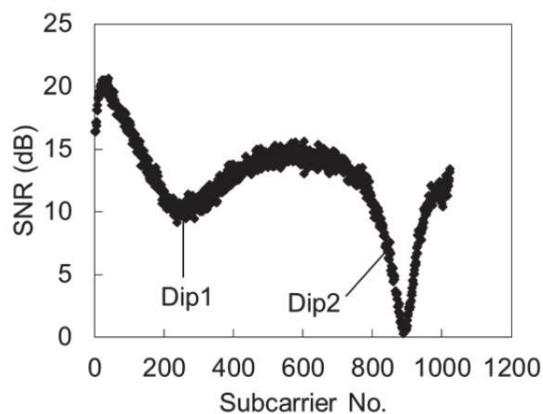


Study questions for OFDM & DMT

1. Give a sketch of the spectra of an orthogonal frequency-division multiplexing signal. Discuss the choice of spacing between subcarriers.
2. Describe how OFDM can avoid intersymbol interference by discussing its time domain attributes.
3. Discuss the time domain versus the frequency domain characteristics of a multipath channel. Give a sketch of the impulse response and the frequency response of a multipath channel.
4. Discuss the symbol duration of a single carrier signal compared to the symbol duration of a symbol on a single subcarrier in an OFDM signal. How is the symbol duration related to the subcarrier frequency spectrum?
5. Describe the mathematical manipulations required to modulate a digital symbol onto an OFDM signal.
6. Give a block diagram of an OFDM system from data to transmit to data received.
7. What is the motivation to use an OFDM signal for a multipath channel? What are the alternatives to using OFDM? What are the advantages and disadvantages of each approach?
8. Give a sketch of a typical OFDM signal in the time domain. Contrast this with a BPSK signal in the time domain. Discuss the peak to average problem with OFDM.
9. Give one major advantage and one major challenge when using OFDM to combat multipath.
10. How are OFDM and DMT related? How are they different? Which is higher performance?
11. Describe the concept of waterfilling to explain the optimality of DMT.
12. Describe how waterfilling allocates power to optimize capacity in a DMT system.
13. For the following channel, which subcarriers in DMT will have the greatest number of bits allocated to it? Which will have no bits allocated to it? Which will have a small number of bits allocated to it?



14. For the following channel (see previous question), which frequency components will have the highest power allocation? Which frequencies will have the lowest power allocated to it?
15. For a channel that is frequently changing in time would it be better to use OFDM or DMT? Justify your response.
16. DMT was first applied to telephone line modems. Why was this a good choice for DMT rather than OFDM? Justify your response.

17. OFDM is frequently used in wireless communications, and DMT is almost unheard of in these situations. What characteristic of the wireless channels makes OFDM preferred over DMT? Justify your response.