

CSE-321

Link layer → 30 સ્તર

- Error detection/correction
- Medium access control
- Framing

Error * detection:

~~સાથ~~

સાથ જ મળે:

Same message આપ્યું send થયું, પણ
ખિનિતરું થઈ જાય, (n bit for n bit)

Parity:

10101 \rightarrow 1

Even \rightarrow bit error \rightarrow 26m

Detect error error at.

Hamming Distance:

minimum number of changes
to make one string another

~~110~~ \rightarrow 1
010

x bit / y bit $\rightarrow (2^x - 2^y)$ bits invalid
error

valid change error valid error
detect error error at.

→ Entropy gain means info gain

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- Error detection DL layer →
ଅଥା, ଡାଟା ଏବଂ ପ୍ରତି hop ଏ
detect କରା ଯାଏ ।

(modulo 2) arithmetic → ଅଥା
ଏବଂ ଡାଟା XOR କରାଯାଇ ଅଥା,

generator → message
 $M(x) = 101$ 4 bit

$$G(x) = 101$$

$$P(x) = x^3 + x + 1$$

$$G(x) = x^2 + 1$$

↑
maximum
power 2

$$x^2 P(x) = (x^3 + x + 1)(x^2)$$
$$= x^5 + x^3 + x^2$$

$$= 101100$$

$$G(x) \mid x^t P(x) \quad ($$

~~1011011000~~

$$\begin{array}{r} x^2 + 1 \overline{) x^5 + x^3 + x^2} \\ \underline{x^5 + x^3} \\ x^2 \end{array}$$

$$\begin{array}{r} x^2 + 1 \overline{) x^2} \\ \underline{x^2 + 1} \\ 1 \end{array} \quad \leftarrow \text{modulo } 2$$

$x^5 + x^3 + x^2 + 1$ ← $x^5 + x^3 + x^2 + 1$ (modulo 2)

101101 → $C(x)$ → send
 remainder

$$C(x) = x^t P(x) + r(x)$$

* Receiver $G(x)$ divides $C(x)$ to find
 error, remainder 0 means correct, remainder error
 value standard is 32 party agree

$$S(n) = C(n) + e(n)$$

error

$$\frac{S(n)}{G(n)} = \frac{C(n)}{G(n)} + \frac{e(n)}{G(n)}$$

remainder

remainder

error થી

choose

generally.

1 bit error:

$$C(n) + x^i$$

Generator → error term

2 bit error:

$$C(n) + x^i + x^j$$

Assuming i smaller,

$$x^i (x^{j-i} + 1)$$

error term

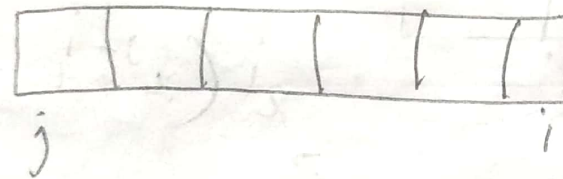
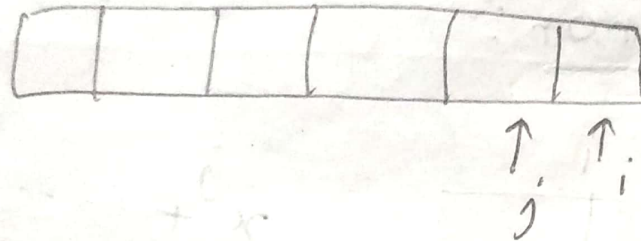
choice

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$$x^i + x^j \rightarrow x^i (x^{j-i} + 1)$$

$j-i=1$



$$j-i=n-1$$

So, $(x^1+1), (x^2+1), \dots, (x^{n-1}+1)$ ଏହି ଜାଣିଥିବା
ସବୁ ଧାରା generator ଦ୍ଵାରା ଗଠିତ

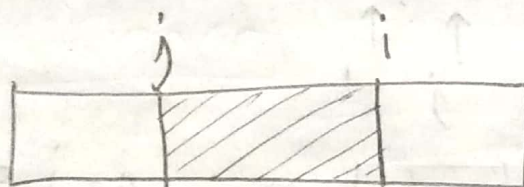
ନା ହୁଏ ।

- Odd 32-bit error:

$(x+1)$ factor cannot detect
 single bit error, So, generator is
 1010 is, $[x^3+x]$

cannot, $(x^3+x)(x+1)$ cannot
 ensure that is $(x+1)$ factor
cannot,

- Burst Error:



↑
error

এই
detection
মডি

$$x^j + \dots + x^i$$

$$x^i (x^{j-i} + \dots + 1)$$

এই roughly
burst length
এই power
generator is
power is 8584
এই 26m detection
ensure is,

standard CRC-32.

So, 32 bit is possible →
 burst error detection

• burst length ચડે ત્યારે ઠીક વચ્ચે
જોઈ શકાય છે. But probability
of detection is quite high.