TiNo Receiver serial Protocol 3.0

Port Parameters:

Gateway	38400 Bd	8N1	8 Data bits, no parity bit, 1 Stop bit
Sensor	4800 Bd	8N1	8 Data bits, no parity bit, 1 Stop bit

Receiver Message Protocol:

human readable byte sequence, coded with Ascii characters (0-127):

<nodeID><white space><VariableName1>=<value>&<VariableName2>=<value>&...\n

N	LZ	V_1	=	W_1	&	V_2	=	W_2	&	…	&	V_n	=	W_n	\n

N	Node ID of Sender
LZ	Separation sign (white space)
V_x	Variable name x
W_x	Value of Variable x – Values must be Integer numbers
&	separation sign (Ampersand)
\n	new line sign (Ascii sign 10)

Available Variables

VariableName	Parameter (ger.)	paramter(engl.)	Unit	Min	Max	scale factor
d	Entfernung	distance	cm	-1	300	10
h	Luftfeuchte	humidity	%rH	0	120	100
he	Höhe	height	m	-450	9999	100
p	Luftdruck	Air pressure	hPa	300	1100	100
r	Reed-Kontakt	contact	---	0	1	1
t	Temperatur	temperature	degC	-40	600	100
t1	Temperatur	temperature	degC	-40	90	100
t2	Temperatur	temperature	degC	-40	90	100
v	Batteriespannung	battery voltage	V	0	5	1000
int	Interrupt	interrupt	---	0	0xFFFF	1
rssi	Signalstärke	RSSI	dBm	-130	0	10
lqi	Kanalgüte	link quality indicator	---	0	127	1
~~fo~~	~~Frequenzversatz~~	~~Frequency offset~~	~~Hz~~	~~-30000~~	~~30000~~	~~1~~
c	Zähler	count	---	0	65535	1
be	Bitfehler	bit errors	---	0	127	1
sy	Synchronisation	synchronized	---	0	1	1
br	Helligkeit	brightness	---	0	1023	1

Example

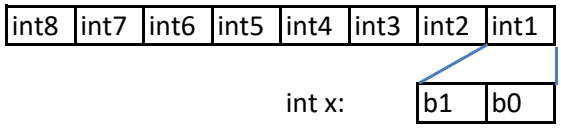
23 v=3002&c=243&t=3400&h=5650&int=0&rssi=-835&fo=2014&be=0\n

Message from Node 23: VCC=3.002V, Rolling code =243, Temperature = 34.00 degC, humidity=56.5%rH, no interrupts, RSSI=-83.5dBm, Frequency Offset =2014 Hz, no bit errors

Variables can be listed in any sequence.
All variables a node has available are transmitted.

Variables Details

VariableName	Resolution	Description
d	1 cm/10 = 1 mm	distance as measured by a ultrasonic sensor
h	0.01%	relative humidity in percent, can be higher than 100% in rare cases
he	1m/100=1cm	height over sea level
p	1hPa/100	Air pressure
r		digital bit value, 1 or 0
t	degC/100	Temperature from first sensor
t1	degC/100	Temperature from 2nd sensor
t2	degC/100	Temperature from 3rd sensor
int		16 bits, 2 bits per interrupt



b1	b0	
0	0	no interrupt
0	1	CHANGE
1	0	FALLING
1	1	RISING

In some cases the gateway does not know the exact nature of the interrupt trigger. In this case a CHANGE is signalled.

rssi	dBm/10	signal strength as measured by the Gateway
lqi		a number indicating if the channel is free of noise or interference. 0 is best, 127 is worst. Not applicable to some radios
~~fo~~	~~1Hz~~	~~Frequency offset measured by the receiver. TiNo Modulation is FM. Tight Frequency tuning control (AFC) is crucial. 0 ist best, values above -5000 are somewhat critical~~
c		Packet counter, rolling over at some point. Can be a 8-bit value or a 16 bit, value depending on implementation
be	1bit	Bit errors in Packet. Only useful when forward Error correction is used. The amount of bit errors the algorithm detected and corrected.
sy	1 bit	the gateway is keeping track with the senders rolling code (count value). If track ist lost this signal is set to 0
br	1bit	Brightness. Measured by a LDR connected to a analog GPIO (A0-A4) 0 corresponds to darkness, 1023 is very light. The resolution depends on the type of LDR (GL5537 is recommended)

Changes in version 3.0 compatred to version 2.2:

Variable fo frequency offset removed. In Version 3.x the measurement of this parameter is not possible.
Variable br (brightness) added.