





Analyse de trames de la station météo

1 Analyse de l'échange

Voilà ci-dessous une capture d'écran d'un logiciel qui reçoit et affiche les trames

envoyées par la station météo, ces trames sont réceptionnées sur la liaison série RS232.

```
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
   FF FF 06 00 51 01 53 06<OK>
6: 42 31 00 00 06 28<TimeOut>
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
    FF FF 03 01 44 01 45 02 8E<OK>
5: FF FF 0E 15 21<0K>
11: FF FF 00 00 97 00 00 00 00 14 A9<0K>
               00 00 97 00 00 00 00 14 19/01
                                                                               Trame n°1
14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28(OK)
          FF 00 00 97 00 00 00 00 14 A9 OK
9: FF FF 03 01 44 01 45 02 8E<OK>
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<OK>
                                                                              \mathbf{0} \times 8 + \mathbf{0} \times 4 + \mathbf{0} \times 2 + \mathbf{0} \times 1 = 0
                                                                                                                 0000
     FF FF 00 00 97 00 00 00 00 14 A9(OK)
   FF FF 0E 16 22 (OK)
                                                                                                                 0001
                                                                              \mathbf{0} \times 8 + \mathbf{0} \times 4 + \mathbf{0} \times 2 + \mathbf{1} \times 1 = 1
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
                                                                              \mathbf{0} \times 8 + \mathbf{0} \times 4 + \mathbf{1} \times 2 + \mathbf{0} \times 1 = 2
                                                                                                                 0010
14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<OK>
     FF FF 00 00 97 00 00 00 00 14 A9(OK)
                                                                                                                 0011
                                                                              \mathbf{0} \times 8 + \mathbf{0} \times 4 + \mathbf{1} \times 2 + \mathbf{1} \times 1 = 3
   FF FF 03 01 44 01 45 02 8E<OK>
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
                                                                              \mathbf{0} \times 8 + \mathbf{1} \times 4 + \mathbf{0} \times 2 + \mathbf{0} \times 1 = 4
                                                                                                                 0100
    FF FF 0E 17 23<0K>
                                                                                                                 0101
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
                                                                              \mathbf{0} \times 8 + \mathbf{1} \times 4 + \mathbf{0} \times 2 + \mathbf{1} \times 1 = 5
   : FF FF 06 00 51 01 53 06 42 31 00 00 06 28(OK)
                                                                              \mathbf{0} \times 8 + \mathbf{1} \times 4 + \mathbf{1} \times 2 + \mathbf{0} \times 1 = 6
                                                                                                                 0110
   : FF FF 00 00 97 00 00 00 00 14 A9<OK>
        FF 03 01 44 01 45 02 8E<OK>
    FF
                                                                                                                 0111
                                                                              \mathbf{0} \times 8 + \mathbf{1} \times 4 + \mathbf{1} \times 2 + \mathbf{1} \times 1 = |7|
             00 00 97<OK>
    00 00 00 00 14 A9(TimeOut)
                                                                                                                 1000
                                                                              1 \times 8 + 0 \times 4 + 0 \times 2 + 0 \times 1 = 8
   : FF FF 06 00 51 01 53 06 42 31 00 00 06 28 (OK)
                                                                              1 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1 = 9
                                                                                                                 1001
   FF FF 00 00 97<0K>
    00 00 00 00 14 A9(TimeOut)
             OE 10
                                                                Trame n°2
    FF FF 03 01 44 01 45 02 8E<OK>
    FF FF 00 00 97 00 00 00 00 14 A9(OK)
    FF FF 00 00 (OK)
    97 00 00 00 00 14 A9(TimeOut)
14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<OK>
11: FF FF 00 00 97 00 00 00 14 49<OK>
    FF FF 03 01 44 01 45 02 8E<OK>
```

Donner le nombre de trames défectueuses.

11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>

9: FF FF 03 01 44 01 45 02 8E<OK>
11: FF FF 00 00 97 00 00 00 00 14 A9<OK>
11: FF FF 00 00 97 00 00 00 14 A9<OK>

9: FF FF 03 01 44 01 45 02 8E<OK>
11: FF FF 00 00 97 00 00 00 014 A9<OK>
5: FF FF 0E 20 2C<OK>
11: FF FF 00 00 97 00 00 00 14 A9<OK>

: FF FF 00 00 97 00 00 00 00 14

FF FF 0E 19 25<0K>: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<0K>

14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<OK>

14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28(OK)











Nous rappelons ci-dessous la signification des trois premiers octets d'une trame :

