



SNS COLLEGE OF TECHNOLOGY COIMBATORE



AN AUTONOMOUS INSTITUTION

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Approved by AICTE New Delhi & affiliated to the Anna University, Chennai

DEPARTMENT OF MCA

Course Name : 19CAT603 - DATA COMMUNICATION AND NETWORK

Class : I Year / I Semester

Unit II - ERROR CONTROL AND DATA LINK PROTOCOLS

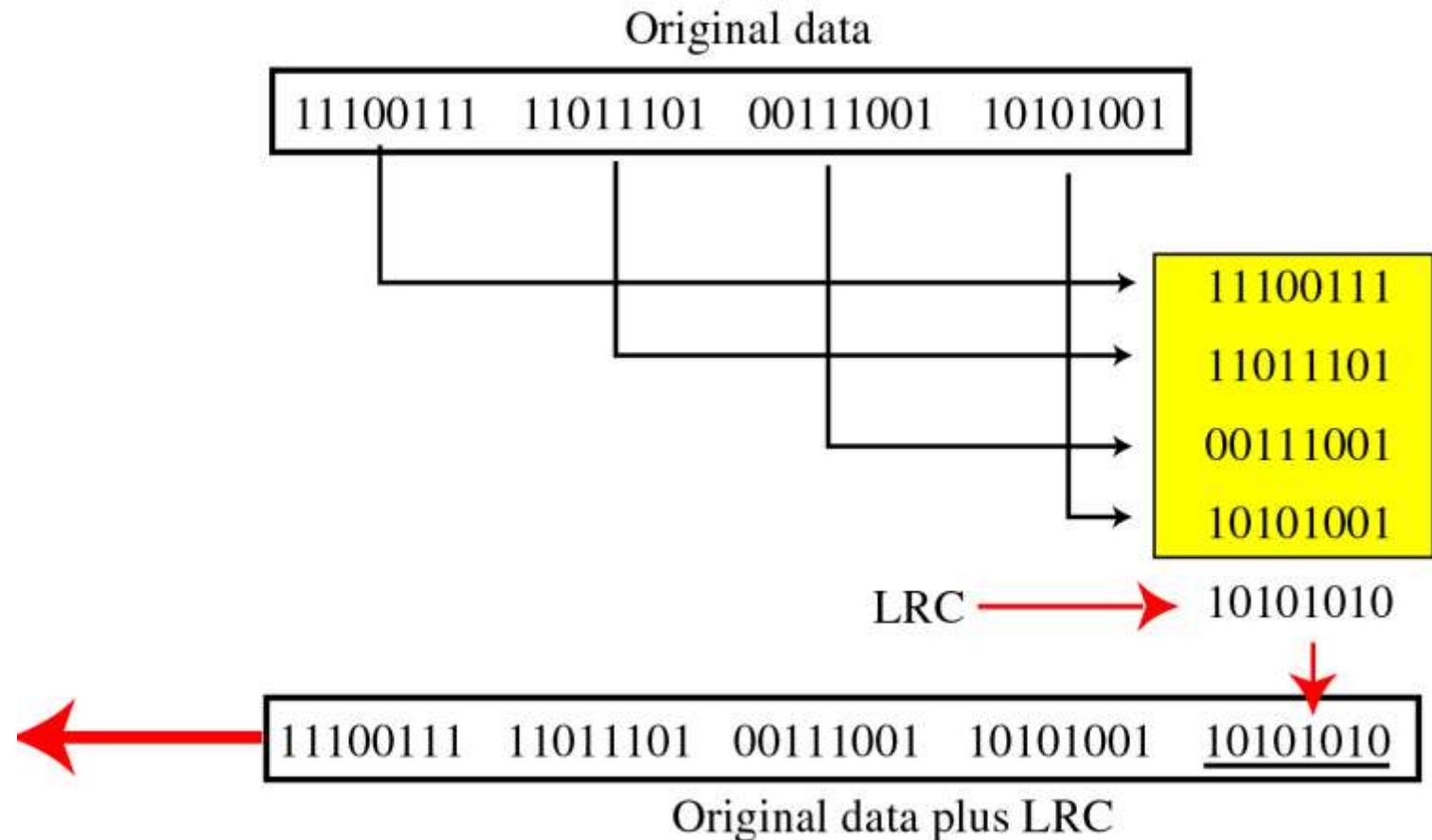
Topic 4 – LRC and CRC



Longitudinal Redundancy Check LRC

LRC(Longitudinal Redundancy Check)

