

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

Submission Title: [Some issues and suggestions on light dimming in D1 draft of TG7]

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Re: []

Abstract: [This document describes some issues and suggestions on light dimming in D1 draft of TG7.]

Purpose: [To clarify some issues on light dimming in D1 draft of TG7]

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Some Issues and Suggestions on Light Dimming in D1 Draft of TG7

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Background (cont.)

5.5.3.2.2 Idle Pattern and Adjustment Time Dimming

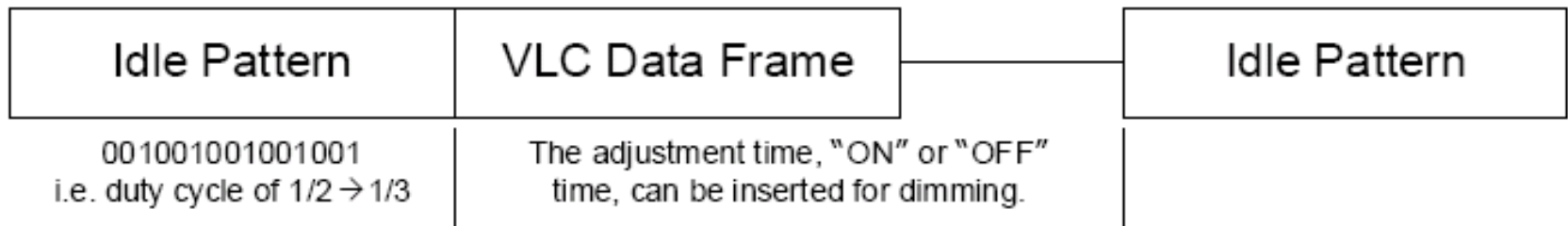


Figure 6—Idle Pattern and Adjustment Time Dimming

6.9.6.4 PHY Type Independent Dimming

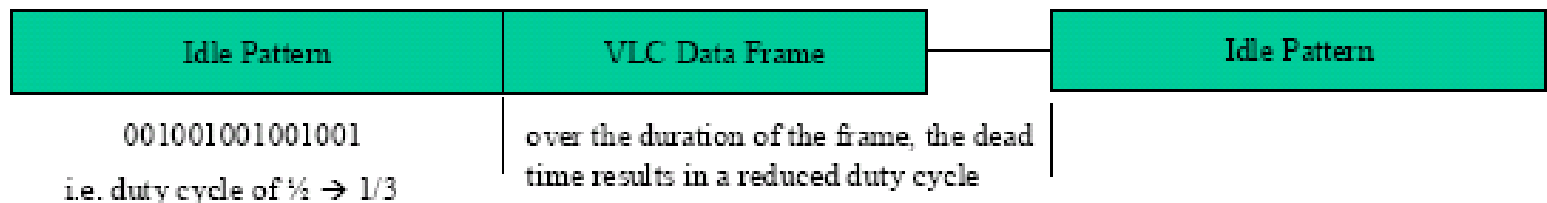


Figure 50—Flicker compensation

Issues on Dimming in D1 draft

1. Clause 5.5.3.2 describes the light dimming methods to give some information and the clause 6.9.6 seems to be tried to describe the actual dimming method according to the operating modes, but there is no remarkable difference between two clauses in D1.
2. We can achieve dimming control by the combination of the idle pattern dimming and the adjustment time dimming, but we need to distinguish two methods because they are different each other in aspect of the concept.

Issues on Dimming in D1 draft (cont.)

3. Sub-clause 6.9.6.4 gives some feeling that we can get VLC dimming under all of operating mode by the idle pattern and adjustment time dimming.
4. Visible pattern dimming method need to belong to the clause 5.5.3.2 because it is a kind of dimming method.
5. We need to clarify the fixed dimming methods and the variable dimming methods on each actual operating mode.

Summary on Suggestions

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Details on Suggestion

5.5.3 Cross Layer Consideration

5.5.3.1 Flicker Compensation

5.5.3.1.1 Intra-frame Flicker Compensation

5.5.3.1.2 Inter-frame Flicker Compensation

5.5.3.2 Light Dimming

5.5.3.2.1 VPM Dimming

5.5.3.2.2 Idle Pattern Dimming

5.5.3.2.3 Adjustment Time Dimming

5.5.3.2.4 Visibility Pattern Dimming

5.5.3.2.5 Analog Dimming

5.5.3.3 Idle Pattern

Details on Suggestion (cont.)

