

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

Submission Title: Panasonic 802.15.7r1 Proposal

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Abstract: Panasonic 802.15.7r1 Proposal

Purpose: Call for Proposals Response

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Requirements

- Flicker free:
average luminance must be constant
- Of-Off modulation:
signal must be modulated with monochrome On and Off state of luminance (Off state may not be zero luminance) so as to use most of LED devices as transmitters

Purposes of Communications

- ID broadcast
- Unidirectional data transfer

Modes

Mode 1

for ID broadcast mode

Mode 2

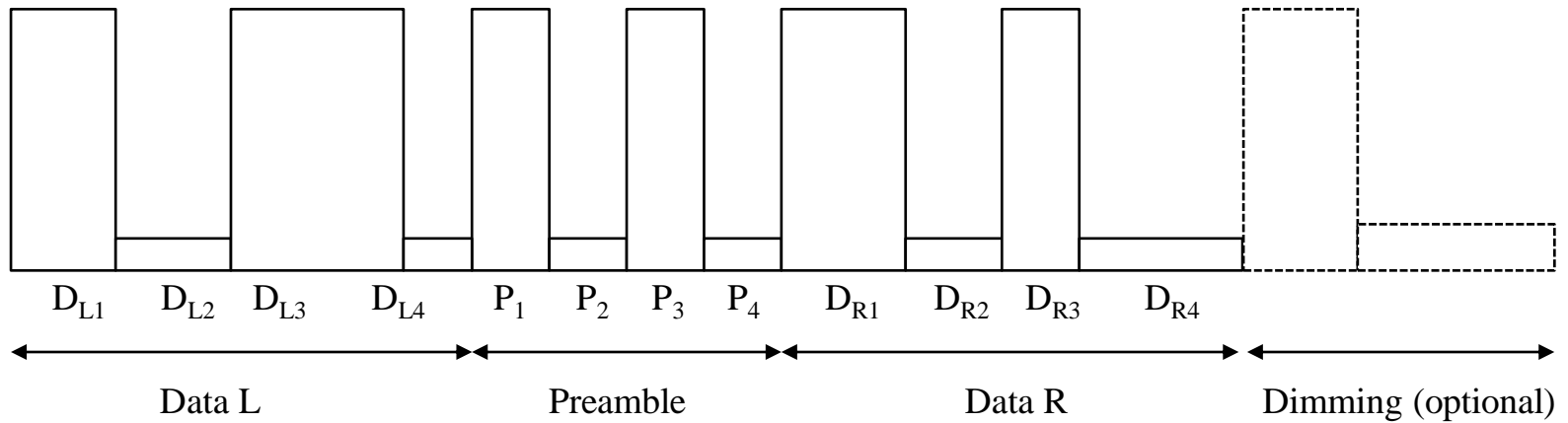
for ID broadcast mode

for low luminance mode

Mode 3

for unidirectional data transfer mode

Mode 1



Modulation [us]

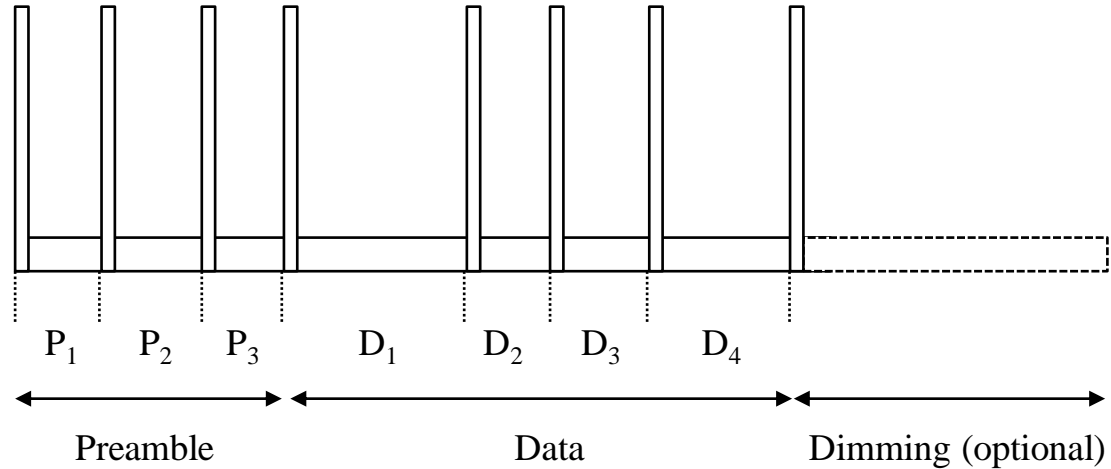
$$(P_1, P_2, P_3, P_4) = (100, 90, 90, 100)$$

