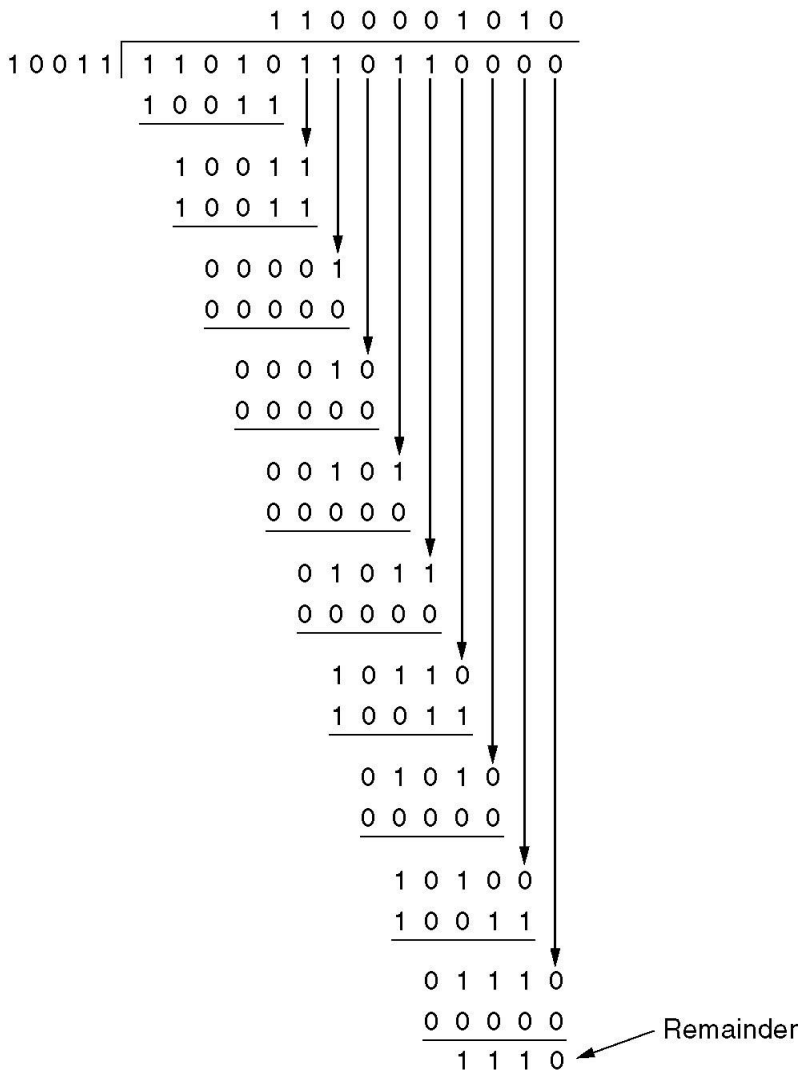
Frame : 1 1 0 1 0 1 1 0 1 1

Generator: 1 0 0 1 1

Message after 4 zero bits are appended: 1 1 0 1 0 1 1 0 1 1 0 0 0 0



Transmitted frame: 1 1 0 1 0 1 1 0 1 1 1 1 0

Cyclic Redundancy Check

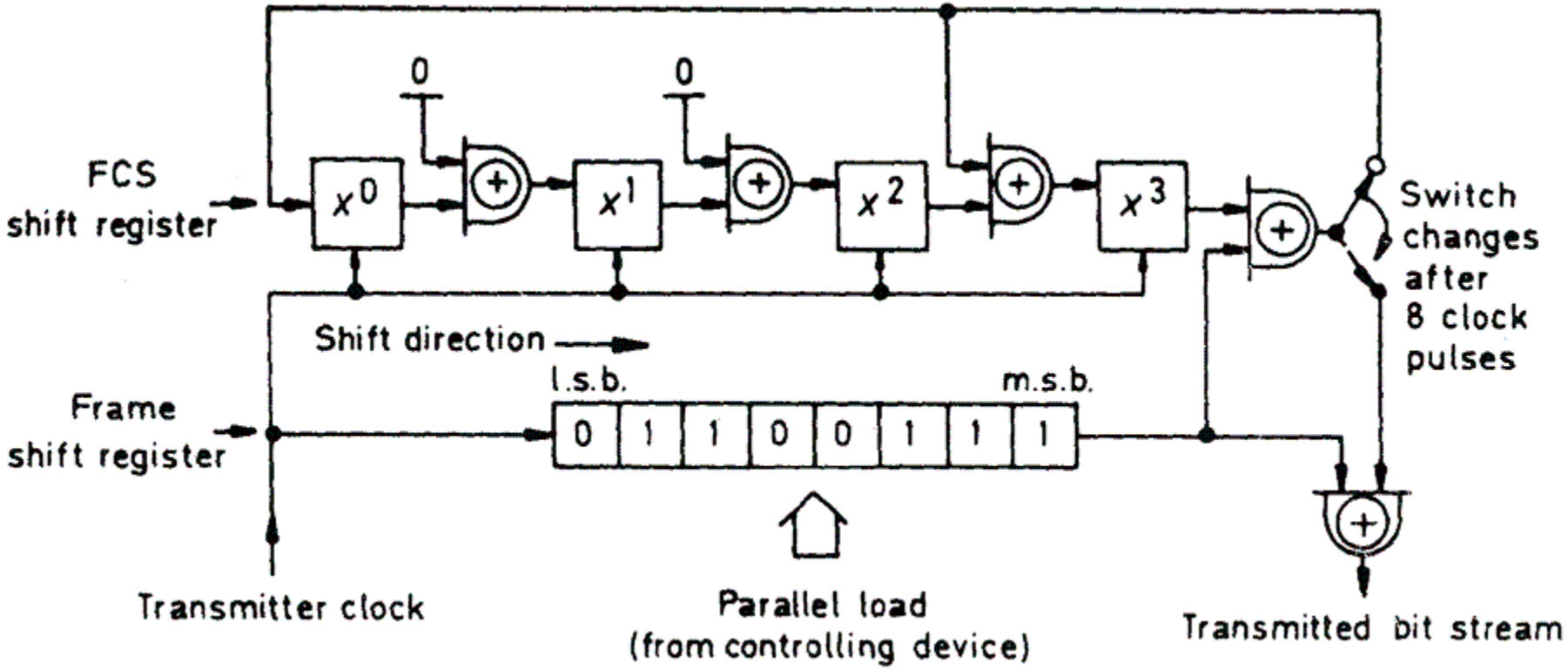
- kódové slovo sa chápe ako polynóm s koeficientami 0 a 1
- napr. 110001 $\leftrightarrow$ $x^5 + x^4 + 1$
- z m-bitovej správy (dát) M(x) sa vyrobí slovo dĺžky m+r reprezentujúce polynóm T(x) – *transmitted frame*, ktorý je deliteľný generujúcim polynómom G(x) - *generátor*
  - $U(x) = M(x).x^r$
  - U(x) sa vydelí G(x) a dostaneme zvyšok R(x) - *remainder*
  - T(x) = U(x) – R(x)
- použitie:
  - namiesto T(x) príde T(x) + E(x)
  - chyba sa odhalí vtedy, ak G(x) nedelí E(x) - *error* bez zvyšku
  - detekuje veľké množstvo chýb

FCS – Frame Check Sequence

Generator: $x^4 + x^3 + 1$

Active bits: x^3, x^0

Frame contents: 11100110



Name	Uses	Representations		
		Normal	Reversed	Reversed reciprocal
CRC-1	most hardware; also known asparity bit	0x1	0x1	0x1
CRC-4-ITU	G.704	0x3	0xC	0x9
CRC-5-EPC	Gen 2 RFID[15]	0x09	0x12	0x14
CRC-5-ITU	G.704	0x15	0x15	0x1A
CRC-5-USB	USB token packets	0x05	0x14	0x12
CRC-6-ITU	G.704	0x03	0x30	0x21
CRC-7	telecom systems,G.707,G.832,MMC, SD	0x09	0x48	0x44
CRC-8-CCITT	I.432.1; ATMHEC, ISDNHEC and cell delineation	0x07	0xE0	0x83
CRC-8-Dallas/Maxim	1-Wire bus	0x31	0x8C	0x98
CRC-8		0xD5	0xAB	0xEA[7]
CRC-8-SAE J1850	AES3	0x1D	0xB8	0x8E
CRC-8-WCDMA	[16]	0x9B	0xD9	0xCD[7]
CRC-10	ATM; I.610	0x233	0x331	0x319
