has label 0 and the other is labeled 1. They switch off every other turn so the receiver makes sure it's receiving data correctly. If it gets two of any packet type in a row, then the system knows something is wrong. I found this online:

"For Control transfers, the SETUP packet has a Toggle bit of 0 (zero). If there are any DATA packets to follow, the first one starts with a Toggle bit of 1 (one), each further DATA stage packet toggling this bit. The STATUS packet always has a Toggle bit of 1 (one), no matter the state of the previous packet." (Stack Overflow)

8. What is the MX_USB_HOST_Process() state called where configuration is complete and useful data transfers with the device are performed?

The state is called HOST_CLASS