

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

Submission Title: [Some discussion for LB #57 comment resolution of Annex G]

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Re: [Response to LB #57 comment]

Abstract: [This document describes the LB #57 comment resolutions related to Annex G]

Purpose: []

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LB #57 comment resolutions related to Annex G

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T-CID 402

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy
402	Rick Roberts	Annex G	Table 91	297	47	consider removal of Annex G	The committee should discuss if there is a technical problem with annex G that can not be remedied (assuming I am not making a mistake in my thinking). If there is a problem that can not be fixed then annex G should be removed from the document.

- The text of Annex E has been modified.

T-CID 403

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy	Accepted Remedy
403	Rick Roberts	Annex G	annex G	297	6	modify text as shown in remedy	This clause is applicable with an a LED signboard consisting of a host controller, line scan IC, Data data IC and LED matrix.	Accept ... use the following text This clause is applicable with an a LED signboard consisting of a host controller, line scan IC controller, Data data IC distributor and LED matrix. Jason to modify figure G.1 accordingly.

- The comment already resolved, but the text has been modified.

T-CID 404

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy	Accepted Remedy
404	Rick Roberts	Annex G	annex G	297	6	add IC to the acronym list	add IC to the acronym list	Do not use the acronym IC in the document, rather use a term that describes the functionality.

- The comment already resolved.
- There is no “IC” acronym in the modified text, too.

T-CID 405

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy
405	Rick Roberts	Annex G	Table 91	298	21	"The math don't add up, or more likely I don't understand it. The text says ... ""The line operating time of 1 ms is fixed at the signboard, so it is assigned 1 ms for 1 time slot. There are 16 possible time slots. For example, at 1Mbit/s one time slot can transmit 125bytes.""	"If I follow the concept, the line operating rate is $(1/60)/16 \approx 1$ mS. And there are 16 pixels per line so each pixel duration is 65 uS. At 1 Mbps the number of bits that can be sent per pixel duration is 65 bits. So the number of bits per line is $16 \times 65 = 1040$, which is the same as 130 bytes. I suspect the problem is in calculating the number 125 bytes, someone didn't carry enough precision in the math. Change the text to read 130 bytes."

- Rick's calculation : $(1/60)/16/16 = 65.104 \text{ us}$

T-CID 405 (cont.)

- ETRI's calculation :
 - $(1/60)/16 = 1.042 \text{ ms}$
 - $1 \text{ Mbit/s} = 1,000,000 \text{ bits/sec}$
 - $1,000,000 \text{ bits} : 1\text{sec} = x \text{ bits} : 1.042 \text{ ms}$
 - $x = 1042 \text{ bits} / 8 = 130 \text{ byte}$
- The calculation results are the same, but we don't know why the pixel duration on Rick's calculation should be needed.

T-CID 406

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy	Accepted Remedy
406	Rick Roberts	Annex G	annex G	298	45.5	says "needs to"	"change to ""can"" The reason is because the assumption that the brightness is cut by half is only true for 100% extinction ratio OOK, but would not be true if the extinction ratio was less than 100%"	Add the text as shown in T-CID 407. Do not implement the suggested remedy.

- The comment already resolved, but the text has been modified and the sentence disappeared in the modified text.

T-CID 407

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy	Accepted Remedy
407	Rick Roberts	Annex G	annex G	298	44.5	add text	" ... reduces the brightness by half (assuming 100% extinction ratio), ..."	Accepted

- The comment already resolved, but the text has been modified and the sentence disappeared in the modified text.

T-CID 408

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy
408	Rick Roberts	Annex G	Table 91	298	45.5	"potentially faulty reasoning ... more likely I don't understand the thinking! The text says: To maintain the same brightness, even though the VLC data stream reduces the brightness by half, the operating time per line needs to be increased such that 100% duty of 1ms = 50% duty of 2ms = 1ms ON time per second."	The implication is that by reducing the number of pixels per line from 16 to 8, and hence increasing the time duration per pixel by a factor of 2x, then the average intensity will remain the same as the unmodulated case is probably not true. As long as the modulation rate is greater than the flicker frequency threshold, the intensity is decreased by 50% for 100% extinction ratio regardless of the time duration of the pixel, and also regardless of the data rate. At least that is what I think. So my comment is the text at the bottom of page 298 is potentially flawed ... as to the implications on the material in annex G, I don't know that. Committee discussion.

