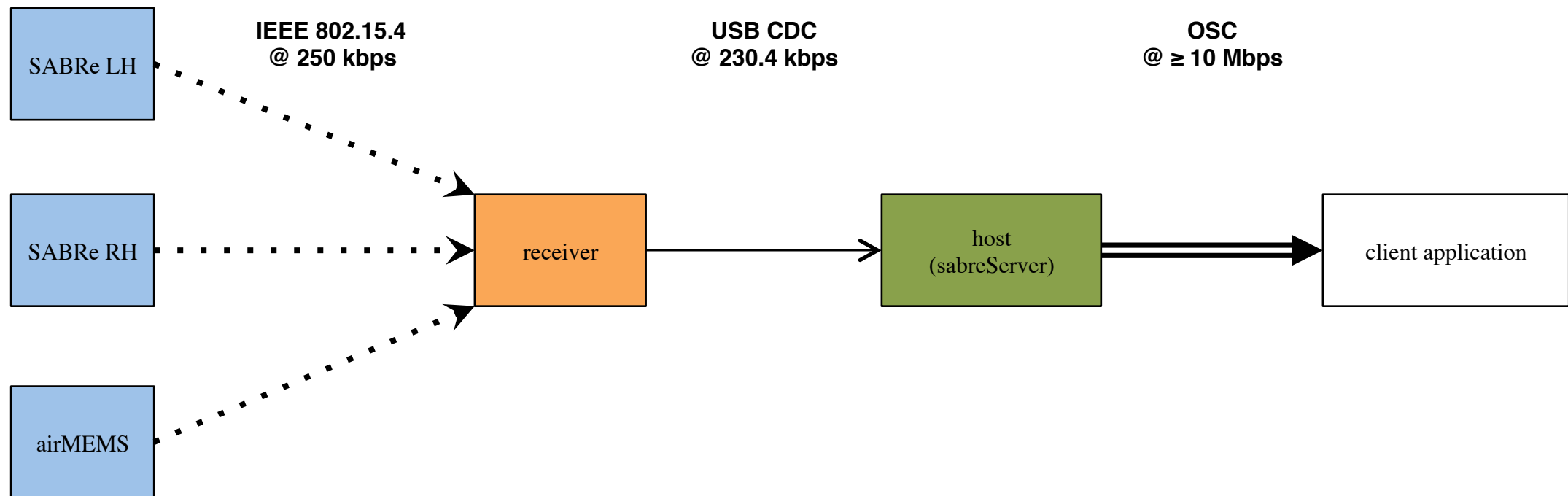
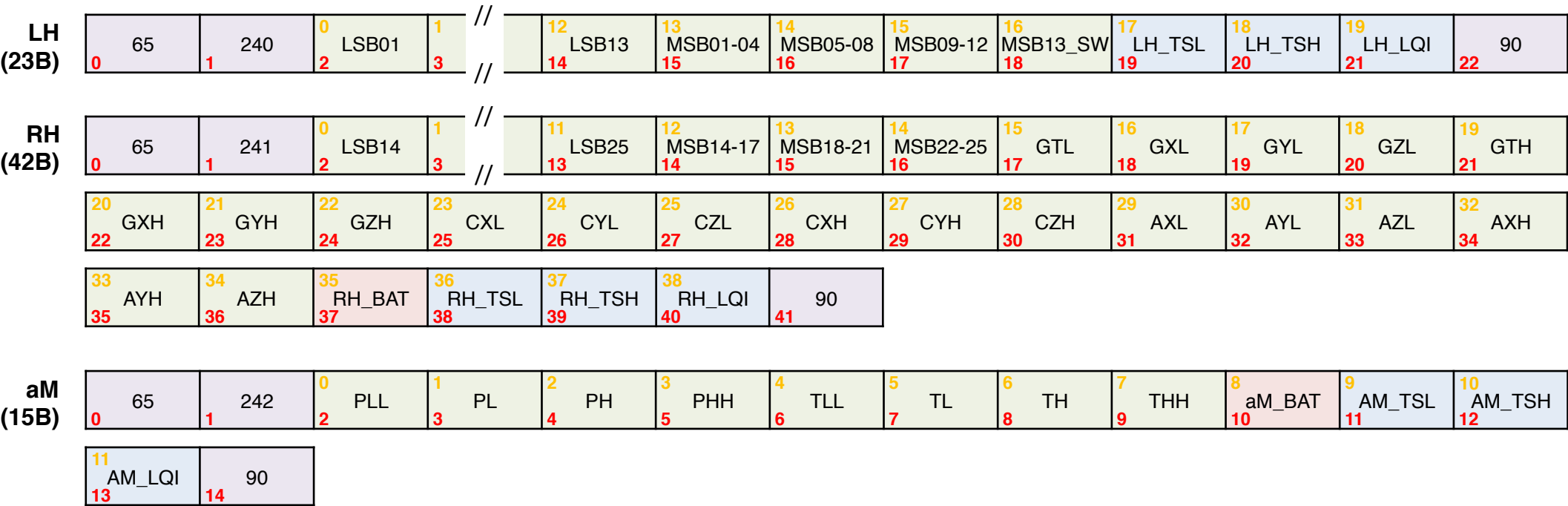


