

MODBUS FIRMWARE
USER'S GUIDE

FOR ETHERNET AND WI-FI PORT SERVERS

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MODBUS TCP USER GUIDE

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I.WHEN TO USE THE MODBUS FIRMWARE ?

This embedded software allows any port server (wired or wireless) made by ACKSYS to be used as a gateway between a MODBUS TCP network and a MODBUS serial network. The MODBUS Gateway may operate in two distinct modes, depending on the type of equipment connected to the serial line:

- With one master MODBUS serial peripheral, the port server operates in SERIAL MASTER MODE mode (also named “Client” mode).

- With slave MODBUS serial peripherals, the port server operates in SERIAL SLAVE MODE mode (also named “Server” mode).

MODBUS/TCP is a variant of the MODBUS family of simple, vendor-neutral communication protocols intended for supervision and control of automation equipment. Specifically, it covers the use of MODBUS messaging in an 'Intranet' or 'Internet' environment using the TCP/IP protocol. The most common use of the protocol at this time is for Ethernet attachment of PLC's, I/O modules, and 'gateways' to other simple field buses or I/O networks.

The MODBUS Applications Programming Interface for Network Communications, (MBAP), was developed by Modicon to allow traditional serial MODBUS communications to occur over a TCP/IP network. It basically defines a “wrapper” around the MODBUS protocol to accommodate routing data packets between two network nodes. The same master/slave messaging protocol is used, however the network aspect allows multiple master devices to access data from the same or different slave devices connected to the network. Using the Client/Server approach, a MODBUS/TCP slave device represents the server side of the communications model, accepting and responding to queries from one or more network client master applications.

II.MODBUS / SERIAL OVERVIEW

MODBUS

MODBUS is a Master/Slave communication protocol, whereby one device, (the Master), controls all serial activity by selectively polling one or more slave devices. The protocol provides for one master device and up to 247 slave devices on a common line. Each device is assigned an address to distinguish it from all other connected devices.

Only the master initiates a transaction. Transactions are either a query/response type, (only a single slave is address), or a broadcast/no response type, (all slaves are addressed). A transaction comprises a single query and single response frame or a single broadcast frame.

Transmission media

MODBUS was initially devised to work on serial asynchronous media like RS232, RS422 or RS485. This is the kind of media that the MODBUS TCP firmware handles on its serial port.

However the MODBUS frames can be transmitted through other media like Ethernet or radio; in this case the MODBUS frame must be encapsulated in the frame of the specific media. On its network port, the MODBUS TCP firmware encapsulates MODBUS frames in TCP/IP frames to handle the specific addressing of devices on this medium.

The following descriptions apply to the serial asynchronous media.

Modes of transmission

The mode of transmission is the structure of the individual units of information within a message, and the numbering system used to transmit the data. Two modes of transmission are available for use in a serial MODBUS system. Both modes provide the same capabilities for communicating with PLC slaves; the mode is selected depending on the equipment used as a MODBUS Master. One mode must be used per MODBUS system; mixing of modes is not allowed.
The modes are ASCII (American Standard Code for Information Interchange), and RTU, (Remote Terminal Unit.) The characteristics of the two transmission modes are defined below:

ASCII Framing

Framing in ASCII transmission mode is accomplished by the use of the unique colon, (:), character to indicate the beginning of frame and carriage return/line feed, (CRLF), to delineate end of frame. The line feed character also serves as a synchronizing character which indicates that the transmitting station is ready to receive an immediate reply.

BEGIN FRAME	ADDRESS	FUNCTION	DATA	ERROR CHECK	EOF	READY TO RECEIVE
:	2-CHAR 16-BIT	2-CHAR 16-BITS	N X 4-CHAR N X 16-BITS	2-CHAR 16-BITS	CR	LF