Parity bits of all the positions are assembled into a new data unit, which is added to the end of the data block

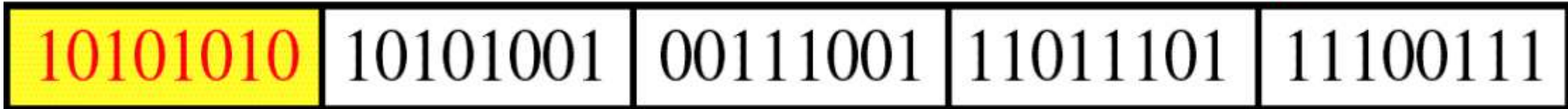




Longitudinal Redundancy Check LRC



Direction of movement



LRC

Data

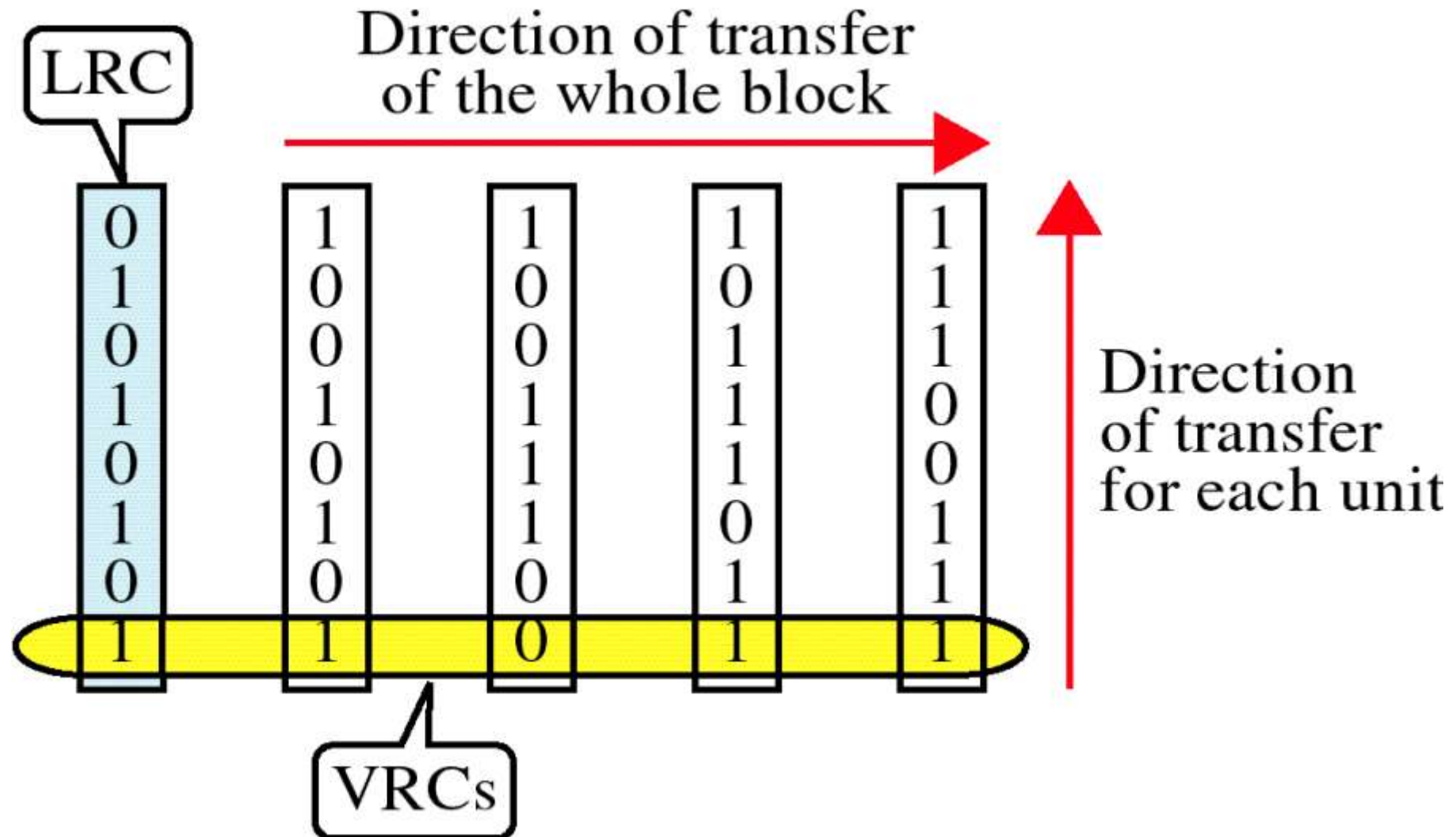


Performance

- LRC increases the likelihood of detecting burst errors.
- If two bits in one data units are damaged and two bits in exactly the same positions in another data unit are also damaged, the LRC checker will not detect an error.