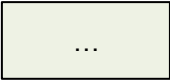
Communication overview:



Serial protocol:



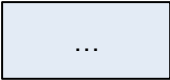
Address/parsing bytes



SABRe data



System data – from SABRe



System data – from receiver

Serial protocol – bytes details

Keys

Low bits (**LSb**) of the SABRe key K_x

LSBx	K_{x_7}	K_{x_6}	K_{x_5}	K_{x_4}	K_{x_3}	K_{x_2}	K_{x_1}	K_{x_0}
------	------------	------------	------------	------------	------------	------------	------------	------------

MSb of four SABRe keys K_x , $K_{(x+1)}$, $K_{(x+2)}$, $K_{(x+3)}$

MSBx	K_{x_9}	K_{x_8}	$K_{(x+1)_9}$	$K_{(x+1)_8}$	$K_{(x+2)_9}$	$K_{(x+2)_8}$	$K_{(x+3)_9}$	$K_{(x+3)_8}$
------	------------	------------	----------------	----------------	----------------	----------------	----------------	----------------

MSb of the key K_{13} and **switch** values

MSB13_SW	K_{13_9}	K_{13_8}	SW_3	SW_2	SW_1	0	0	0
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Gyroscope

Low bits (**LSb**) of the # (X, Y, Z) axes

G#L	$G_{\#_07}$	$G_{\#_06}$	$G_{\#_05}$	$G_{\#_04}$	$G_{\#_03}$	$G_{\#_02}$	$G_{\#_01}$	$G_{\#_00}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

High bits (**MSb**) of the # (X, Y, Z) axis

G#H	$G_{\#_15}$	$G_{\#_14}$	$G_{\#_13}$	$G_{\#_12}$	$G_{\#_11}$	$G_{\#_10}$	$G_{\#_09}$	$G_{\#_08}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Accelerometer

Low bits (**LSb**) of the # (X, Y, Z) axes

A#L	$A_{\#_07}$	$A_{\#_06}$	$A_{\#_05}$	$A_{\#_04}$	$A_{\#_03}$	$A_{\#_02}$	$A_{\#_01}$	$A_{\#_00}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

MSb of the **X** and **Y** axes

A#H	$A_{\#_15}$	$A_{\#_14}$	$A_{\#_13}$	$A_{\#_12}$	$A_{\#_11}$	$A_{\#_10}$	$A_{\#_09}$	$A_{\#_08}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Compass

Low bits (**LSb**) of the # (X, Y, Z) axis

C#L	$C_{\#_07}$	$C_{\#_06}$	$C_{\#_05}$	$C_{\#_04}$	$C_{\#_03}$	$C_{\#_02}$	$C_{\#_01}$	$C_{\#_00}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

High bits (**MSb**) of the # (X, Y, Z) axis

C#H	$C_{\#_15}$	$C_{\#_14}$	$C_{\#_13}$	$C_{\#_12}$	$C_{\#_11}$	$C_{\#_10}$	$C_{\#_09}$	$C_{\#_08}$
-----	--------------	--------------	--------------	--------------	--------------	--------------	--------------	--------------

Serial protocol – bytes details (cont.)

airMEMS

Bytes of the **pressure** value

PLL	P_07	P_06	P_05	P_04	P_03	P_02	P_01	P_00
PL	P_15	P_14	P_13	P_12	P_11	P_10	P_09	P_08
PH	P_23	P_22	P_21	P_20	P_19	P_18	P_17	P_16
PHH	P_31	P_30	P_29	P_28	P_27	P_26	P_25	P_24

Bytes of the **temperature** value

TLL	T_07	T_06	T_05	T_04	T_03	T_02	T_01	T_00
TL	T_15	T_14	T_13	T_12	T_11	T_10	T_09	T_08
TH	T_23	T_22	T_21	T_20	T_19	T_18	P_17	T_16
THH	T_31	T_30	T_29	T_28	T_27	T_26	T_25	T_24