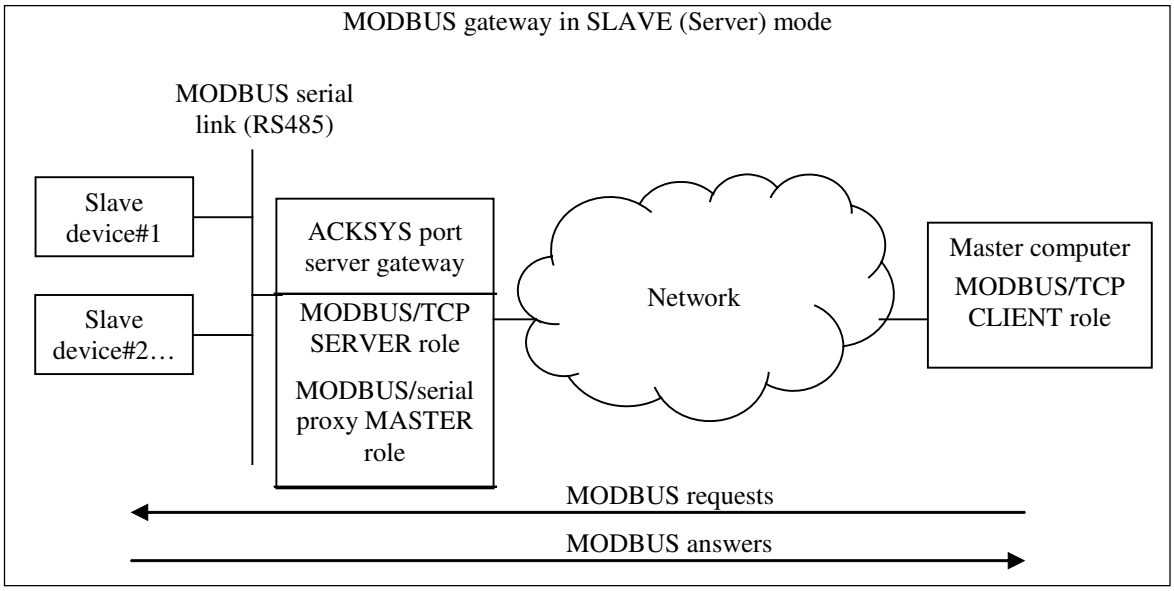
RTU Framing

Frame synchronization can be maintained in RTU transmission mode only by simulating a synchronous message. The receiving device monitors the elapsed time between receipts of characters. If three and one-half character times elapse without a new incoming character, then the frame received is considered terminated: the receiving device checks the CRC (last two characters received) to determine frame validity, and assumes that the next byte received will be an address.
A frame is also considered completed when 256 characters have been received.
Note: for practical purposes, the three and one-half character time is usually rounded up to four characters time.

T1,T2,T3,T4	ADDRESS	FUNCTION	DATA	CHECK	T1,T2,T3,T4
	8-BITS	8-BITS	N X 8-BITS	16-BITS	

III.USING THE FIRMWARE IN SLAVE MODE

The SLAVE mode, also called "Server" mode, is used when the Modbus Slave devices are located on the serial link of the Port server. The Master is then a Modbus TCP device, located on the network side of the Port server. The port server acts as a gateway between the networked Modbus TCP master device and serial Modbus slave devices.



The port server gateway converts and transfers requests from the TCP clients towards the serial line, then wait for an answer and sends it back to the client. As the serial line may support several bussed slave Modbus peripherals, these ones are distinguished on the serial link by their own unique Modbus address. Therefore, on TCP side, the client application identifies each serial peripheral by its Modbus address and the IP address of the port server gateway.

Nevertheless, if the TCP client has not the possibility to specify the Modbus address of the slave device, the latter may be forced by the port server gateway, allowing the client to identify the slave device only by its IP address. In this case, the slave device must be unique on the serial link.

With firmware versions 2.0.0.0 and above, up to five simultaneously opened connections are allowed. Upon reception of a sixth connection request, the oldest unused connection is automatically closed.

The port server gateway handles only one transaction at a time. It can memorize one additional request from the network, which will be sent to the serial line after completion of the current transaction (answer from the serial peripheral or time out).

The delay allocated to the serial peripheral's answer, called "Time Out" delay, is defined in the administration menu discussed later in this documentation (command "**stout**").

If the slave device fails to respond to a Modbus request, at expiration of the time out the gateway merely cancels the transaction: no answer is returned to the TCP client, so it can likewise fall in time out. Therefore, the TCP client time out value must be slightly higher than the gateway time out configured by command "**stout**".
Optionally, and if handled by the TCP client, the gateway can return Modbus exception 11 (0xB) in case of response failure from a slave device. This exception, defined by Modbus TCP specifications, is specific to gateways, and may be activated using command "**exception**".

An access control option may be activated to forbid device accessibility to unauthorized clients: use command "**authip**" to define a list of authorized IP addresses.

In ***Slave*** mode, the port server gateway listens by default Modbus TCP registered port **502**. Nevertheless, another port can be configured, for compatibility with some non-standard applications, by the mean of command "**mdbport**".

