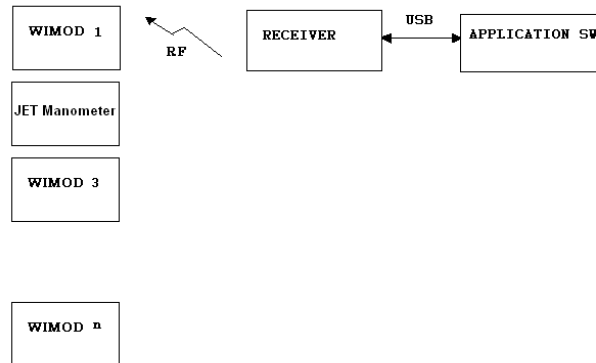




WIMOD and JET Manometer Communication protocol

The communication protocol between a network, composed by WIMOD and JET Manometer (WIMODs from now on), and a receiver sw is on 2 levels.



The first level is the communication between the application sw and the receiver RF module.

You need to implement this level to initialize the receiver hardware and to get RF data coming from the WIMODs network.

It is based on a USB port managed by a FTDI FT232R chip. The port is seen as a virtual serial port so no special driver or library are necessary to use in your driver. You have just to use the standard API for a serial port.

You must open the serial port with the followings parameters : baud: 19200 : parity : none : stop bit : 1 : N. bit : 8

The second level of the communication protocol is necessary to implement commands to WIMODs and to decode data coming from WIMODS.

WIMODs /RECEIVER RF COMMUNICATION

Each WIMODs network is identified by network address (4 chars) (common to all modules) and for each RF module is assigned a dedicated address (4 chars) (normally the last four digits of its serial number).

These allow that can exist more than one WIMODs networks at the same time

These addresses (network and module address) are AEP factory assigned.

AEP will communicate for each delivered system the addresses that will be assigned to each modules

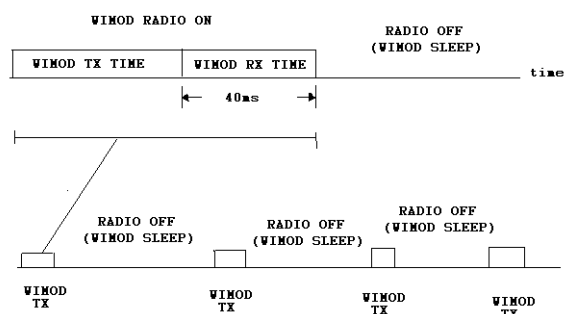
From the RF communication point of view all WIMODs modules are slaves and the RF receiver is a master.

Each WIMODs modules transmit its load values at regular interval (from .1s to 5s) . The time between two data can be changed by the master.

The master from time to time (let me say : every 5 s) must send at least one command to each slave. In this way WIMOD recognize that the receiver is on and continue to transmit.

To save battery life each WIMOD activates the radio only for a certain time. It transmit the load data packet and then for 40ms still keep the radio on waiting for a master command.

The master so must send its commands inside the RX TIME slot. As soon as it receives some data from a WIMOD it must send its command to it to be sure the WIMOD radio is still on.





If a WIMOD does not receive at least one command from the master it goes in power down mode in order to save battery life.
 In power down mode WIMOD transmit a data packet every 8s.
 Note : this does not apply to JET Manometers

RECEIVER INITIALITATION

To init the RF receiver module it is necessary to send some commands to it.

```
"C151";           // send * after command
"C01XXXX";       // XXXX = network address
"C02YYYY";       // YYYY = master address
"C0406";         // the data packed length is 6 byte
"C07Z";          // Z= power Level (valid values are : '0'-'1'-'2'-'3'
"C08";           // Init Radio
"C14";           // Set Output *WD
"C150";          // don't send * after command
```

It is not the scope of this document describe this commands.

MASTER COMMANDS

There are just a few commands that the master can send to each WIMOD to set parameters :
 The application sw must send 3 messages to the RF receiver module with the indication of the destination WIMOD address command

```
"C03KKKK";       // KKKK = destination WIMOD address slave address
"C30XXX00";      // XXXX00 : 6 byte of Payload data command
"C31";
```

Inside the KKKK field you have to specify the destination WIMOD and inside the XXXX00 you put the commands and its associate parameters (last 2 char always 0).

The meaning of XXXX commands fields is the following :

X X X X			
+-----	command parameter	P1	
+-----	command parameter	P2	
+-----	command parameter	P3	
+-----	command specifier : valid values are	'0': do nothing : used for keep alive the WIMOD	
		'1': zero on/off:	P1 = '0' → zero Off : '1' → zero On : ASCII value
		'2': set power level :	P1 = '0' → power level = -10dbm : ASCII Value
			P1= '1' → power level = -2dbm
			P1= '2' → power level = +6dbm
			P1 = '3' → power level = +10dbm
		'3': Set TxRate Interval (in step of 100ms)	
			P1= 1..50 : binary value
			P2=0 : binary value
			P3=0 : binary value
		'6': Set Filter	P1=0..31 : binary value

- NOTE :
- The command
- Set Power Level
 - Set Tx Rate
 - Set Filter

Only apply to WIMOD load cell



CODE EXAMPLE to decode receiving data from a WIMOD

RxBuffer is the RX communication buffer.

j is the index inside the buffer where it was recognized the message coming from a WIMOD address 'E0E2' .