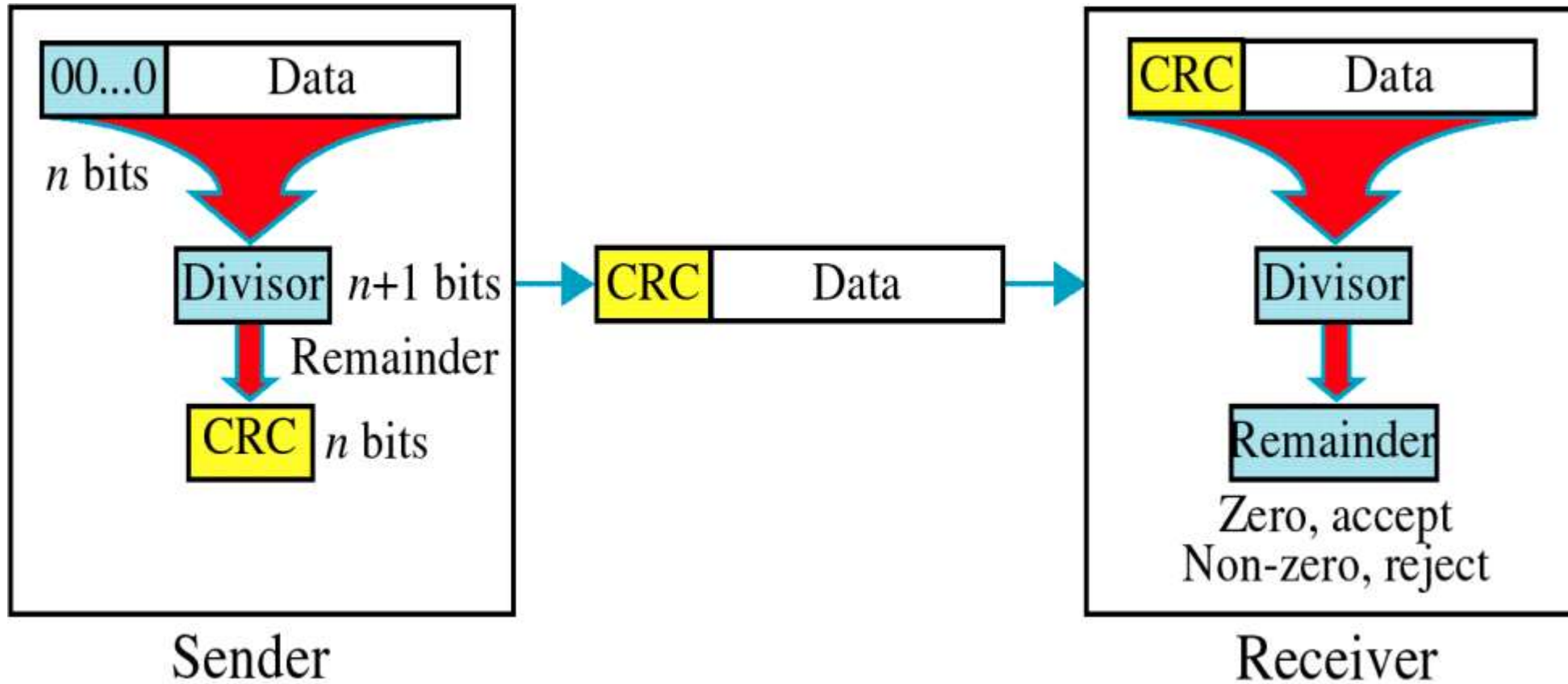


VRC and LRC





Cyclic Redundancy Check CRC





Cyclic Redundancy Check



Given a k -bit frame or message, the transmitter generates an n -bit sequence, known as a frame check sequence (FCS), so that the resulting