CSE 461

Section 4

Homework Comments

- Use bytes and powers of 2 for data, bits and powers of 10 for bandwidth
- Example
  - How much data fits in a 10.24 kbps link with 0.1s latency?
  - How about a 10kbps link instead?
- We were relaxed about the powers on the first homework about this, but please use these conventions and check your conversion (hint: use units)

Hamming Distance

- Distance is the minimum number of bit flips needed to change a codeword (data + check bits) to another valid codeword
- Example: 2 data bits + parity check bit
    - What are the valid code words?
    - What is the hamming distance?
    - How many bits of error can be detected?
    - How many bits of error can be corrected?
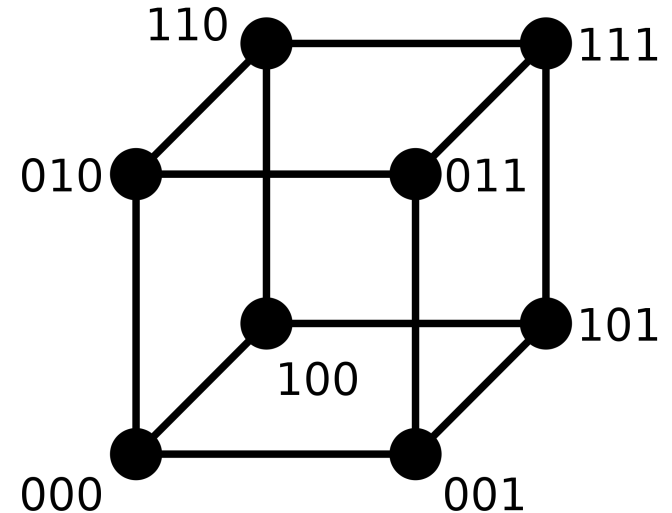
Hamming Distance

- For a code of distance d+1, up to d errors will always be detected
- For a code of distance 2d+1, up to d errors can always be corrected by mapping to the closest codeword
- Example
  - Hamming distance of 5
    - How many errors can be detected? How about corrected?
  - Hamming distance of 6
    - How many errors can be detected? How about corrected?

Surprise Exam 2 Problem 1

- Double Parity: 2 parity bits
  - one for the odd data bits
  - the other for the even data bits
- What are the parity bits for 10110101?
- What is the hamming distance?

MAC Addresses

- 48 bit unique addresses assigned to network interfaces
  - Network Interface Card (NIC) manufacturers have their own address prefix(es)!
- Also known as *physical address*
- Used by Ethernet and WiFi at the Data Link Layer

Switching Tables

- Switches use frame addresses to connect input port to the right output port
- Uses backwards learning to figure out which address goes with which port
  - Ex. Switch receives frame from port 2 with sender address A1, it learns A1 is on port 2.
- Live Demo

Spanning Tree Algorithm

1. Elect a root node of the tree (switch with the lowest address)
2. Grow tree as shortest distances from the root (using lowest address to break distance ties)
3. Turn off ports for forwarding if they aren't on the spanning tree