

Selection Mechanism of the FCS Type

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Wireless Personal Area Networks

Title: Selection Mechanism of the FCS type

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Re: Task Group 15.4g LB59 comment resolution

Abstract: Comment resolutions related to the FCS Type selection

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Motivation

This document addresses some issues related to the selection of the FCS type. CID #325, #726 #729

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- ▶ a CRC-32 based FCS (ANSI X3.66-1979)

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- ▶ a CRC-32 based FCS (ANSI X3.66-1979)
- ▶ a CRC-16 based FCS (ITU-T CRC)

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- ▶ signaled by a dedicated information bit of the PHR for MR-FSK.

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- ▶ signaled by a dedicated information bit of the PHR for MR-FSK.
- ▶ not specified at all for the other SUN PHYs (MR-OFDM / MR-O-QPSK PHY), i.e. there is neither a dedicated information bit nor a PIB attribute.

- ▶ Assume that information on the FCS type is perfectly known.
- ▶ Let P_{ue}^T be the probability of an undetected error, where T is either CRC-16 or CRC-32.
- ▶ For long message sequences we have

$$P_{ue}^T \approx \frac{1}{2^L}$$

where L is the length of the CRC check sequence.

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- ▶ Hence

$$P_{ue}^{\text{CRC-32}} \ll P_{ue}^{\text{CRC-16}}$$

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- ▶ For a significant P_b , the probability of an undetected error for CRC-32 is dominated by

$$\tilde{P}_{ue}^{\text{CRC-32}} \approx P_b P_{ue}^{\text{CRC-16}}$$

- ▶ Hence for noisy channels, error detection capabilities of a CRC-32 based FCS are considerably reduced.

Proposed solutions

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2. Consider a CRC-32 based FCS only

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1. Consider a CRC-16 based FCS only (enhanced error detection based on upper security layer)
2. Consider a CRC-32 based FCS only
3. Consider a PIB attribute indicating the FCS type