Data		Data Type								
Data		Wind	Rain	TH	Mushroom	Т	ВТН	Minute	Clock	EXTBTH
Header 1	Bit 0	1	1	1	1	1	1	1	1	1
	Bit 1	1	1	1	1	1	1	1	1	1
	Bit 2	1	1	1	1	1	1	1	1	1
	Bit 3	1	1	1	1	1	1	1	1	1
	Bit 4	1	1	1	1	1	1	1	1	1
1	Bit 5	1	1	1	1	1	1	1	1	1
1	Bit 6	1	1	1	1	1	1	1	1	1
	Bit 7	1	1	1	1	1	1	1	1	1
	Bit 0	1	1	1	1	1	1	1	1	1
	Bit 1	1	1	1	1	1	1	1	1	1
	Bit 2	1	1	1	1	1	1	1	1	1
Header 2	Bit 3	1	1	1	1	1	1	1	1	1
neader 2	Bit 4	1	1	1	1	1	1	1	1	1
1	Bit 5	1	1	1	1	1	1	1	1	1
1	Bit 6	1	1	1	1	1	1	1	1	1
	Bit 7	1	1	1	1	1	1	1	1	1
	Bit 0	0000000	00000001	00000010	00000011	00000100	00000101	00001110	00001111	00000110
1	Bit 1	wind	rain	thermo hygro	mushroom	thermo only	thermo hygrobaro	Minute	Clock	thermo hygrobaro
3rd Byte (Device type)	Bit 2			,,,		,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			,,,
	Bit 3									
	Bit 4									
	Bit 5									
	Bit 6									
	Bit 7									

2 Déterminer :

Q1 : Le nombre de capteurs différents connectés à la station.

Q2: Les mesures réalisées.

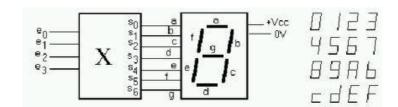
Q3 : Combien de minutes se sont écoulées pendant cet enregistrement ?

3 Analyser les deux trames repérées

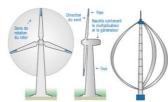
There are only 10 types of people in the world: Those who understand binary and those who don't.

A l'aide du document ressource WMR928Protocol.pdf

• Analyser deux trames différentes.





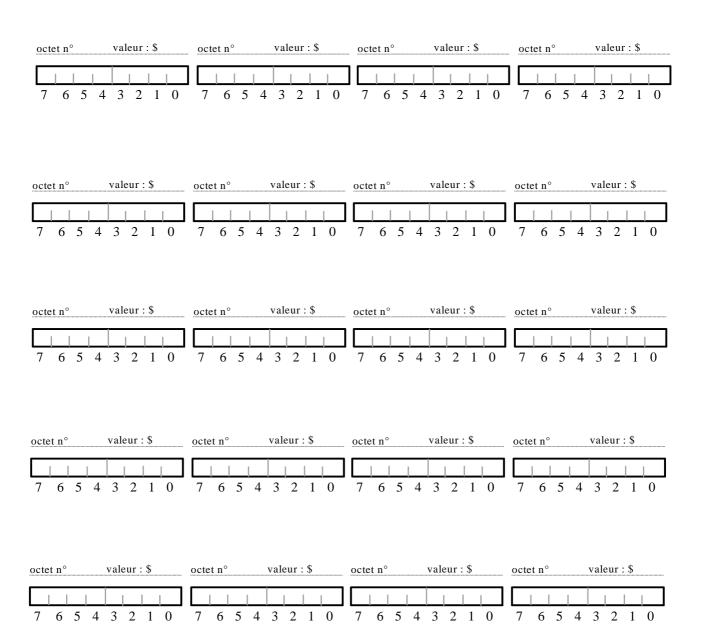








Q4 : Première trame grille d'analyse :



Conclusion:

Qu'est-ce qu'un checksum ?
Qu'est-ce qu'un time out ?



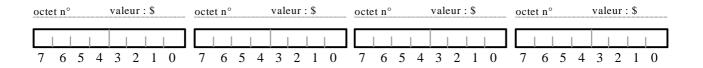


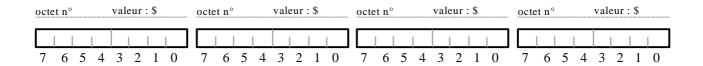


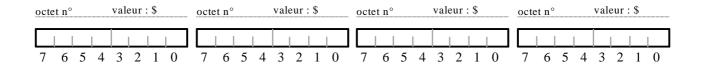


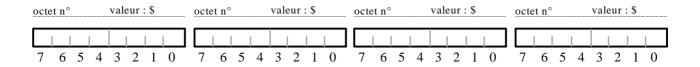


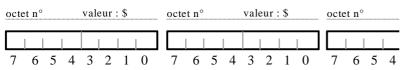
Q5 : Deuxième trame grille d'analyse :









