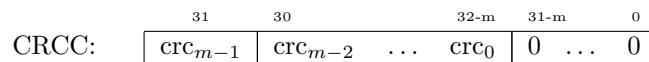


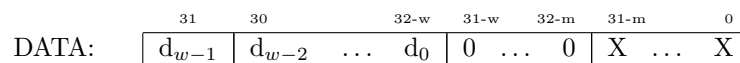
SpiNNaker Programmable CRC

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- The degree m of the CRC polynomial can be chosen up to a maximum value of 32. In case $m < 32$, a calculated CRC value will be located in the m most significant bits of the CRC register (CRCC), while all other bits will be 0.



- The width w of the data to be processed in parallel is limited to 32. For $w < 32$, data is expected at the most significant bit positions of the data bus. In case $w < m$, it needs to be made sure that data bits $32 - m$ to $31 - w$ are all set to 0 as illustrated in the following:



- In order to set up the CRC module to a specific polynomial and data width, 32 configuration words need to be supplied. The following matlab code generates these values:

```
function FM = getFM(P,m,w)

P=[zeros(m-length(P),1); P]
if (m>32 || w > 32)
    error('Polynomial degree and data width must not exceed 32');
end
F= [[P; zeros(32-m,1)], [eye(31);zeros(1,31)]];
res = F;
for i=1:1:w-1
    res = mod(res*F,2);
end
res(1:32,max(m,w)+1:32)=0; % adjustment for w<32 && m<32
nbit=2.^(size(res,2)-1:-1:0);
FM=dec2hex(nbit*res.');
```

For the CRC32 Ethernet polynomial **0x04C11DB7** and a data width of **32**, the configuration values can be obtained with:

```
getFM(sscanf(dec2bin(hex2dec('4C11DB7')), '%1d'), 32, 32)
```

Output:

```
ans =  
  
FB808B20  
7DC04590  
BEE022C8  
5F701164  
2FB808B2  
97DC0459  
B06E890C  
58374486  
AC1BA243  
AD8D5A01  
AD462620  
56A31310  
2B518988  
95A8C4C4  
CAD46262  
656A3131  
493593B8  
249AC9DC  
924D64EE  
C926B277  
9F13D21B  
B409622D  
21843A36  
90C21D1B  
33E185AD  
627049F6  
313824FB  
E31C995D  
8A0EC78E  
C50763C7  
19033AC3  
F7011641
```

These values need to be written into the DMA controller address block starting at offset **0x0180**. Consequently, the last value of the list corresponds to offset **0x01FC**.

- The CRC circuit can be also configured to calculate several smaller CRCs for corresponding data chunks, f.i. two independent CRC16 for the each halfword of the data. This option still needs to be incorporated into the getFM function.