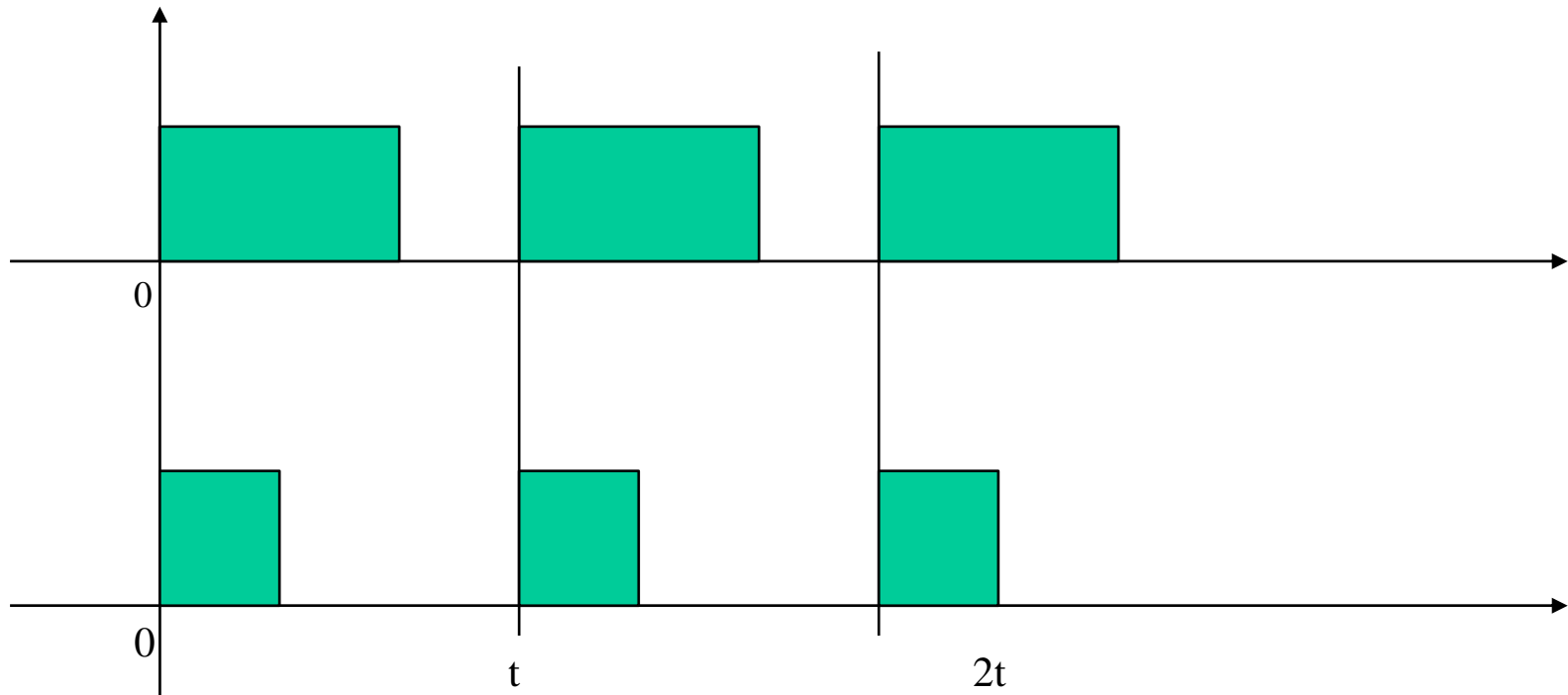
- Some discussion

T-CID 408

- Average value in periodic function
 - t means the repetitive time period.

$$\textit{Average Value} = \frac{\int_0^t f(x)dx}{t}$$

Average brightness



- The repetitive time periods are the same.

T-CID 408 (cont.)