$$D_{Ri} = 120 + 20 \times w_i \quad (i \in 1 \sim 4, w_i \in 0 \sim 15)$$

$$D_{Li} = 120 + 20 \times (15 - w_i)$$

A transmitter can send either or both of Data R and L

Mode 2



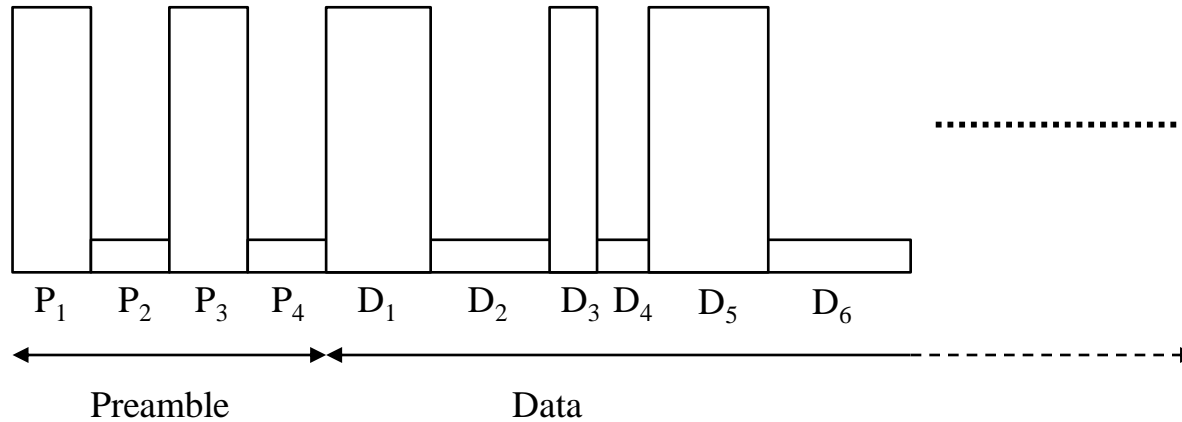
Modulation [us]

$$(P_1, P_2, P_3) = (160, 180, 160)$$

$$D_i = 180 + 20 \times w_i \quad (i \in 1 \sim 4, w_i \in 0 \sim 15)$$

Pulse width < 10

Mode 3



Modulation [us]

$$(P_1, P_2, P_3, P_4) = (50, 60, 60, 50)$$

$$D_{2i} + D_{2i+1} = 100 + 15 \times x_i$$

$$(i \in 1 \sim N, x_i \in 0 \sim 15, D_{2i} > 50, D_{2i+1} > 50)$$

Packet Modulation for ID Broadcast

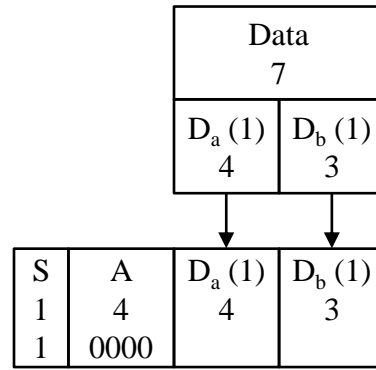
Packet Modulation

			bit 1	bit 2	bit 3	bit 4	
w_1	=	(	P_1	D_{a1}	S	D_{b1})
w_2	=	(	P_2	D_{a2}	A_1	D_{b2})
w_3	=	(	P_3	D_{a3}	A_2 / D_{a6}	D_{b3})
w_4	=	(	P_4	D_{a4}	A_2 / D_{a5}	A_3 / D_{b4})