frame, consisting of $(k+n)$ bits, is exactly divisible by some predetermined number.

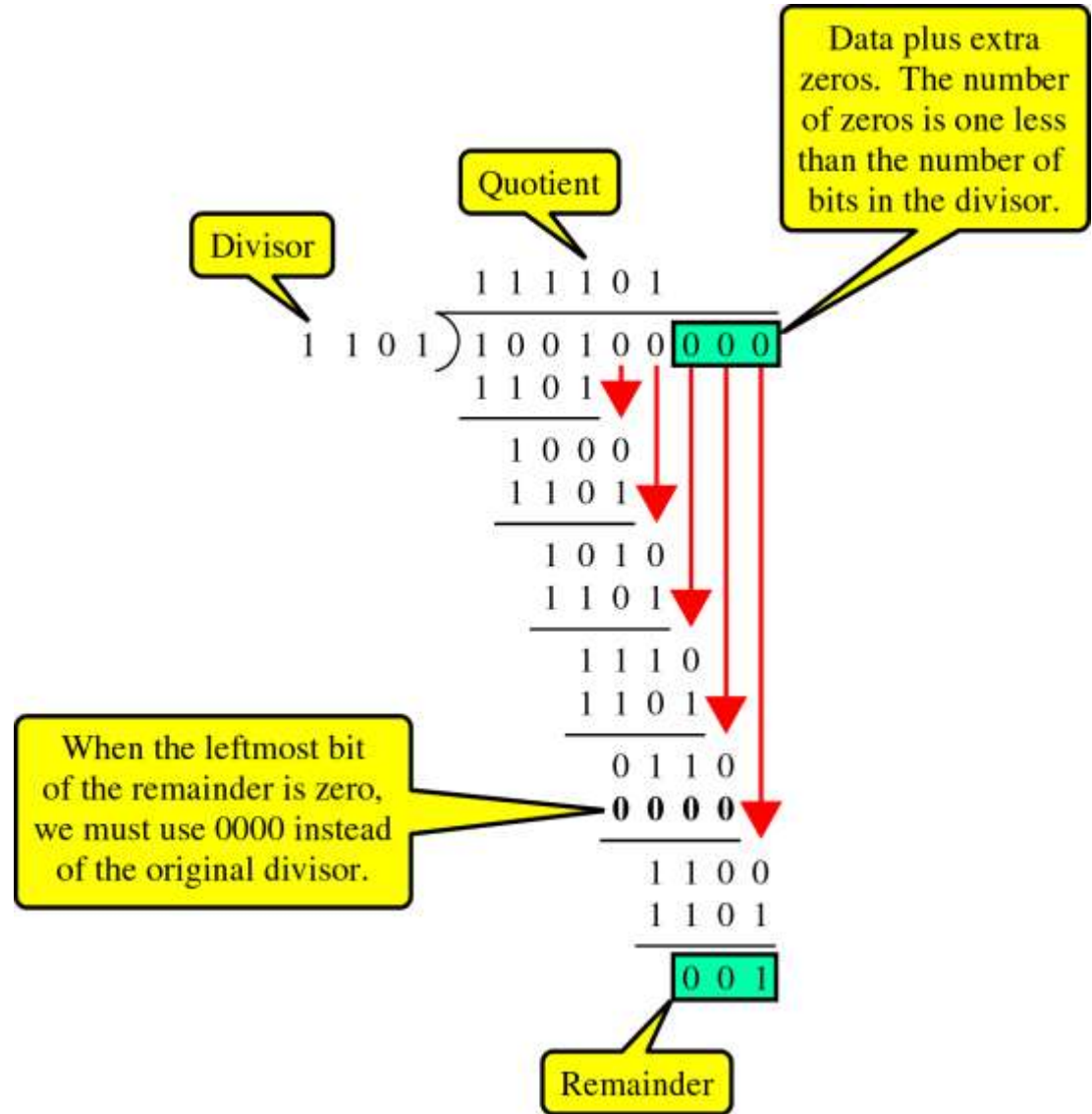
The receiver then divides the incoming frame by the same number and, if there is no remainder, assumes that there was no error.