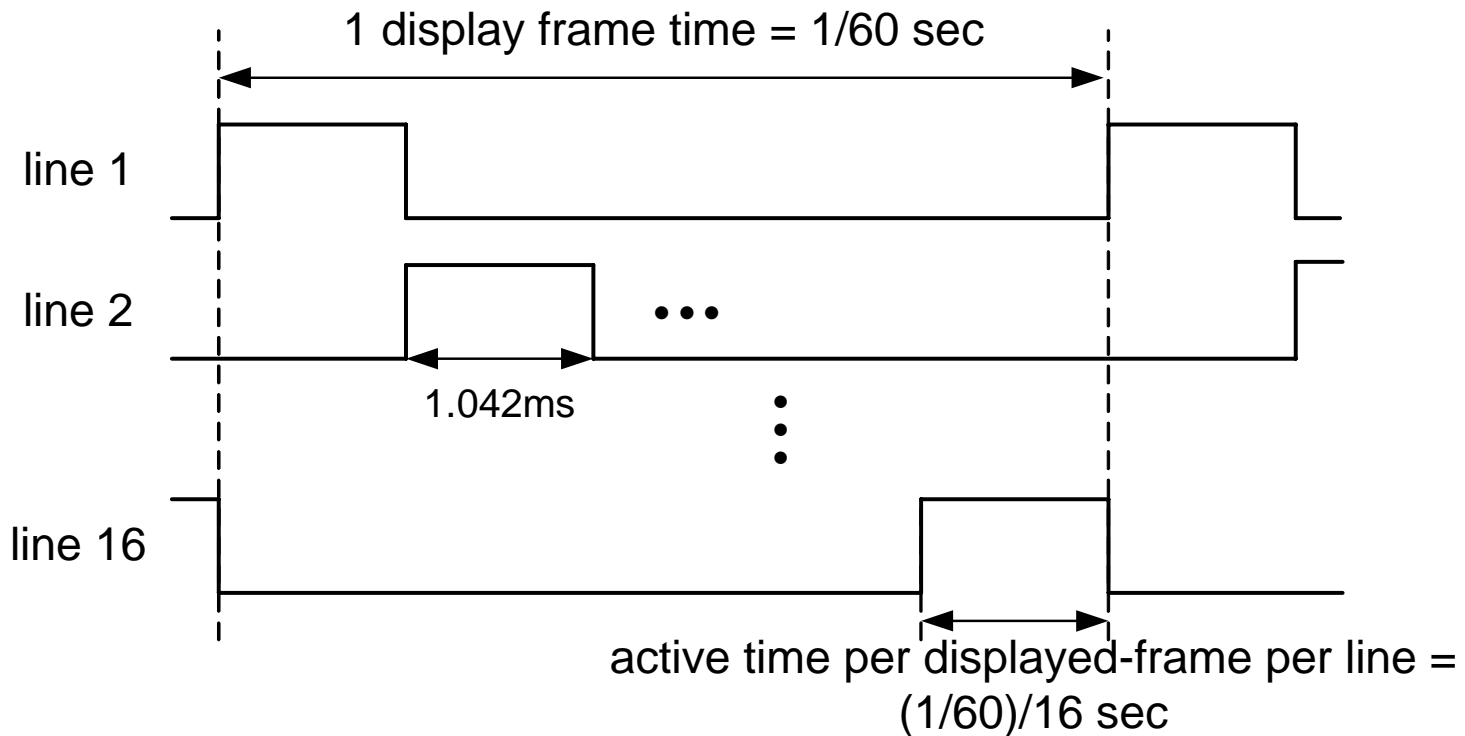


Figure G.2 An example of LED signboard operation mechanism

T-CID 408 (cont.)