A : Address 1-4 bit
 D : Data 4-6 + 3-4 bit
 P : Parity 4 bit
 S : Stop bit 1 bit

Packet Division (1, 2)

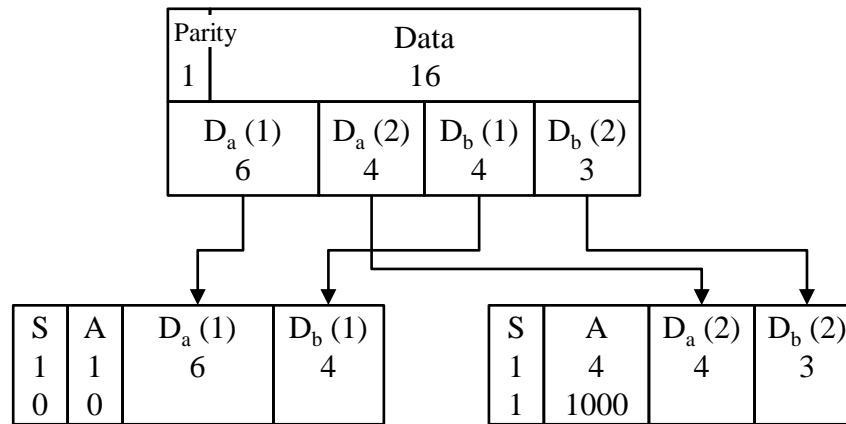
Division (1)



Packet 1

label
bit size
value

Division (2)