In this example you have

```
RxBuffer[j+0]= 'E'  
RxBuffer[j+1]= '0'  
RxBuffer[j+2]= 'E'  
RxBuffer[j+3]= '2'
```

```
char RxBuffer[10000];  
int stato;           //signal if the load cell is overload/underload/ in range  state  
float value;        // WIMOD Load  
int PowerLevel;    // WIMOD actual setup : Power Level,Filter,TxRate  
int Filtro;  
int TxRate;  
  
void DecodeMessageWIMOD(int j)  
{  
  union  
{  
    long L;  
    BYTE Buffer[4];  
  } L;  
  
  L.Buffer[0]=RxBuffer[4+j];           // extract the load info (20 bit)  
  L.Buffer[1]=RxBuffer[5+j];  
  L.Buffer[2]=RxBuffer[6+j] & 0xf;  
  if (RxBuffer[6+j] & 0x8)             // detect the sign and extend it to the long variable  
  {  
    L.Buffer[3]=0xff;  
    L.Buffer[2]|=0xf0;  
  }  
  else  
  {  
    L.Buffer[3]=0;  
    L.Buffer[2]&=0x0f;  
  }  
  
  if (L.L==0x7ffff) stato=1;          //UPPER (if value = 0x7ffff then WIMOD is in overload)  
  else if (L.L==0xfff80000) stato=2;  //LOWER (if value = 0xfff80000 then is underload)  
  else  
  {  
    stato=0;  
    switch(RxBuffer[6+j] & 0x70)  
    {  
      case 0x00:FactMul=0.0001f;break;  
      case 0x10:FactMul=0.001f;break;  
      case 0x20:FactMul=0.01f;break;  
      case 0x30:FactMul=0.1f;break;  
      case 0x40:FactMul=1.0f;break;  
      case 0x50:FactMul=10.0f;break;  
      case 0x60:FactMul=100.0f;break;  
      case 0x70:FactMul=1000.0f;break;  
    }  
    value=(float)L.L*FactMul;  
  }  
}
```



```
if (RxBuffer[6+j] & 0x80)
    ZeroOn=true;
else
    ZeroOn=false;

if (RxBuffer[7+j] & 0x1)
    LowBattery=true;
else
    LowBattery=false;

Filtro=RxBuffer[8+j];
TxRate=RxBuffer[9+j];
switch(RxBuffer[7+j] & 0x06)
{
case 0x00:PowerLevel=0;break;
case 0x02:PowerLevel=1;break;
case 0x04:PowerLevel=2;break;
case 0x06:PowerLevel=3;break;
}
```



DECODING RECEIVED DATA FROM JET MANOMETER

The application sw must poll data coming from JET Manometer on the serial line
Any time the RF receiver module get valid data from a JET Manometer it send a data packet of 10 characters.

The first 4 characters are the address of the JET Manometer.
The following 6 characters are the data sent from the JET Manometer.

The 6 chars received from the WIMOD are bit oriented with the following format :

```
byte 5  byte 4  byte 3  byte 2  byte 1  byte 0
7      07     07     07     07     07     0  bit
xxxxxxx xxxxxxx xxxxxxx xxxxxxx xxxxxxx xxxxxxx
||||||| ||||||| ||||||| ||| |+++++ 20 bit binary value with sign
||||||| ||||||| ||||||| |+++----- Point Position
||||||| ||||||| ||| |+++----- Measurement Unit (see table below)
||||||| ||||||| ||| |+----- Zero On / Zero Off
||||||| ||||||| || |+----- Low Battery
||||||| ||||||| || +----- Filter Value
+++++++----- Tx Rate
```

Point Position and binary value with sign

The pressure value is transmitted as an integer on 20 bit

The point position field gives the

000 = no decimal point
001 = 1 decimal point
010 = 2 decimal point
011 = 3 decimal point
100 = 4 decimal point
101 = 5 decimal point

So the real pressure value is

Displayed Value = Binary value / $10^{\text{decimal point position}}$

Measurement Unit Table

The measurement Unit is a 4 bit code according to the table below

0000	:	0= bar
0001	:	1=mbar
0010	:	2=psi
0011	:	3=MPa
0100	:	4=kPa
0101	:	5=kg/cm2
0110	:	6=mHg
0111	:	7=mmHg
1000	:	8 = mmH2O
1001	:	9=mH2O