Timestamp

Timestamp low byte (**LSB**) of the xx node

xx_TSL	TS_07	TS_06	TS_05	TS_04	TS_03	TS_02	TS_01	TS_00
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Timestamp high byte (**MSB**) of the xx node

xx_TSH	TS_15	TS_14	TS_13	TS_12	TS_11	TS_10	TS_09	TS_08
--------	-------	-------	-------	-------	-------	-------	-------	-------

Battery

Battery level of the xx node

xx_BAT	BAT_7	BAT_6	BAT_5	BAT_4	BAT_3	BAT_2	BAT_1	BAT_0
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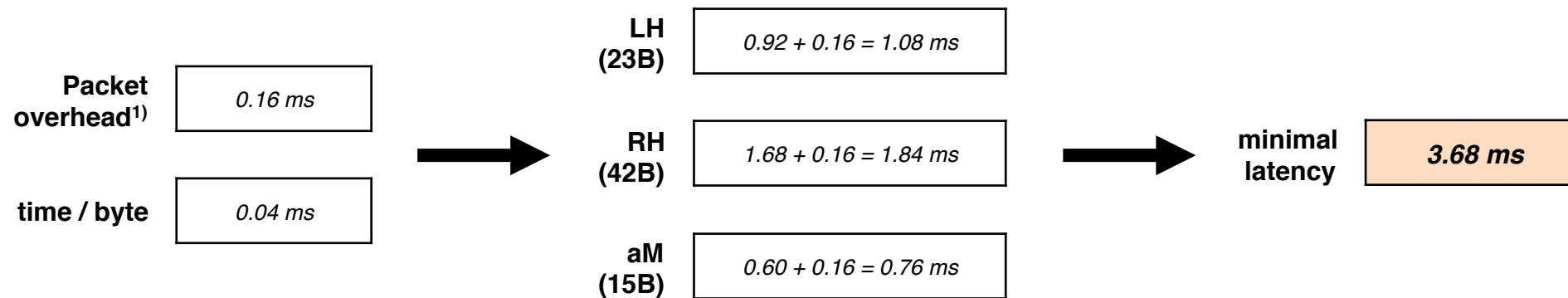
Link quality

Link quality value of the xx node

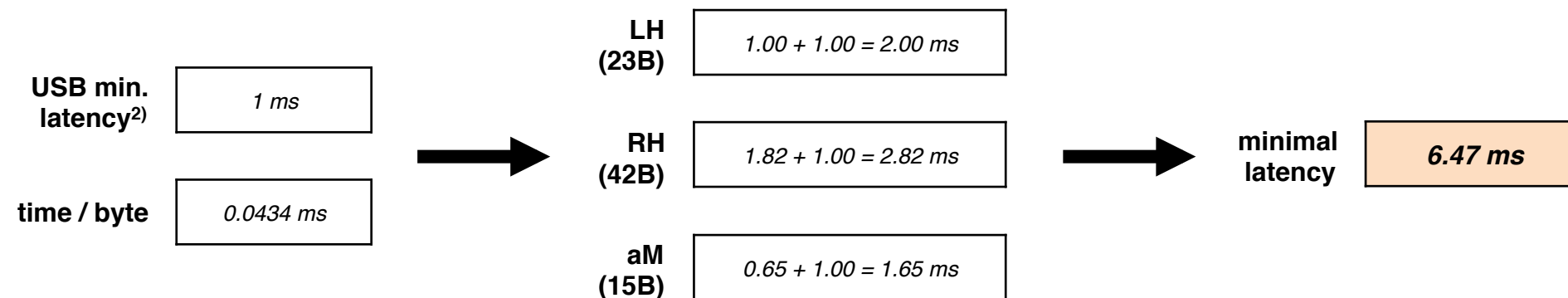
xx_LQI	LQI_7	LQI_6	LQI_5	LQI_4	LQI_3	LQI_2	LQI_1	LQI_0
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Timing calculation:

1. node – receiver (@ 250 kbps)



2. receiver – host (@ 230.4 kbps)



¹⁾ based on the ATmega128RFA1 datasheet (<http://www.atmel.com/Images/doc8266.pdf>)

²⁾ for the USB interface ATmega8U2, based on the arduino users forum „UNO serial latency“ (<http://arduino.cc/forum/index.php?topic=96.0>)