Binary Division

CRC generator
~ uses modular-2
division.

Binary Division in a CRC Generator

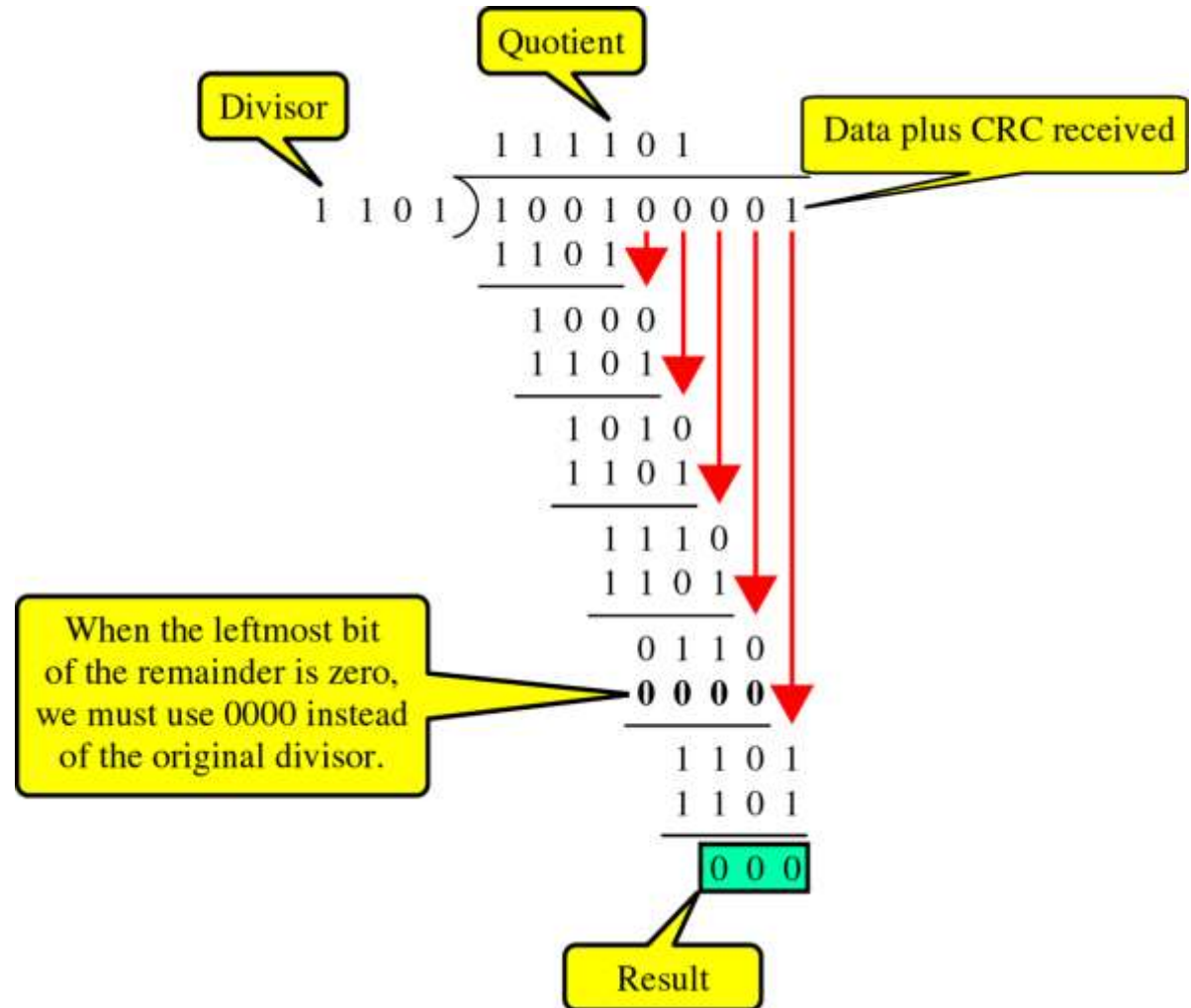




Binary Division



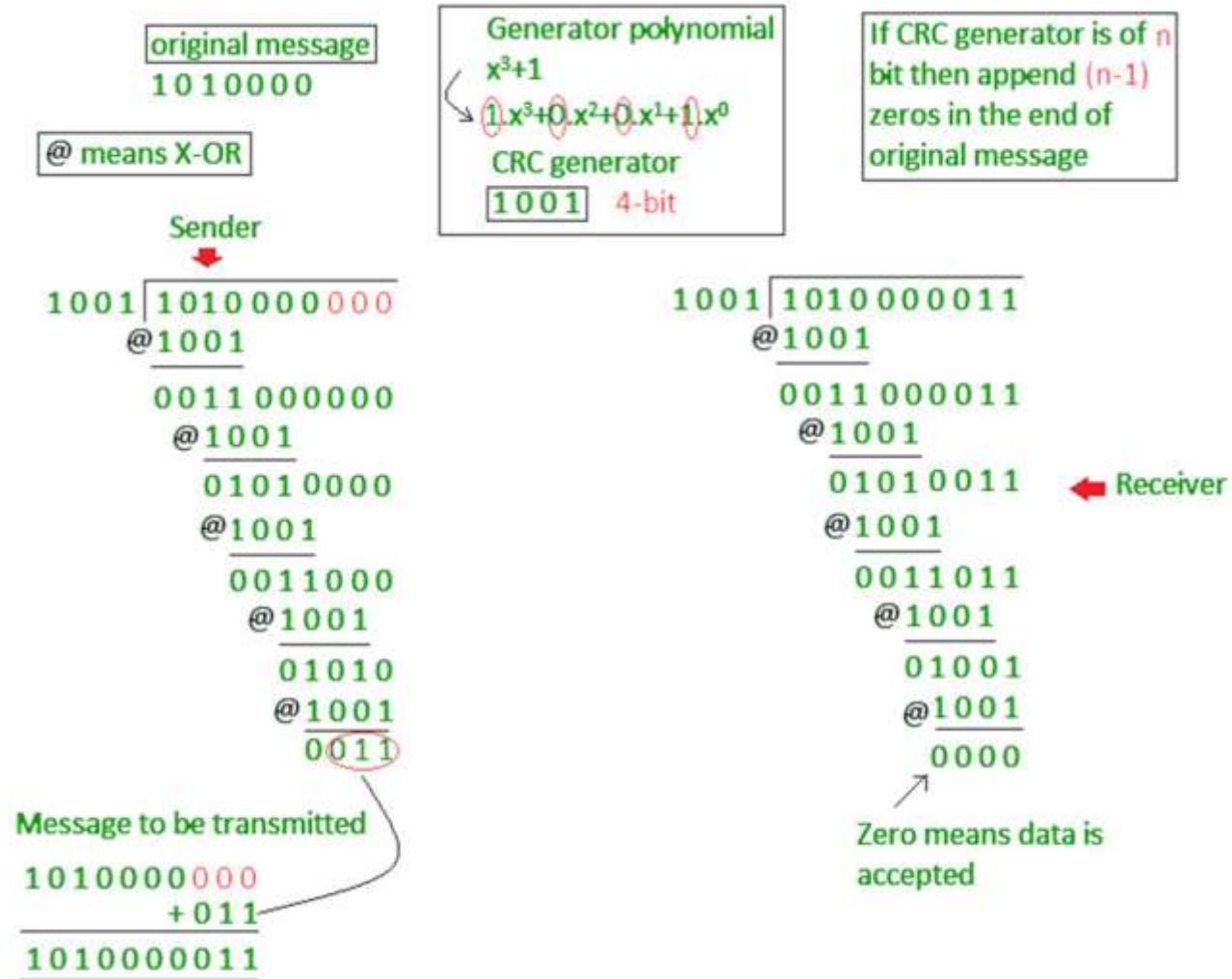
Binary Division in a CRC Generator





Binary Division

Binary Division in a CRC Generator





Polynomial

Polynomials