CRC-11	FlexRay[17]	0x385	0x50E	0x5C2
CRC-12	telecom systems[18][19]	0x80F	0xF01	0xC07[7]
CRC-15-CAN		0x4599	0x4CD1	0x62CC
CRC-15-MPT1327	[20]	0x6815	0x540B	0x740A
CRC-16-IBM	Bisync,Modbus, USB,ANSI X3.28, SIA DC-07, many others; also known as*CRC-16* and*CRC-16-ANSI*	0x8005	0xA001	0xC002
CRC-16-CCITT	X.25, V.41,HDLC *FCS*,XMODEM,Bluetooth,PACTOR, SD, many others; known as*CRC-CCITT*	0x1021	0x8408	0x8810[7]
CRC-16-T10-DIF	SCSI DIF	0x8BB7[21]	0xEDD1	0xC5DB
CRC-16-DNP	DNP, IEC 870,M-Bus	0x3D65	0xA6BC	0x9EB2
CRC-16-DECT	cordless telephones[22]	0x0589	0x91A0	0x82C4
CRC-16-ARINC	ACARSapplications[23]	0xA02B	0xD405	0xD015
Fletcher	Used in Adler-32 A & B CRCs	Not a CRC; see Fletcher's checksum		
CRC-24	FlexRay[17]	0x5D6DCB	0xD3B6BA	0xAEB6E5
CRC-24-Radix-64	OpenPGP,RTCM104v3	0x864CFB	0xDF3261	0xC3267D
CRC-30	CDMA	0x2030B9C7	0x38E74301	0x30185CE3
Adler-32	Zlib	Not a CRC; see Adler-32		
CRC-32	HDLC, ANSIX3.66, ITU-TV.42, Ethernet,Serial ATA,MPEG-2,PKZIP, Gzip,Bzip2,PNG,[24] many others	0x04C11DB7	0xEDB88320	0x82608EDB[10]
CRC-32C (Castagnoli)	iSCSI, SCTP,G.hn payload,SSE4.2, Btrfs,ext4	0x1EDC6F41	0x82F63B78	0x8F6E37A0[10]
CRC-32K (Koopman)		0x741B8CD7	0xEB31D82E	0xBA0DC66B[10]
CRC-32Q	aviation;AIXM[25]	0x814141AB	0xD5828281	0xC0A0A0D5
CRC-40-GSM	GSM control channel[26][27]	0x0004820009	0x9000412000	0x8002410004
CRC-64-ISO	HDLC, Swiss-Prot/TrEMBL; considered weak for hashing[28]	0x000000000000001B	0xD800000000000000	0x800000000000000D
CRC-64-ECMA-182	ECMA-182,XZ Utils	0x42F0E1EBA9EA3693	0xC96C5795D7870F42	0xA17870F5D4F51B49

