

## ECE435: Network Engineering – Homework 9

**Due: Friday 10 April 2026, 5:00pm**

For this homework short answers will suffice.

To submit, create a document with your answers (text, pdf, libreoffice, MS Office if you must) and e-mail them to *vincent.weaver@maine.edu* by the homework deadline. Title your e-mail “ECE435 Homework 9” and be sure your name is included in the document.

### 1. Physical Layer – Bandwidth Calculations

- (a) You have a network connection where the signal to noise (S/N) ratio is 25. What is this equal to in dB? (HINT:  $dB = 10\log\frac{S}{N}$ )
- (b) You have a connection with 100MHz of bandwidth and 20dB S/N ratio. What’s your maximum transmission speed predicted by the Shannon theorem? (HINT:  $bps = H\log_2(1 + \frac{S}{N})$ , where H is bandwidth)

### 2. Physical Layer – Tradeoffs

For the following your answer can be brief but be sure it adequately explains the benefit.

- (a) What is one benefit fiber optics have over copper wire?
- (b) What is one benefit fiber connections have over satellite?
- (c) What is one benefit satellite connections have over fiber?

### 3. Physical Layer – Regulations

- (a) For your final project you decide to build a transmitter that transmits a 100W signal at 4.3GHz. Can you? Who is likely to get upset about this?