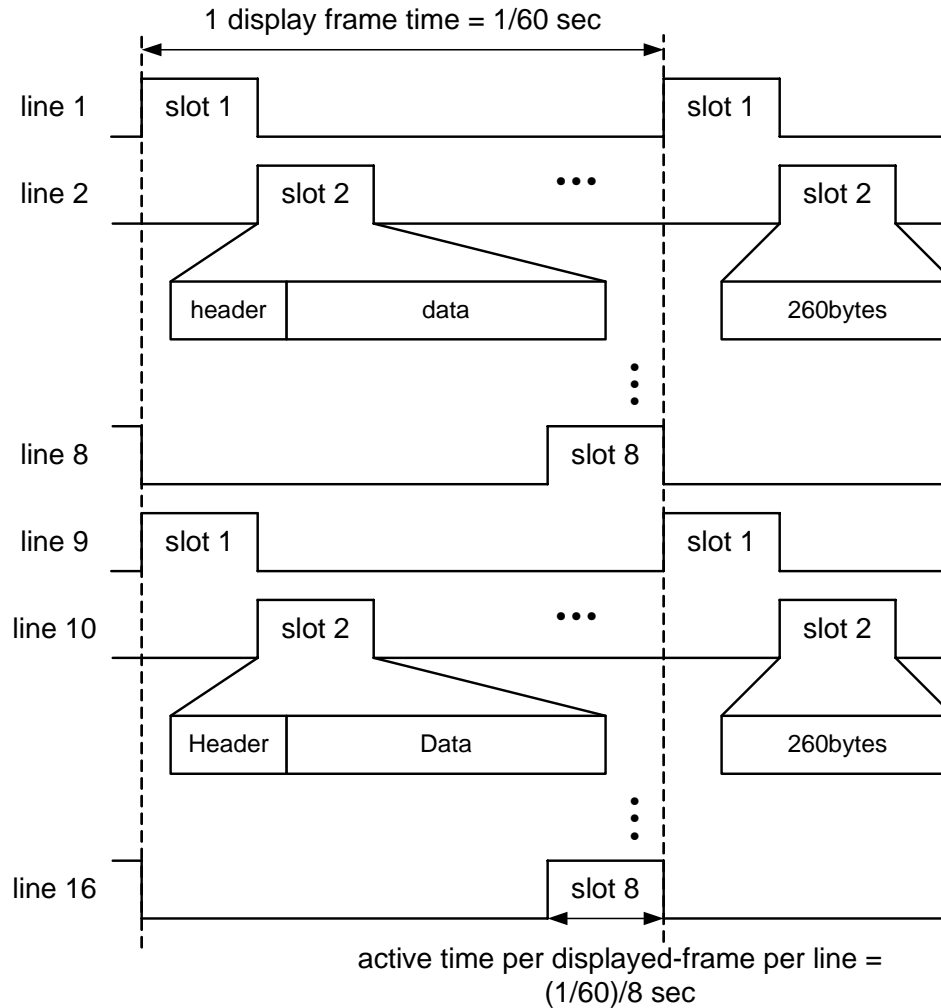
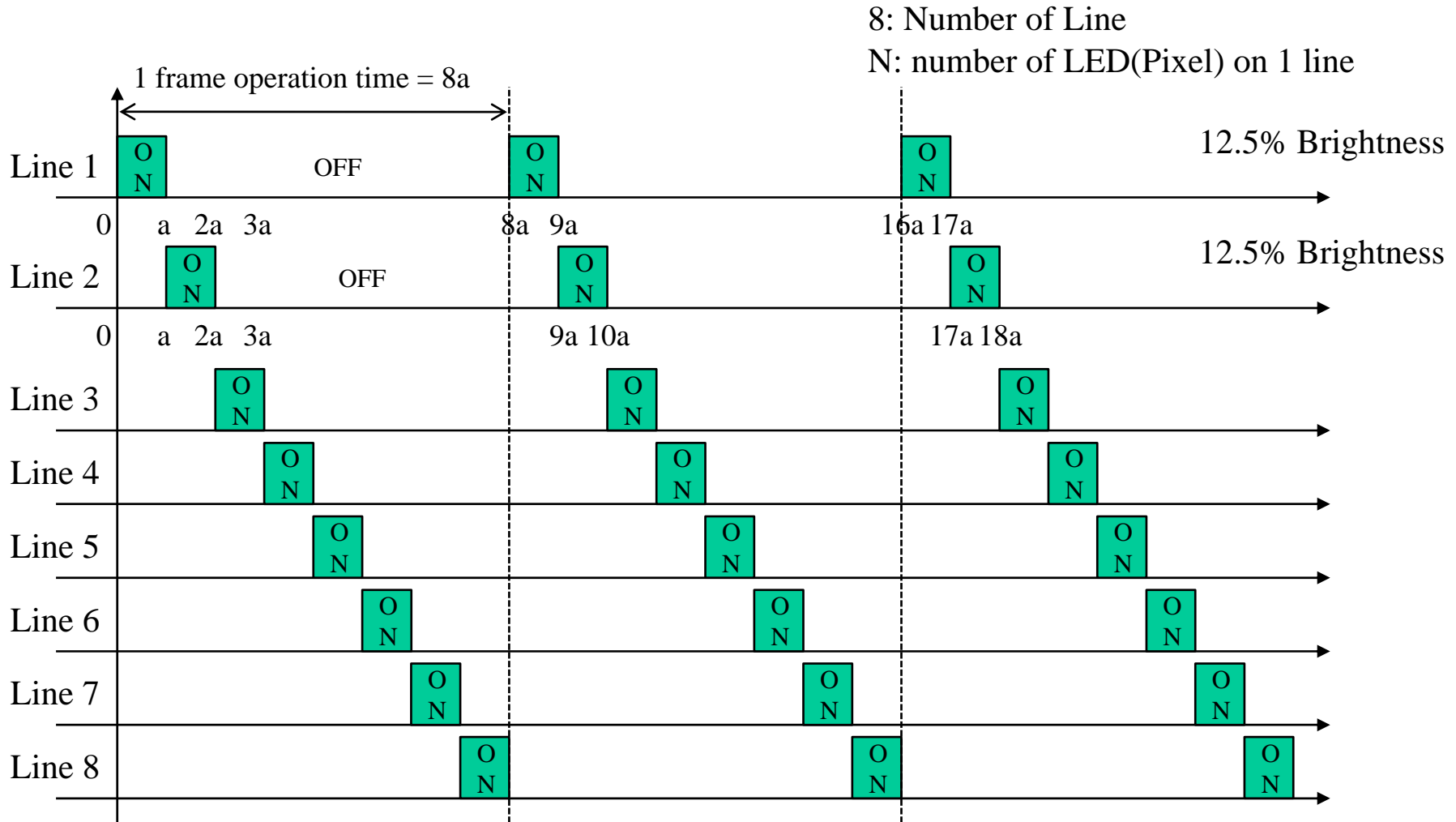