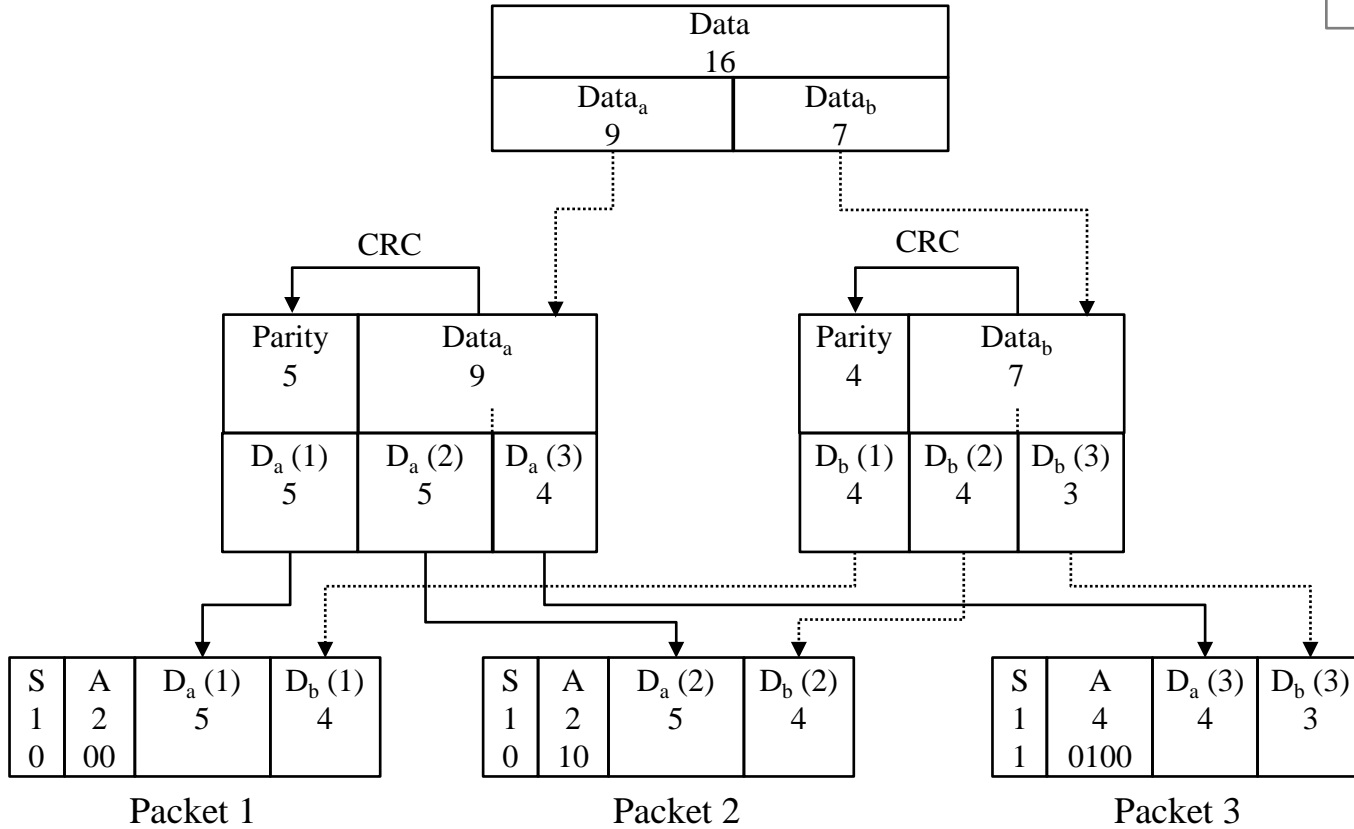
Packet 1

Packet 2

Packet Division (3, 4)

Division (3)

label
bit size
value



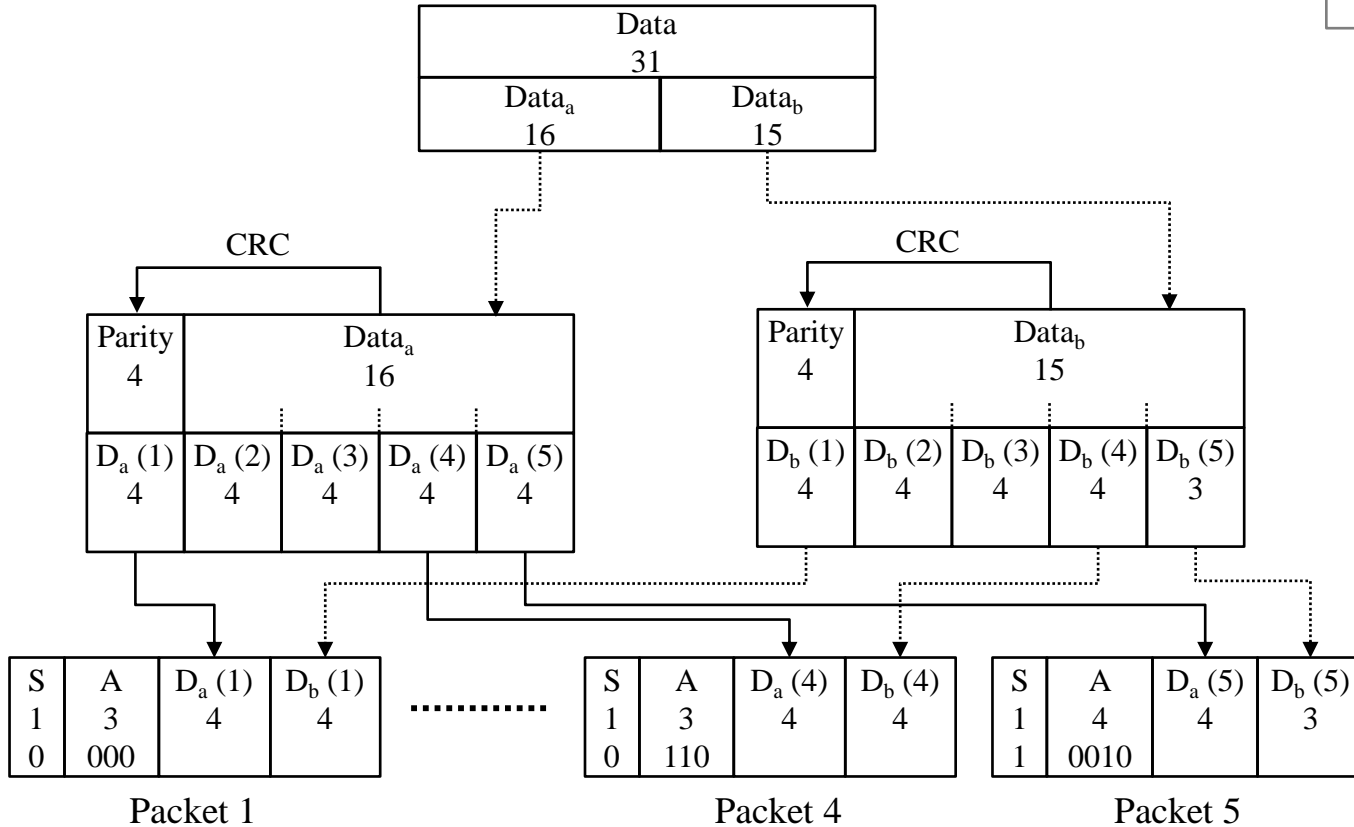
Division (4)

