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

Submission Title: [Comment resolution related to Annex F in D6]
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Re: [Response to the SB 1st recirculation for the IEEE 802.15.7 standard]

Abstract: [This document describes the comment resolution related to Annex F in D6]

Purpose: [To resolve the comments related to Annex F in D6 after the SB 1st recirculation]

Comment resolution related to Annex F in D6

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Comments related to Annex F

Comment No.	Name	Page	Subclause	Line	Comment	Proposed Change
21	Lim, Sang-Kyu	281	Annex F	36	Table F.1	Remake the Table F.1 as per the updated bandplan.
22	Lim, Sang-Kyu	282	Annex F	45	Table F.2	Remake the Table F.2 as per the updated bandplan.
23	Lim, Sang-Kyu	282	Annex F	40	Figure F.4	Redraw the Figure F.4 as per the updated bandplan and the updated Table F.2.
24	Lim, Sang-Kyu	282	Annex F	11	According to the updated band plan in Table 75 (page 213), 480nm, 535nm, and 625nm are not center wavelengths in 7 color bands any longer.	Change "480nm, 535nm, and 625nm" to the center wavelengths in the updated 7 color bands.

Comments related to Annex F (*cont*.)

Comment No.	Name	Page	Subclause	Line	Comment	Proposed Change
61	SON, JAESEUNG	281	Annex F	36	We decided to change band plan in last SB. So, we have to reflect it in document.	change Table F.1 based on new band plan
229	Walewski, Joachim	281	Annex F	36	The wavelengths in Table F.1 are based on an updated version of Table 78.	Introduce the correct wavelength values. Recalculate the V factors and receiver input power. Also, correct the corresponding values in Table F.2 and Figure F.4.
289	Walewski, Joachim	281	Annex F	36	Confusing Table caption and missing hyphens.	Replace "Calculated Color Channel Difference Table at Receiver Input" with "Calculated difference in the different bands, expressed as received power."

Main issue in Annex F related to the bandplan

- **Table F.1 on page 281 should be updated because the bandplan has been changed.**

Table F.1—Calculated Color Channel Difference Table at Receiver Input

Wavelength Band (nm)		Spectral Width (nm)	Center Wavelength (nm)	V(λ) at C.W.	Receiver input power (Watts) @ 1m
380	450	70	415	0.0118	0.1241
450	510	60	480	0.1390	0.0105
510	560	50	535	0.9151	0.0016
560	600	40	580	0.8700	0.0017
600	650	50	625	0.3205	0.0046
650	710	60	680	0.0170	0.0861
710	780	70	745	0.0002	7.3206

Main issue in Annex F related to the bandplan (*cont*.)

- **2nd paragraph on page 281**

Table F.1 describes the receiver input powers, calculated in Watts, from the assumption of 1 lumen on each of the 7 color bands (given in Table 75). The assumption that the lights have only their center wavelength monochromatic component on each color band is also used for simple calculations. V(λ) is the human eye sensitivity function which indicates CIE sensitivity curves [B5].

Resolutions for the main issue

Wavelength band (nm)		Spectral width (nm)	Example wavelength (nm)
380	478	98	430
478	540	62	510
540	588	48	565
588	633	45	610
633	679	46	655
679	726	47	700
726	780	54	750

- What we change the wavelength band and spectral width as per the new bandplan is easy.
- The calculation is not simple if we still keep the title of blue column as the center wavelength because they are not integer and multiples of 5 any longer.
- So, for the simple calculations, we need to select the multiples of 5 near the center wavelengths for the blue column and to change its title to “example wavelength”.

