

**Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)**

**Submission Title:** [Resolution on comment #40]

**Date Submitted:** [18 Mar., 2008]

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**Re:** [In response to IEEE802.15-08-0020-03-003c-df0-comments]

**Abstract:** [This document provides a resolution for comment #40 discussed in IEEE Jan. '08 meeting at IEEE802.15-08-0020-03-df0-comments]

**Purpose:** [Resolving the comment #40]

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**Issue No. #40**: It is better to use two different HCS for combined PHY and MAC header and MAC subheader.  
(for single carrier)

**Resolution**: Yes, because it is **safer for system's robustness** and does not increase the redundancy. Use the following generator polynomial,  $g(x)$ , of cyclic-redundancy-check code (CRCC) for HCS,

$$g(x) = x^{16} + (1 - p)(x^{15} + x^8 + x) + p(x^{13} + x^2) + 1,$$

where  $p = 0$  for the combined PHY and MAC header and  $p = 1$  for the MAC subheader.

This resolution can improve undetected error probabilities for the combined PHY and MAC header, *e.g.* 2 digits lower (from  $10^{-9}$  to  $10^{-11}$ ) than that for CCITT at a bit-error rate of  $10^{-3}$ .

Details for this CRCC have been presented in IEEE Jan. '08 meeting using the document IEEE802.15-08-0042-01-003c.

You can see that there is no technical advantage in CCITT.

Also in the case that the header lengths become shorter than the current values, the proposed CRCC can keep the advantages.

A question at the last IEEE meeting was why the number of parity bits for CRCC was 16.

Because improving the undetected error probability by increasing the number of parity bits is a trade-off with increasing the redundancy, probably no one can show the exact optimal number of parity length.

Regardless, 16-bit HCS is recommended as the resolution for comment #28 in the document 802-15-08-0102-02-003c.

Our resolution is only valid in the case that 16-bit HCS is employed in the standard. In that case, there is no technical advantage in CCITT.

# Notes for this resolution

- CCITT for single-carrier-mode HCS written in the baseline document was **NOT** included in the document [1] approved on the confirmation voting in the IEEE Nov. '07 meeting.
- CRCC with a new generator polynomial for HCS had already been proposed as a CoMPA proposal in the IEEE May '07 meeting [2]. This CRCC, however, has not been discussed in the process of making the baseline document. This resolution is just a modification of the CRCC to adopt changes of header specifications.

[1] IEEE802.15-07-0934-01-003c

[2] IEEE802.15-07-0693-03-003c