SLAVE mode configuration summary
(Slave devices on the Port server serial link)

The following parameters must be checked in ***Slave*** mode. **All these parameters can also be changed with the browser interface (Network serial port servers administration software).**

- Network parameters (IP address, IP gateway, netmask, DHCP…)
- On WiFi models, WiFi parameters (SSID, channel, infrastructure/ad-hoc, keys…)
- Serial parameters (baud rate, electrical interface…)
  please note: *the "slave" and "master" submodes of the RS422 interface are NOT related to the "slave" and "master" roles in MODBUS. Please refer to the "set serial interface" command for details.*
- Parameters specific to the Modbus ***Slave*** mode:
  - Firmware
    download and/or activate the MODBUS firmware (see product user's guide or quick start guide).
  - Device Mode
    command: **set serial mode slave**
    (because your serial device is a slave)
  - Modbus Mode
    Either command: **set serial mode rtu**
    Or command: **set serial mode ascii**
  - Response time out
    command: **set serial stout *nnnn***

- Seldom used parameters:

  These parameters should be changed only in special cases. See the command list for details.
  command: **set net slaveid *nn***
  command: **set net exception *on / off***
  command: **set net authip *[IP Address]***
  command: **set net mdbport *nnnn***
  command: **set net metric *nn***

- Debugging parameter

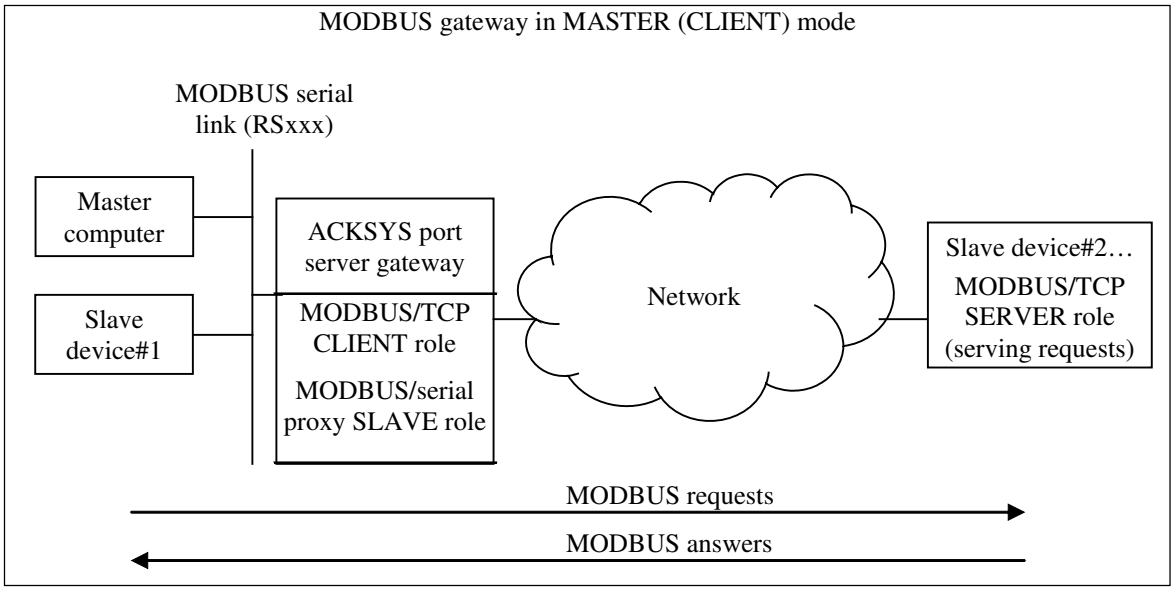
  command: **set serial nocheck on / off**

  This command allows to suppress integrity control of serial frames received from a slave device. When activated, frame length and CRC control are disabled, and data is returned "as is" to the TCP client, without any error warning. ***Serial nocheck should only be used for debugging purposes.***

More parameters are available. See the product user's guide or the quick start guide.

IV.USING THE FIRMWARE IN MASTER MODE

In this mode, also called "Client" mode, the MODBUS master equipment is connected on the serial link, and the MODBUS port server gateway acts as a proxy for the networked slaves, capturing requests from the master, sending them to the networked slaves when appropriate, waiting for answers and retransmitting them to the serial master. If other slave MODBUS peripherals are present on the serial bus, they are not accessible from the network. Every request issued by the master toward slave TCP devices must be acknowledged by an answer in a predefined delay, configurable through the administration menu (command "**tcpto**").



The Master on the serial line doesn't know the network address of the slave devices that it interrogates: those are identified on the serial side by an unique MODBUS address. A translation table in the administration menu establishes the correspondence between the MODBUS serial addresses and the corresponding IP addresses. In the case of a distant server managing itself several slave serial devices, these last are also identified by their own MODBUS address. The configuration table of the port server gateway offers the possibility to establish a correspondence between the MODBUS address known by the master equipment on the port server serial link, and the distant slave address used on the remote Server serial link. For example, serial MODBUS address range 1 to 8, scanned by the Master, may be assigned to addresses 31 to 38 ('unit identifier' field of the MODBUS TCP frame) on the remote slave serial link.

The port server gateway can manage simultaneously up to 5 active connections, each of these connections capable to give access to up to 247 slave devices (on the same IP address). If the number of servers to interrogate (different IP addresses) is greater than 5, the oldest connection is closed when the master gives out the sixth connection request.