Figure G.4 An example for the mitigation of the average brightness weakness on LED signboard

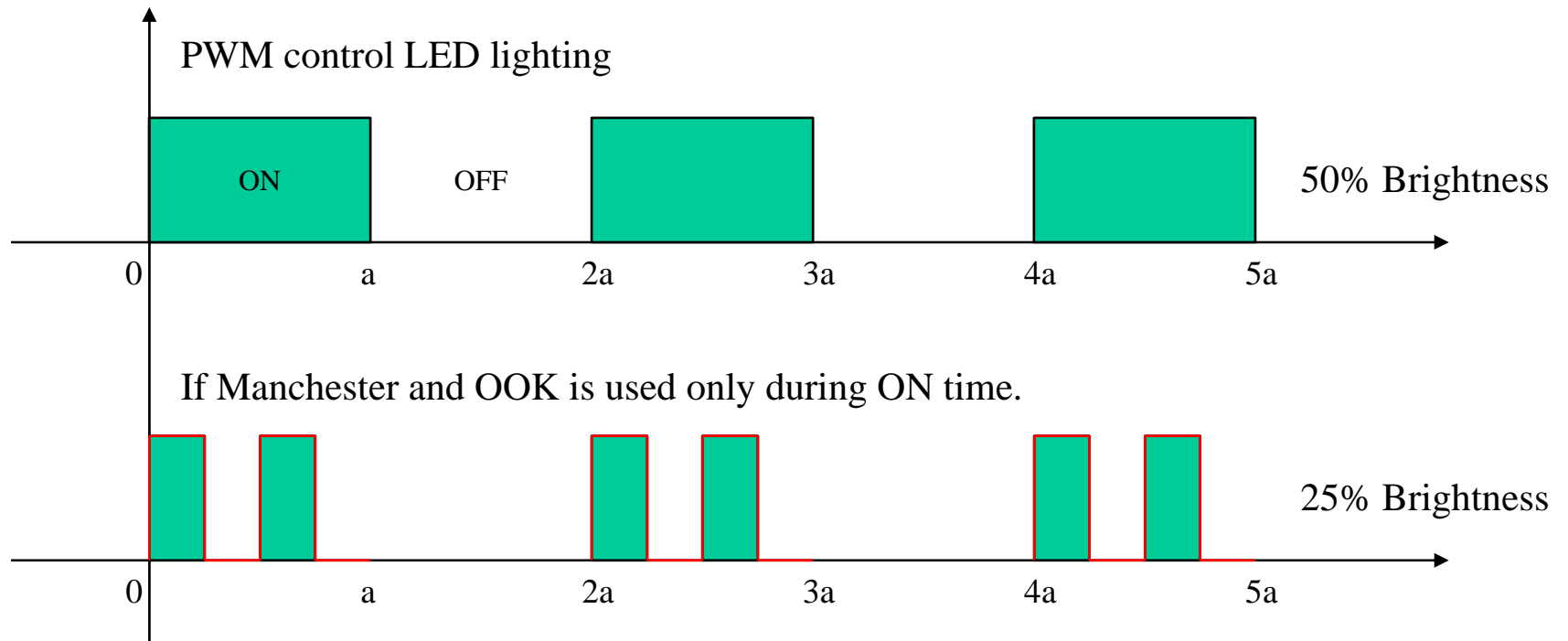
T-CID 408 (cont.)