6.9.6 Dimming and Flicker Mitigation

6.9.6.1 Dimming on Data Transmission Time

6.9.6.1.1 OOK-mode Dimming

6.9.6.1.2 VPM-mode Dimming

6.9.6.1.3 CSK-mode Dimming

6.9.6.2 Dimming on Idle Time

6.9.6.2.1 VPM Dimming

6.9.6.2.2 Idle Pattern Dimming

6.9.6.2.3 Adjustment Time Dimming

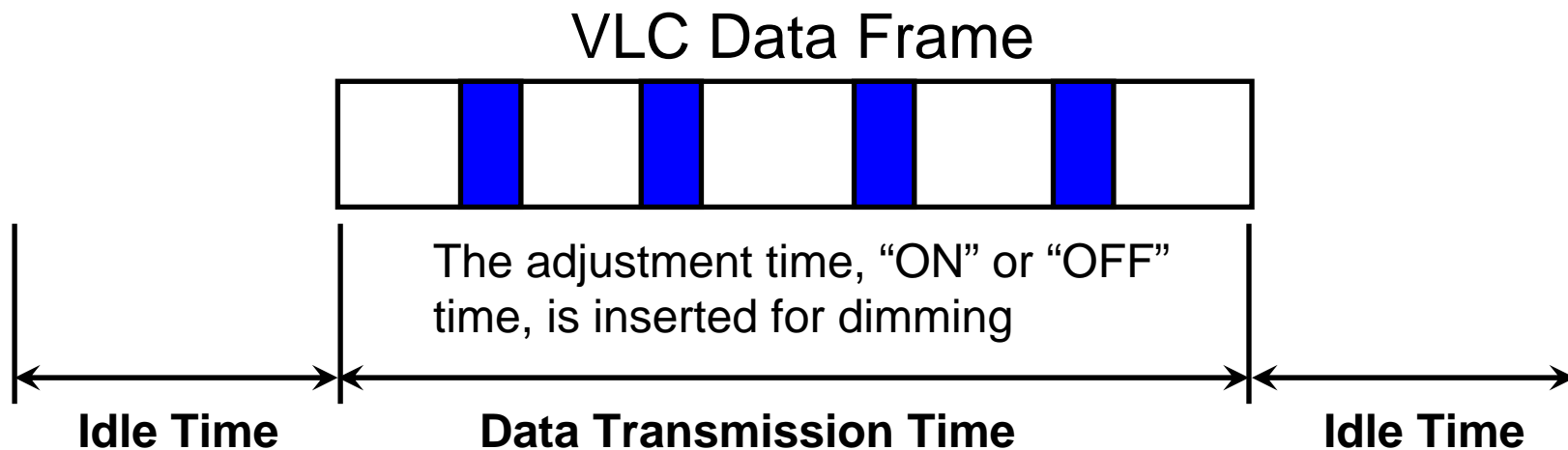
6.9.6.2.4 Visibility Pattern Dimming

6.9.6.2.5 Analog Dimming

6.9.6.3 Flicker Mitigation

Details on Suggestion (cont.)

- 6.9.6.1 Dimming on Data Transmission Time
 - 6.9.6.1.1 OOK-mode Dimming
 - 6.9.6.1.2 VPM-mode Dimming
 - 6.9.6.1.3 CSK-mode Dimming



(Adjustment Time Dimming)

(Ref. 10/0159/r1 and D1 draft)

Details on Suggestion (cont.)

- 6.9.6.1 Dimming on Data Transmission Time
 - 6.9.6.1.1 OOK-mode Dimming
 - 6.9.6.1.2 **VPM-mode Dimming**
 - 6.9.6.1.3 CSK-mode Dimming

VPM Dimming

+

High Resolution Algorithm

This method has been also described in 6.9.6.2 of D1 draft.

Details on Suggestion (cont.)

- 6.9.6.1 Dimming on Data Transmission Time
 - 6.9.6.1.1 OOK-mode Dimming
 - 6.9.6.1.2 VPM-mode Dimming
 - 6.9.6.1.3 **CSK-mode Dimming**

Total Power Control Dimming

(Analog Dimming ?)

This method has been also described in 6.9.6.3 of D1 draft.

Details on Suggestion (cont.)

- 6.9.6.2 Dimming on Idle Time
 - 6.9.6.2.1 VPM Dimming
 - 6.9.6.2.2 Idle Pattern Dimming
 - 6.9.6.2.3 Adjustment Time Dimming
 - 6.9.6.2.4 Visibility Pattern Dimming
 - 6.9.6.2.5 Analog Dimming

The dimming on idle time can be supported by one of 5 techniques described in clause 5.5.3.2 or their combinations which shall support non-inter-frame flicker as well as non-intra-frame flicker.

Details on Suggestion (cont.)

6.9.6.3 Flicker Mitigation

The dimming on data transmission time and idle time, respectively, shall support non-intra-frame flicker, and non-inter-frame flicker between data transmission time and idle time shall be supported under the dimming.

Conclusions

1. Clause 5.5.3.2 “Light Dimming” describes 5 methods we can achieve the light dimming in VLC as its 5 sub-clauses.
2. Clause 6.9.6 describes the dimming on data transmission time and idle time, respectively, as its sub-clauses in aspect of the actual operating modes.
3. Sub-clause 6.9.6.1 describes that the dimming methods on data transmission time are fixed under each operating mode. OOK-mode, VPM-mode, and CSK-mode use the adjustment time dimming, the combination of VPM dimming and high resolution algorithm, and the total power control dimming (analog dimming), respectively.

Conclusions (cont.)

4. Sub-clause 6.9.6.2 describes that the dimming methods on idle time are variable under each operating mode. In other words, the dimming on idle time can be supported by one of 5 techniques (VPM dimming, idle pattern dimming, adjustment time dimming, visibility pattern dimming, and analog dimming) or their combinations which shall support non-inter-frame flicker as well as non-intra-frame flicker.
5. Sub-clause 6.9.6.3 describes that the dimming on data transmission time and idle time, respectively, shall support non-intra-frame flicker, and non-inter-frame flicker between data transmission time and idle time shall be supported under the dimming.