Name Polynomial

CRC-1 (most hardware; also known as parity bit)
CRC-4-ITU (ITU-T G.704, p. 12)
CRC-5-EPC (Gen 2 RFID[1])
CRC-5-ITU (ITU-T G.704, p. 9)
CRC-5-USB (USB token packets)
CRC-6-ITU (ITU-T G.704, p. 3)
CRC-7 (telecom systems, ITU-T G.707, ITU-T G.832, MMC, SD)
CRC-8-CCITT
CRC-8-Dallas/Maxim (1-Wire bus)
CRC-8
CRC-8-SAE J1850
CRC-8-WCDMA [3]
CRC-10 (ATM; ITU-T I.610)
CRC-11 (FlexRay[4])
CRC-12 (telecom systems[5][6])
CRC-15-CAN
CRC-16-IBM (Bisync, Modbus, USB, ANSI X3.28, many others; also known as *CRC-16 and CRC-16-ANSI)*
CRC-16-CCITT (X.25, V.41, HDLC, XMODEM, Bluetooth, SD, many others; known as *CRC-CCITT)*
CRC-16-T10-DIF (SCSI DIF)
CRC-16-DNP (DNP, IEC 870, M-Bus)
CRC-16-DECT (cordless telephones)[8]

CRC-16-Fletcher Not a CRC; see Fletcher's checksum
CRC-24 (FlexRay[4])
CRC-24-Radix-64 (OpenPGP)
CRC-30 (CDMA)
CRC-32-Adler Not a CRC; see Adler-32
CRC-32 (ISO3309, ANSI X3.66, FIPS PUB 71, FED-STD-1003, ITU-T V.42, Ethernet, SATA, MPEG-2, Gzip, PKZIP, POSIX cksum, PNG,[9] ZMODEM)
CRC-32C(Castagnoli) (iSCSI & SCTP, G.hn payload, SSE4.2)
CRC-32K(Koopman)
CRC-32Q (aviation; AIXM[11])
CRC-40-GSM (GSM control channel[12][13])
CRC-64-ISO (HDLC — ISO 3309, Swiss-Prot/TrEMBL; considered weak for hashing[14])
CRC-64-ECMA-182 (as described in ECMA-182 p. 51)

CRC Soft

Assume a preformatted frame to be transmitted (including a zero byte at its tail) or a received frame is stored in a byte array buff[1.. count]. Also that the 8 active bits of a 9-bit divisor are stored in the most-significant 8 bits of a 16-bit integer CRCDIV. The following function will compute and return the 8-bit CRC

```
function  CRC : byte;
var       i, j : integer;
          data : integer

begin     data := buff[1] shl 8;
          for j := 2 to count do
              begin
                  data := data + buff [j];
                  for i := 1 to 8 do
                      if ((data and $8000) = $8000) then
                      begin data := data shl1;
                            data := data xor CRCDIV; end
                      else  data := data shl 1;
              end;

          CRC := data shr 8;
end;
```