- The **average brightness per display frame time** perceived by human eye of the VLC signboard can be reduced less than that of the non-VLC signboard. Therefore, it is important to minimize the **average brightness** weakness on VLC applications using LED signboard because the LED signboard should keep the display function as its inherent **function**.

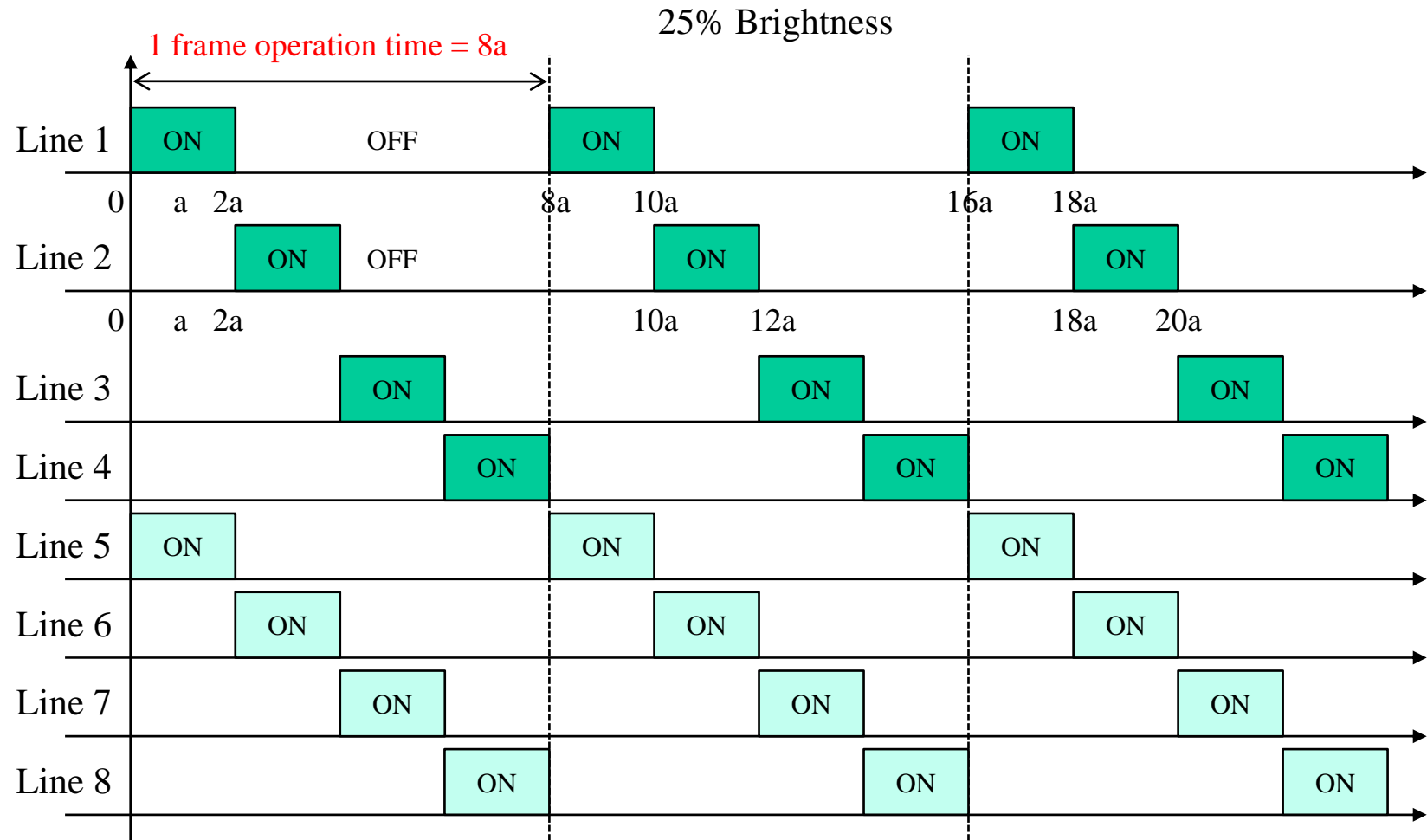
Average brightness of 8xN LED signboard



Average brightness weakness by modulation

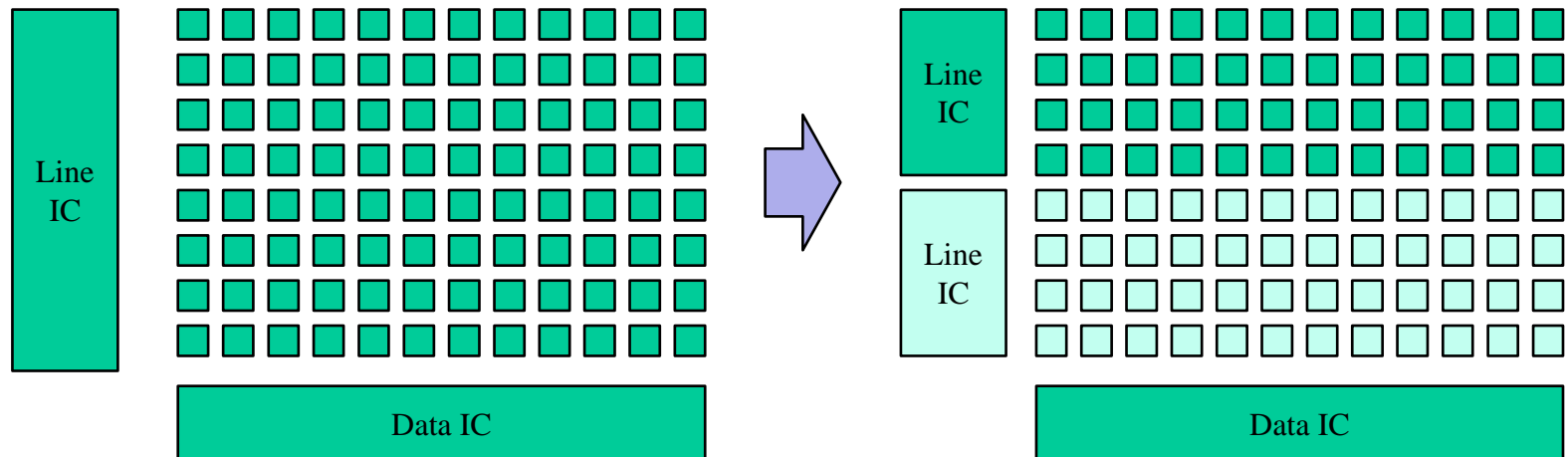


Average Brightness of $(4 \times N) \times 2$ LED signboard



Method 1: Divide 8xN into two 4xN

- Operation time for 1 line is fixed = 8a
- Number of line controlled by line IC is decreased 8 to 4



T-CID 408 (cont.)

- Figure G.4 shows an example of operation mechanism to mitigate the **average brightness weakness per display frame time** which can arise from when the 16x16 lines LED signboard operated as shown in Figures G.2 and G.3 is used for the VLC and the VLC data is carried during the active time of each line. The **average brightness per display frame time** in Figure G.4 is two times as large as that in Figure G.2 because the active time per displayed-frame per line in Figure G.4 is two times as long as that in Figure G.2.

T-CID 409

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy
409	Rick Roberts	Annex G	Table 91	299	23 to 50	potentially faulty reasoning ... more likely I don't understand the thinking!	Basically the same argument as for my comment against the text in Annex G on page 298. I think the slot duration time (which I call pixel duration time) is irrelevant ... there will be a 50% decrease in intensity for 100% extinction ration OOK.

- The text and Figure G.5 of Annex G related to “TDM 2” architecture has been deleted.

T-CID 410

CID	Name	Clause	Subclause	Page	Line	Comment	SuggestedRemedy
410	Rick Roberts	Annex G	Table 91	300	1	modify text as shown in remedy	" ... QoS policy by multiple slot allocations according to the service level as shown in subclause 6.2.2.1. The TDM time slot consists of the beacon slot and the data slot. The beacon slot TS0 is a VLC header for compatibility information with the source address and the destination address, the length field of beacon slot, the service type (information broadcast service or data download service) and the time slot information. The data slot from TS1 to the end of TS is simply the header with the destination address (only for data download service) and no length field."

- The text has been modified and a Figure for the understandings has been inserted.

T-CID 410 (cont.)