Resolutions for the main issue (*cont.*)

- **Table F.1 – Calculated color channel power at receiver**

Wavelength band (nm)		Spectral width (nm)	Example wavelength (nm)	V(λ) at example wavelength	Receiver input power (Watts) @ 1 lm
380	478	98	430	0.0273	0.0536
478	540	62	510	0.5030	0.0029
540	588	48	565	0.9788	0.0015
588	633	45	610	0.5030	0.0029
633	679	46	655	0.0817	0.0179
679	726	47	700	0.0041	0.3571
726	780	54	750	0.0001	14.6413

Resolutions for the main issue (*cont.*)

- **2nd paragraph on page 281**

Table F.1 describes the receiver input powers, calculated in Watts, from the assumption of 1 lumen on each of the 7 color bands (given in Table 75). The assumption that the lights have only ~~their center wavelength~~ monochromatic component (shown as example wavelength in Table F.1) on each color band is also used for simple calculations. V(λ) is the human eye sensitivity function which indicates CIE sensitivity curves [B5].

2nd issue in Annex F related to the bandplan

- Figure F.4 and 1st paragraph on page 282

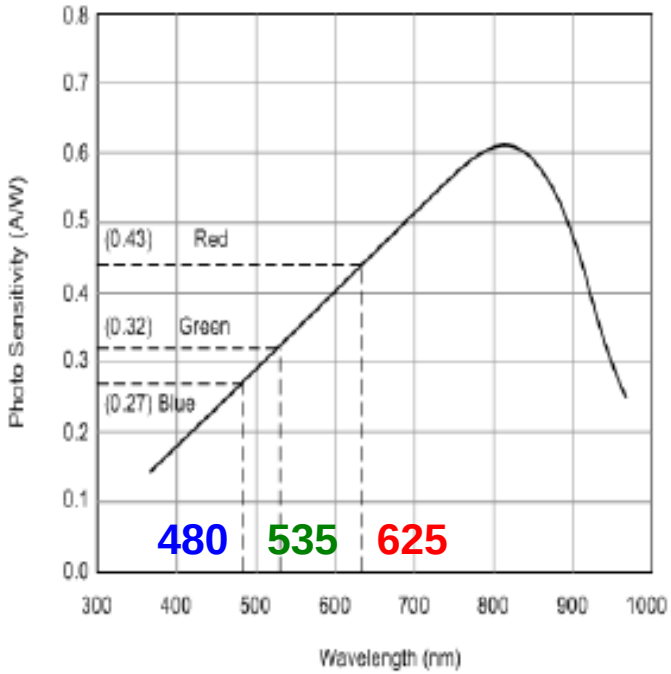


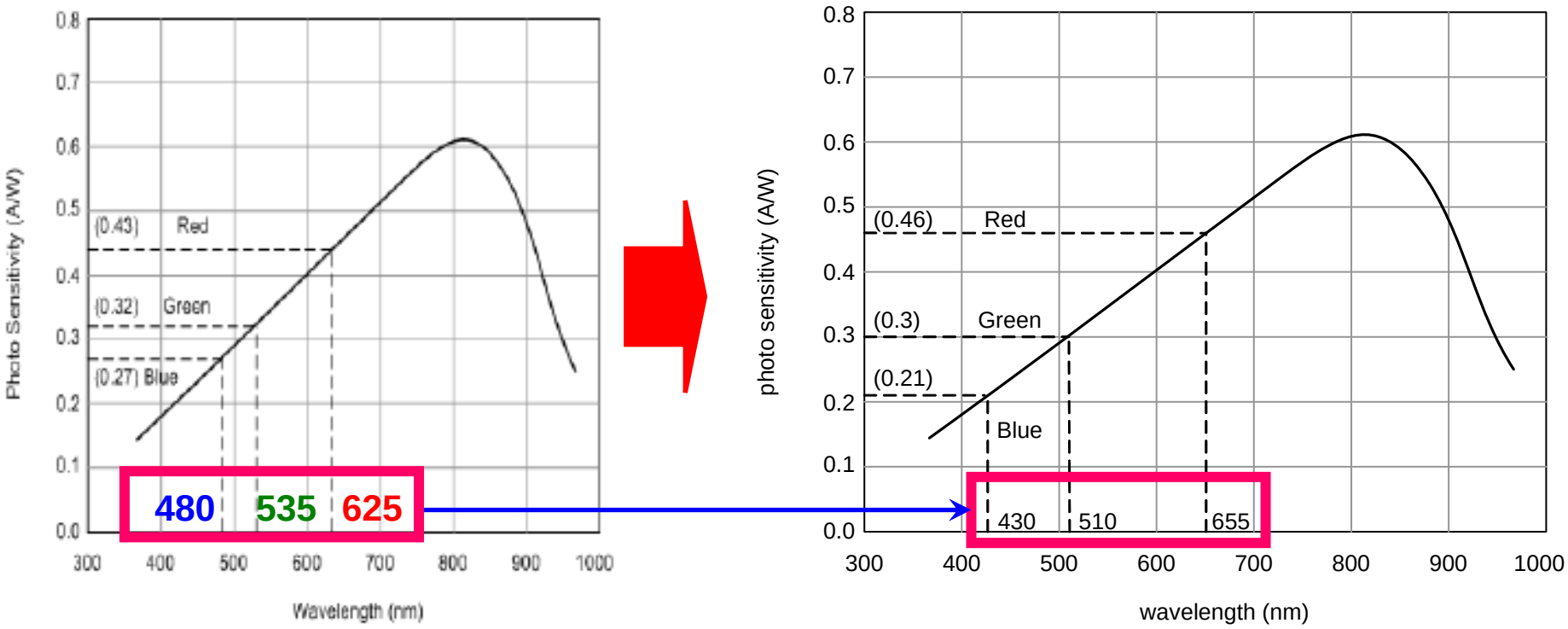
Figure F.4—Typical Si photo-detector wavelength sensitivity

