**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |  |
| --- | --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title |  | |
| Date Submitted | 20 September, 2011 | |
| Source | [] [Kuhram Waheed] [] [Freescale] | Voice: [ +1 925 997 0576 ] Fax: [ ] E-mail: [Steve.Shearer@gatech.edu] |
| Re: |  | |
| Abstract | Suggested resolution to sponsor ballot CID 22,23. | |
| Purpose | Present a resolution to the BRC for consideration. | |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. | |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. | |

## Comment

This paragraph, beginning with "At the transmitter", is confusing and possibly incomplete.

## Resolution

Accept, see text below

## Discussion

The formulation of the FCS calculation in 802.15.4g is used in other standards and is well proven as a reliable method for FCS calculation. However the wording describing how the calculation is performed is confusing to many who read it for the first time

This resolution proposes a new wording that is mathematically accurate, is a direct description of a well tested public domain implementation, and is more in the style of the 16 bit FCS description used in **5.2.1.9** .

The same test vectors used in the 4g draft have been used to validate this explanation.

## Proposed Text

Starting on page 13, line 54, replace the text ….. until page 14 line 21…

The 4-octet FCS is calculated using the following standard generator polynomial of degree 32:



In the following way

1. Let be the polynomial representing the sequence of k bits for which the checksum is to be computed



1. Invert the first 32 bits, to form



1. Divide by the generator polynomial , to obtain the remainder polynomial,



1. The FCS, , is the ones complement of



Note that, for clarity, bit strings are represented as binary polynomials with first bit corresponding to the highest polynomial degree.

At the receiver the same procedure is applied to derive which, in the absence of transmission errors will result in the unique non-zero remainder value below



….. following text included for readability of this document ….



## Validation

Message

M = 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 0 0 0 0 0 0 0 0

FCS

Q = 0 1 0 1 1 1 0 1 0 0 1 0 1 0 0 1 1 1 1 1 1 0 1 0 0 0 1 0 1 0 0 0

Assembled Packet

1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 0 0 0 0 0 0 0 0 1 0 1 1 1 0 1 0 0 1 0 1 0 0 1 1 1 1 1 1 0 1 0 0 0 1 0 1 0 0 0

At the receiver

R = 1 1 0 0 0 1 1 1 0 0 0 0 0 1 0 0 1 1 0 1 1 1 0 1 0 1 1 1 1 0 1 1



Errored Packet

**0** 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 1 1 0 0 0 0 0 0 0 0 0 1 0 1 1 1 0 1 0 0 1 0 1 0 0 1 1 1 1 1 1 0 1 0 0 0 1 0 1 0 0 0

Resulting R for errored packet

Re = 1 0 1 1 1 1 1 0 0 0 0 0 0 1 0 0 1 0 0 0 1 0 0 0 0 1 0 0 1 0 0 0