- The VLC LED signboard can be useful for the broadcast topology. The VLC broadcast topology in this standard consists of mainly the beacon and the downlink, as shown in Figure 106. Therefore, a broadcast topology can be constructed by assigning the active time slot #1 to the beacon and the active time slots from #2 to #8 to the downlink as shown in Figure G.5 and the use of GTS fields in the beacon frame.
- The GTS fields of beacon frame can be used to indicate the GTS number, GTS length, and GTS direction for the broadcast topology. The multiple GTS slot can also be used, which depends on the service level, the subscriber's grade, and the QoS policy.

T-CID 410 (cont.)

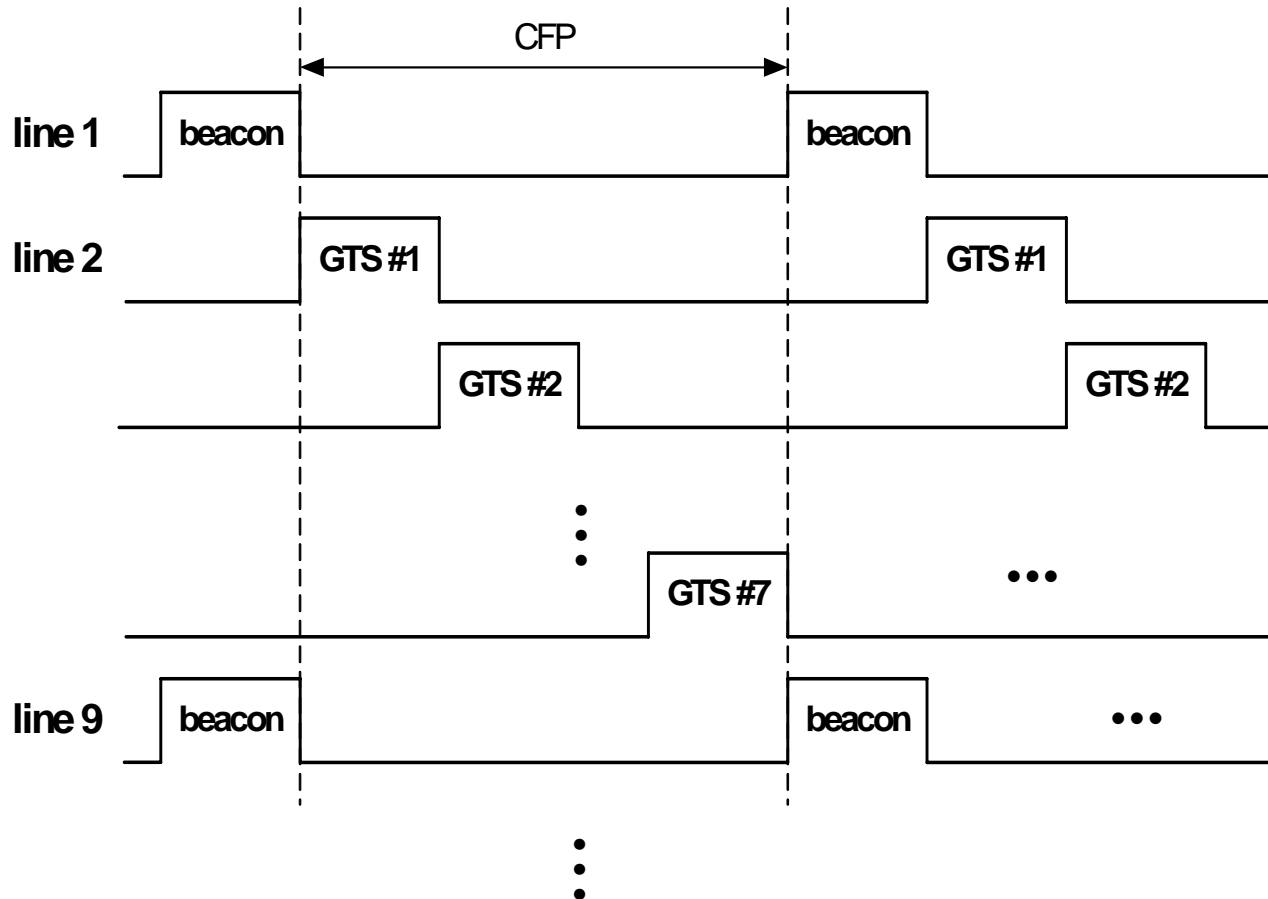


Figure G.5. An example of broadcast topology construction on VLC LED signboard