Dokumenttitel *Document Title*

Saab Ericsson Space comments to SpaceWire RMAP protocol

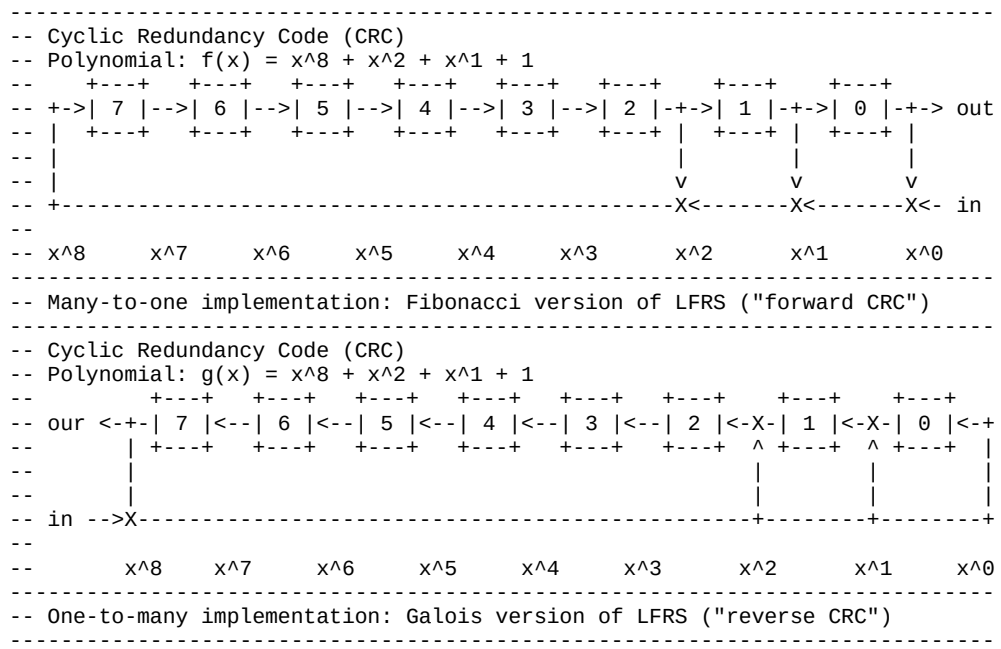
This document gives the comments to the ECSS-E-50-12 Part 2 Draft C from Mars 2005.

RMAP General:

The use of CRC8 has some implementation drawbacks.

The use of CRC8 implicitly tells that CRC can not be calculated or checked by software, at least not for the data CRC, and must be generated or checked by hardware in some way.
This should be the case at least in high performance systems where large transfers of data will occur, the overhead for software would reduce the total system performance too much.

The CRC8 algorithm must be defined, should it be the Galois or the Fibonacci version



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We think it is important for the hardware implementation that the algorithm produces a result equal to zero when the CRC8 is calculated over the header including the CRC8 checksum of the header. In this way the hardware does not always need to know where the actual boundary is between the header and by that the header checksum, and the generator checker could be independent of the interpretation of the RMAP and other transfer protocols, (where the header/data boundary is not yet defined).

The Galois CRC algorithm does just that and it is the algorithm we suggest, (if CRC8 algorithm is the final choice).

6.6 Error Codes

One error code seems to be missing
Address range, size and alignment error which is set if a node does not support the commanded address range, alignment or size of the block. This fault type would include the fault types “Verify buffer overrun” and “RMW data length error” (see No11 below)

No10 Authorisation failure
The use of Authorisation failure is a little vague; an error code may be missing. Our interpretation is that Authorisation failure is set only if the destination node does not enable RMAP commands for some reason at a certain time or the destination nodes mode determines which RMAP commands that are valid.
To authorise an address range is impractical in most internal bus system, each access of the address range is normally granted access, but can be rejected with an error indication from the internal bus, this can be due to gaps in the address map, protected area or that a data access failed (for example EDAC non-correctable error).
The error case that the internal bus signals error should set is another error code than “Authorisation failure” as it could be data failure or the RMAP command address range include some empty spaces, these are error types that should not be interpreted as authorisation failure

No 11 “RMW data length error”
This error code is redundant.
If the data field is not correct, the error codes should be Early or Late EOP (EEP),
If the data field is not supported, the error codes should be “Command not supported” or we can introduce a new type which is “Illegal command”. In the latter group we may also include for instance read commands with no ACK bit set (the error code is not needed here since there will not be any acknowledge sent!!!!!), Or is the error type 1 “General error” the correct type for these types of errors.

Note that the error type, when a read transfer is performed, the response header is sent and the following data transfer could generate an internal bus error, this should cause an EEP in the response.

Our suggested error codes:

Error Code	Error	Error Description
0	Command executed successfully	
1	General error code	The detected error does not fit into the other error cases or the node does not support further distinction between the errors
2	RMAP command not supported by node or illegal command	The header CRC was decoded correctly but the command *type* is not accepted by the node *Note that the spec today says* byte*, which should be changed to* type.
3	Invalid destination key	The header CRC was decoded correctly but the device key did not match that expected by the destination user application.
4	Invalid data CRC	Error in the CRC of the data field
5	Early EOP	EOP marker detected before the end of the data.
6	Late EOP	EOP marker detected beyond the expected end of the data.
7	Early EEP	EEP marker detected before the end of the data. Indicates that there was a communication failure of some sort on the network.
8	Late EEP	EEP marker detected beyond the expected end of the data. Indicates that there was a communication failure of some sort on the network.
9	RMAP Address Range, Size or Alignment Error	The address range was out side the destination nodes supported range, (For example Extended address is not all zeroes) The size of the block is to large, (For example Verified write to large or to small, Only word supported or only max 65656 byte blocks supported) The alignment was erroneous, (For example misaligned address, should be word aligned)
10	Authorisation failure	The destination user application did not authorise the requested operation at the moment or the operation is not at all allowed. (RMAP could be disabled by the node)
11	Destination node error	The destination node detected an error during command execution. Could be illegal address/protected address, not implemented address, data read or write error, the access got timeout

6.7 Partial Implementations of RMAP

The text “If a destination receives a command or a command with options that it does not support… then the Authorisation Failure error shall be sent back”
The error type should be “RMAP command not supported by node”.