Same manner as Division (3)

Packet Division (5-7)

Division (5)

label
bit size
value



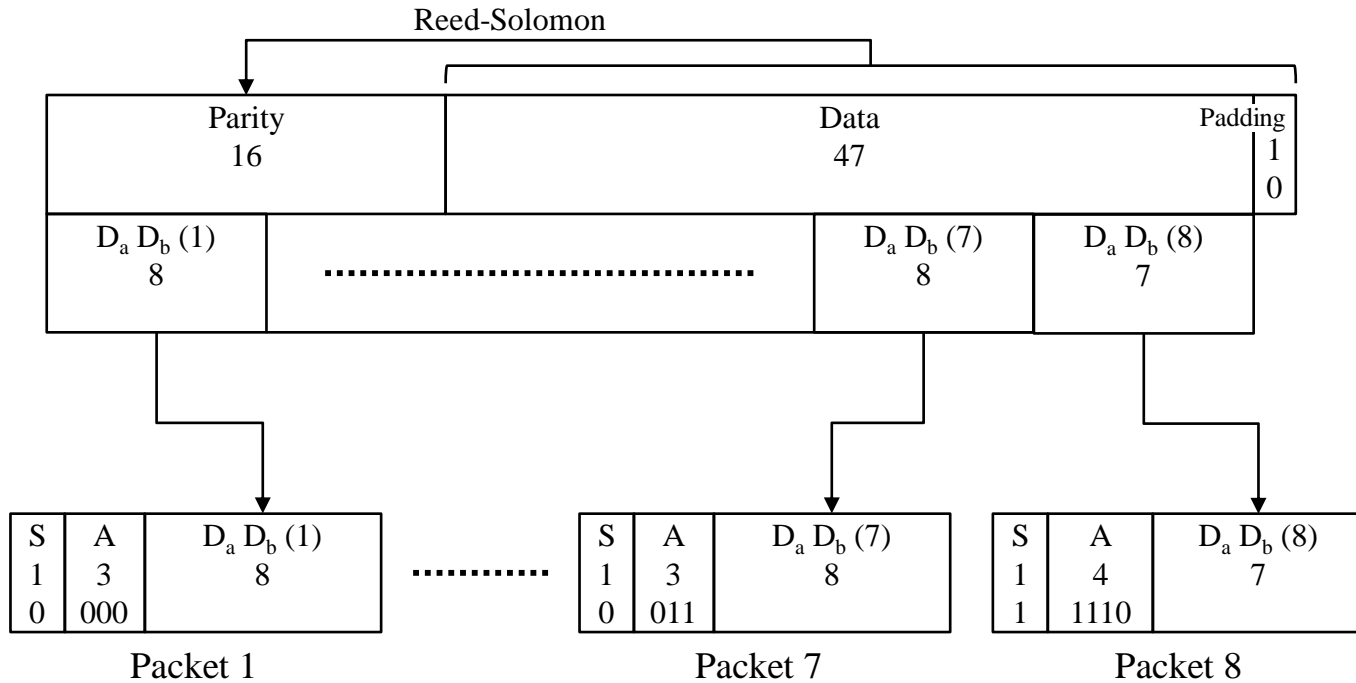
Division (6, 7)