The second factor ~.
Figure F.4 shows the photo sensitivity characteristics of a Si photo-detector according to the wavelength variation. It has been known that the photo sensitivity value of Si photo-detector is higher on longer wavelength than on shorter wavelength in the visible band as shown in Figure F.4. Figure F.4 shows that a Si photo-detector produce more electrical current on red color channel than on green or blue color channel even though the radiometric received powers on each color channel are equal.

No change

Resolution for the 2nd issue

- Figure F.4 should be changed as per the updated Table F.1.



3rd issue in Annex F related to the bandplan

- **Table F.2 and 2nd paragraph on page 282**

Table F.2—Photo-detector current from Figure F.4 with conditions of Table F.1

Center Wavelength (nm)	Receiver Input Power (Watt) @ 1m	Photo Sensitivity (A/W)	Photo-detector Output Current (mA) @ 1 lm
480	0.0105	0.27	2.84
535	0.0016	0.32	0.51
625	0.0046	0.43	1.98

Table F.2 shows the photo-detector output current obtained from both the wavelength dependence of photo sensitivity shown in Figure F.4 and the conversion relations between the radiometric and photometric units described in Table F.1. The photo-detector output currents in Table F.2 were calculated only at 480nm, 535nm, and 625nm among the center wavelengths in 7 color bands according to VLC band plan for convenience.

Resolution for the 3rd issue

- **Table F.2 should be changed as per the updated Table F.1 and Figure F.4.**

Table F.2—Photo-detector current from Figure F.4 with conditions of Table F.1

Center Wavelength (nm)	Receiver Input Power (Watt) @ 1m	Photo Sensitivity (A/W)	Photo-detector Output Current (mA) @ 1 lm
480	0.0105	0.27	2.84
535	0.0016	0.32	0.51
625	0.0046	0.43	1.98

Example wavelength (nm)	Receiver input power (Watts) @ 1 lm	Photo sensitivity (A/W)	Photo-detector output current (mA) @ 1 lm
430	0.0536	0.21	11.26
510	0.0029	0.30	0.87
655	0.0179	0.46	8.23

Resolution for the 3rd issue (*cont*.)

- **2nd paragraph on page 282**

Table F.2 shows the photo-detector output current obtained from both the wavelength dependence of photo sensitivity shown in Figure F.4 and the conversion relations between the radiometric and photometric units described in Table F.1. The photo-detector output currents in Table F.2 were calculated only at ~~480~~ 430nm, ~~535~~ 510nm, and ~~625~~ 655nm among the ~~center~~ example wavelengths in 7 color bands, as shown in Table F.1, ~~according to VLC band plan~~ for convenience.