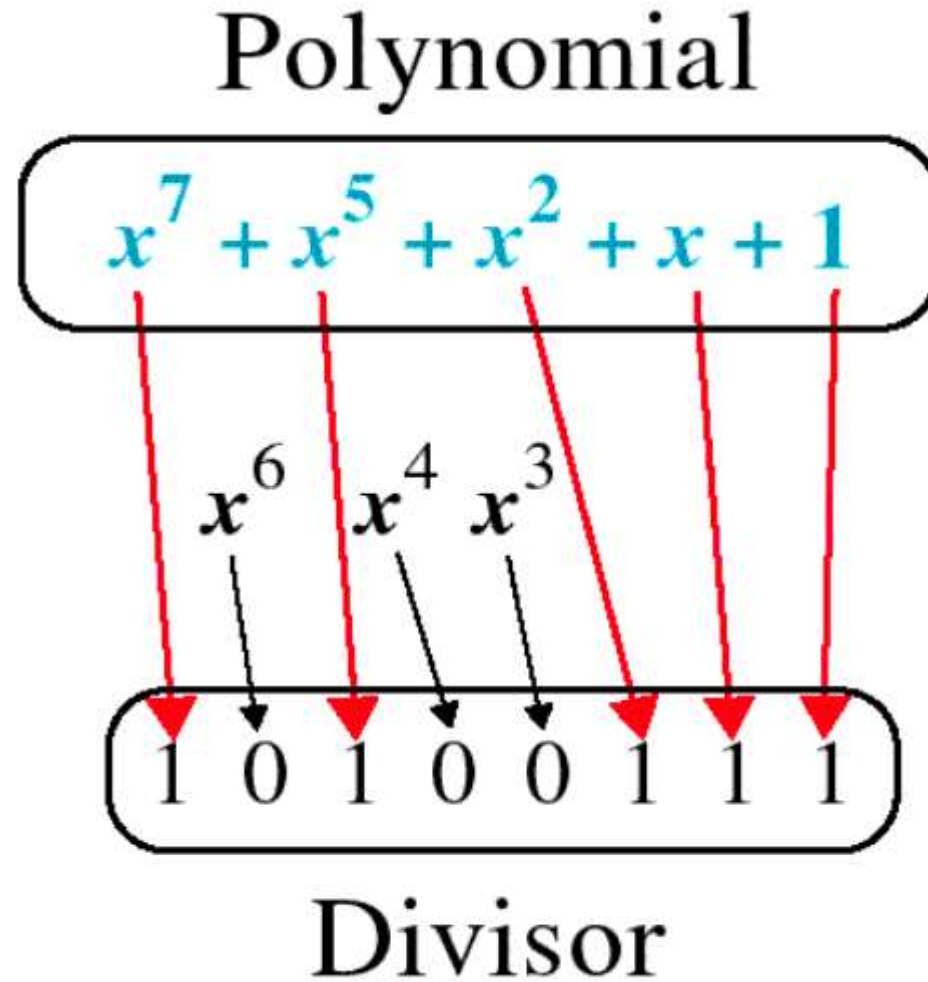
CRC generator(divisor) is most often represented not as a string of 1s and 0s, but as an algebraic polynomial.

$$x^7 + x^5 + x^2 + x + 1$$



Polynomial and Divisor

A polynomial representing a divisor





Standard polynomials

CRC-12

$$x^{12} + x^{11} + x^3 + x + 1$$

CRC-16

$$x^{16} + x^{15} + x^2 + 1$$

CRC-ITU-T

$$x^{16} + x^{12} + x^5 + 1$$

CRC-32

$$x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$



Reference

1. <https://www.geeksforgeeks.org/types-transmission-media/>
2. <https://www.javatpoint.com/guided-transmission-media>
3. <https://www.geeksforgeeks.org/performance-of-a-network/>