Same manner as Division (5)

Packet Division (8)

Division (8)

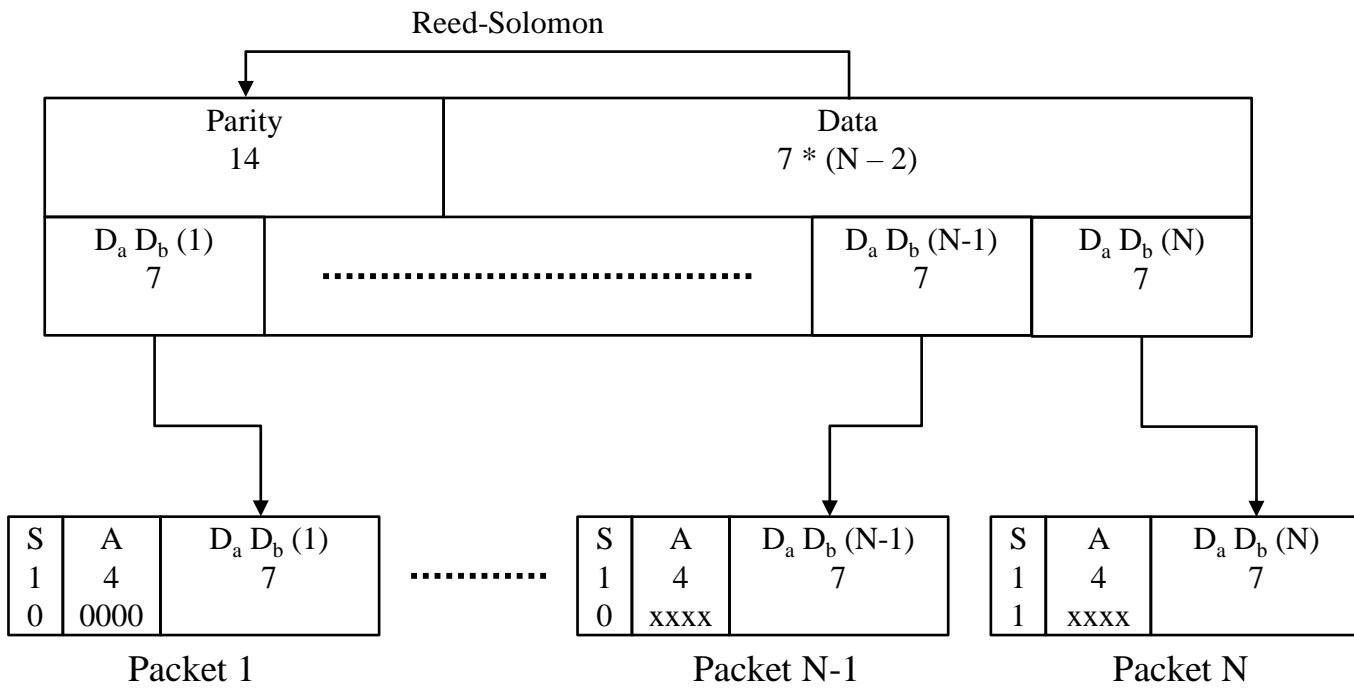
label
bit size
value



Packet Division (9-16)

Division (N = 9-16)

label
bit size
value



ID Size

Packet Division	Data Size [bit]	
	Short mode	Full mode
1	4	7
2	9	16
3	9	16
4	14	25
5	16	31
6	20	39
7	24	47
8	-	47
9	-	49
10	-	56
11	-	63
12	-	70
13	-	77
14	-	84
15	-	91
16	-	98