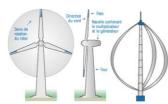


Conclusion:

	bits (b) or bytes (B)							
Dec	cimal		Binary					
Value	Metric	Value	JEDEC	IEC				
1000	k kilo	1024	K kilo	Ki kibi				
1000 ²	M mega	1024 ²	M mega	Mi mebi				
1000 ³	G giga	1024 ³	G giga	Gi gibi				
1000 ⁴	T tera	1024 ⁴		Ti tebi				
1000 ⁵	P peta	1024 ⁵		Pi pebi				
1000 ⁶	E exa	1024 ⁶		Ei exbi				
1000 ⁷	Z zetta	1024 ⁷		Zi zebi				
1000 ⁸	Y yotta	1024 ⁸		Yi yobi				

Prefixes for multiples of











Trame complète capteur HygroBaro

	$\overline{}$	
Data	ŀ	EXTBTH
	Bit 0	1
l	Bit 1	1
l	Bit 2	1
Header 1	Bit 3	1
Header 1	Bit 4	1
l	Bit 5	1
l	Bit 6	1
	Bit 7	1
	Bit 0	1
l	Bit 1	1
l	Bit 2	1
Header 2	Bit 3	1
neader 2	Bit 4	1
l	Bit 5	1
l	Bit 6	1
	Bit 7	1
	Bit 0	00000110 thermo
l	Bit 1	hygrobaro
l	Bit 2	
3rd Byte	Bit 3	
(Device type)	Bit 4	
	Bit 5	
	Bit 6	
	Bit 7	
	Bit 0	
I	Rit 1	

	PIC I	l I		
	Bit 2			
4th Byte	Bit 3			
4th Dyte	Bit 4	Dew under		
	Bit 5			
	Bit 6	Low batt.		
	Bit 7			
	Bit 0			
	Bit 1	Temp0.1°Cdigit		
	Bit 2	'		
5thByte	Bit 3			
Junbyte	Bit 4			
	Bit 5	Temp1°Cdigit		
	Bit 6			
	Bit 7			
	Bit 0			
	Bit 1	Temp10°Cdigit		
	Bit 2			
6thByte	Bit 3			
·	Bit 4	Temp100°C		
	Bit 5			
	Bit 6	Over/Under		
	Bit 7	Sign		
	Bit 0			
	Bit 1	Hum1% digit		
	Bit 2			
7thByte	Bit 3			
	Bit 4			
	Bit 5	Hum10% digit		
	Bit 6			
	Bit 7			
	Bit 0			
	Bit 1	DewTemp1°Cdigit		
	Bit 2			
8thByte	Bit 3			
	Bit 4			
		DewTemp10°Cdigit		
	Bit 6			
	Bit 7			
	Bit 0	ı I		

9thByte	Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6	ADC0BARO Reading
	Bit 0	ADCbit9
	Bit 1	
	Bit 2	
	Bit 3	
10thByte	Bit 4	
	Bit 5	WeatherStatus
	Bit 6	vveatrierStatus
	Bit 7	
	Bit 0	
	Bit 1	
	Bit 2	
444.5.4.	Bit 3	
11thByte	Bit 4	
	Bit 5	Sea level offset0.1
	Bit 6	digitmb
	Bit 7	
	Bit 0	See to st
	Bit 1	Sea level offset1
	Bit 2	digitmb
12thByte	Bit 3	
	Bit 4	Sea level
	Bit 5	offset10
	Bit 6	digitmb
	Bit 7	
	Bit 0	Sea level
	Bit 1	offset100
	Bit 2	digitmb
13thByte	Bit 3	
'	Bit 4	Sea level
	Bit 5	offset1000
	Bit 6	digitmb
ı	Bit 7	











Weather Status:

1100-sunny 0110-half cloudy 0010-cloudy 0011-rainny

0001- Channel 1

0010- Channel 2

0100- Channel 3

under:

1=under range 0=normal

0=positive 1-negative

Batt.Low:

over/under:

1=over /under 0=normal

Low batt. :

1=low battery

* to identify over/under check also the sign of data ADC baro reading: range 0 to FF (hex)

1=low battery of main unit

ADC0 & ADCbit9

range: 0 to 1FF (Hex) where ADC0 is the LSB ADCbit9 is the MSbit

Bit 0 Bit 1 Bit 2 Bit 3 Check-sum 14thByte Bit 4 Bit 5 Bit 6 Bit 7

over:

1=over range 0=normal

Channel:

Note:

- 1. For Device 5 (BTH), the barometic pressure reading = ADC baro reading (converted from HEX to BCD) + 795mb For Device 6 (EXTBTH), the barometric pressure reading = ADC reading (converted from 9 bit HEX to BCD) + 600mb
- 2. For Device 5 (BTH), the Sea level offset of 1000mb digit is not send out. If the Sea level offset pressure is less than 400.0mb, then it means the Sea level offset is (1000mb + offset). Howver, if the offset is larger or equal to 400.0mb, then (0mb + Offset) The above will only applied to device 5. There is NO NEED TO ADJUST FOR DEVICE 6 (EXTBTH)
- 3. Sea level pressure reading = ADC baro reading (converted from HEX to BCD) + Sea level offset
- 4. Total start date = The date that total rainfall started to count.
- 5. The total rainfall that send is added by 0.5mm, please minus 0.5mm before display.
- 6. Check sum = the lower byte of the sum of the data send (include header)







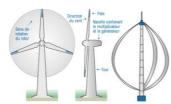




Trame du capteur Mushroom

				Bit 2	
			4th Byte	Bit 3	Dew under
			1	Bit 4	Dew under
			1	Bit 5	Low batt.
			1	Bit 6	
				Bit 7	
			1	Bit 0	
			1	Bit 1	Temp0.1°Cdigit
			1	Bit 2	
			5thByte	Bit 3	
			'	Bit 4	
		Data Typ	_	Bit 5	Temp1°Cdigit
Data		Mushroom	-	Bit 6	
	Bit 0	1		Bit 7	
	Bit 1	1	-	Bit 0	
	Bit 2	1	-	Bit 1	Temp10°Cdigit
	Bit 3	1	-	Bit 2	l rompro ouign
Header 1	Bit 4	1	- Cabbara	Bit 3	
	Bit 5	1	6thByte	Bit 4	Temp100°C
	-	1	-	Bit 5	Temproo C
	Bit 6	1	-	Bit 6	Over/Under
<u> </u>	Bit 7		-	Bit 7	Sign
	Bit 0	1	-	Bit 0	
	Bit 1	1	-	Bit 1	1148/
	Bit 2	1	. [Bit 2	Hum1% digit
Header 2	Bit 3	1	- l	Bit 3	
	Bit 4	1	7thByte	Bit 4	
	Bit 5	1	-	Bit 5	
	Bit 6	1	- l	Bit 6	Hum10% digit
	Bit 7	1	. [Bit 7	
	Bit 0	00000011 mushroom		Bit 0	
	Bit 1	masmosm	1	Bit 1	
	Bit 2		1	Bit 2	DewTemp1°Cdigit
3rd Byte	Bit 3		1	Bit 3	
(Device type)	Bit 4		8thByte		
	Bit 5		1	Bit 4	
	Bit 6		1	Bit 5	DewTemp10°Cdigit
	Bit 7		_	Bit 6	
	Bit 0		·	Bit 7	
I	Rit 1		I	Bit 0	I
			9thByte	Bit 1 Bit 2 Bit 3 Bit 4 Bit 5	Check-sum
		STI2D A		Bit 6 Bit 7	







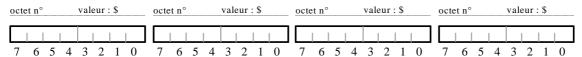




Exercice analyse de la trame '0E':

11: FF FF 00 00 97 00 00 00 00 14 A9<0K>
14: FF FF 06 00 51 01 53 06 42 31 00 00 06 28<0K>
11: FF FF 00 00 97 00 00 00 14 A9<0K>
5: FF FF 0E 16 22<0K>
11: FF FF 00 00 97 00 00 00 14 A9<0K>

Q6 : Compléter le tableau d'analyse ci-dessous :



octet n° valeur : \$

7 6 5 4 3 2 1 0

Q7 : Interpréter les résultats avec la documentation jointe ci-après donner la signification de chaque octet :

Data					
		Minute			
	Bit 0	1			
	Bit 1	1			
	Bit 2	1			
Header 1	Bit 3	1			
rieader	Bit 4	1			
	Bit 5	1			
	Bit 6	1			
	Bit 7	1			
	Bit 0	1			
	Bit 1	1			
	Bit 2	1			
Header 2	Bit 3	1	4th Byte	pr. q	
Treader 2	Bit 4	1		Bit 2	
	Bit 5	1		Bit 3 Bit 4	
	Bit 6	1			Date10 digit
	Bit 7	1		Bit 5	minute
	Bit 0	00001110 Minute		Bit 6	
	Bit 1	Minute		Bit 7	Batt. Low
	Bit 2			Bit 0	
3rd Byte	Bit 3			Bit 1	
(Device type)	Bit 4			Bit 2	
	Bit 5		5thByte	Bit 3	Check-sum
	Bit 6			Bit 4	
	Bit 7			Bit 5	
	Bit 0	Date1 digit minute		Bit 6	
	Rit 1	minute		Bit 7	

Bilan :		