Franklin Colton Parry

Homework 12 & C

CS 2600

10/23/2013

12. Give an example of a 4-bit error (i.e., 4 bits are changed in the message) that would not be detected by two-dimensional parity, as illustrated in Figure 2.14. What is the general set of circumstances under which 4-bit errors will be undetected? You can do this in handwritten form, but please write and scan it neatly so that columns line up, etc. (5 points)

The general set of circumstances is that the errors must be two errors that occur on the same line and the same row. In other words a bit string needs to have two errors that occur, and a different bit string must have the same errors in the same bit locations.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fig 2.14 | | | | | | | |  | Parity Error | | | | | | | |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |  | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |  | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |  | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 |  | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |  | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |  | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |  | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |

C. What are the advantages of a CRC over the Internet checksum algorithm?

What are the disadvantages? (5 points)

One of the advantages of the CRC is that it is extremely reliable. It has a probability of having and undetected error of less than one in one trillion for a regularly sized frame. Another advantage is that it is widely used