In Master mode, the port server gateway requests connections to remote server on the TCP registered port **502**. It is however possible to define a different TCP port for connection to non-standard equipments.

MASTER mode configuration summary
(Modbus Master device is on the port server serial link)

The following parameters must be checked in ***Master*** mode. **All these parameters can also be changed with the browser interface (Network serial port servers administration software).**

- Network parameters (IP address, IP gateway, netmask, DHCP…)
- On WiFi models, WiFi parameters (SSID, channel, infrastructure/ad-hoc, keys…)
- Serial parameters (baud rate, electrical interface…)
  please note*: the "slave" and "master" submodes of the RS422 interface are NOT related to the "slave" and "master" roles in MODBUS. Please refer to the "set serial interface" command for details.*
- Parameters specific to the Modbus ***Master*** mode:
  - Firmware
    download and/or activate the MODBUS firmware (see product user's guide or quick start guide).
  - Device Mode
    command: **set serial mode master**
    (because your serial device is a master)
  - Modbus Mode
    Either command: **set serial mode rtu**
    Or command: **set serial mode ascii**
  - Serial / Network address assignment
    command: **set net slaveid *[…]***
  - Response time out
    command: **set net tcpto *nnnn***
- Seldom used parameters:
  These parameters should be changed only in special cases. See the command list for details.
  command: **set net mdbport *nnnn***
  command: **set net metric *nn***

More parameters are available. See the product user's guide or the quick start guide.

V.COMMANDS REFERENCE LIST

Displaying the configuration parameters is allowed if the “**showperm**” parameter is set to “**allow**”. If set to “**deny**”, the configuration parameters can only be displayed by the administrator after logging in.

Some parameters can only be displayed for your information but cannot be changed.

Conventions used in these tables:

- **bold text** must be typed as is.
- *italicized text* denotes a parameter which must be replaced by the proper value.
- ***italicized bold text*** denotes warnings or limitations.

Tables:

- general parameters
- network parameters
- wireless parameters
- serial parameters
- parameters available only for the "WLg" products range
- notes

SETTING OR DISPLAYING THE GENERAL PARAMETERS

Command			Default value	Notes	Description
login	*username*				start the administrator identification sequence. Ask password.
set	**default**				restore factory defaults, except the MAC address, the save count, the current firmware and the next firmware to run.
save					save the current configuration to the permanent configuration memory which is used after reboot and remains when the device is powered off.
reset					close the administration session and reboot the device, to ignore parameters changed but not saved, or to reload saved parameters. The following parameters do not need a reset to take effect: location, showperm, netconfigperm, serial interface.
show	**version**				display firmware name and version
quit					close administration session (TELNET only).
set **show**	**login** **login**	*Username*	root		change/display administrator username. 8 bytes max. Upper and lower cases.
set **show**	**password** **password**	*Password*	root		change/display administrator password. 8 bytes max. Upper and lower cases.
set **show**	**location** **location**	*Location*	“Unknown location”		change/display *location* description of the device server. 30 bytes max. Upper and lower cases.
set **show**	**showperm** **showperm**	*perm*	allow		change/display the right to display configuration information without entering the administrator password. *perm* : one of **allow** / **deny**
set **show**	**netconfigperm** **netconfigperm**	*perm*	allow		change/display the right to use the administration system from the network. *perm* : one of **allow** / **deny**
set **show**	**upgradeperm** **upgradeperm**	*perm*	allow		change/display the right to upgrade the firmware. *perm* : one of **allow** / **deny** If this flag is set to “**allow**”, upgrade is allowed. (through serial port or Wifi interface) else upgrade is not allowed. ***These commands are not available for devices providing several firmwares simultaneously.***

The following commands are available only in devices that provide several firmwares simultaneously.

set **show**	**prog enable** **prog enable**	*seg*	MODBUS firmware located in seg /4	execute after next reset the current firmware located in segment *seg*.
show	**prog list**			display information about all firmwares.
show	**prog info**	*seg*		display information about firmware located in segment *seg*, in computer readable format.
show	**prog data**	*seg*		display information about firmware located in segment *seg*, in computer readable format.

SETTING OR DISPLAYING THE NETWORK PARAMETERS

Command			Default value	Notes	Description
show	**net ethernet**		Factory defined		display Ethernet MAC address. 6 hex digits separated by columns.
set **show**	**net dhcp** **net dhcp**	*state*	off		turn **on** /**off** or display the DHCP client use. When dhcp is on, the manually specified IP address is not used.
set **set** **show**	**net dhcp clientid** **net dhcp clientid** **net dhcp clientid**	*ident*	empty (MAC address sent as string)		replace the default client ID (MAC address as a string) by the custom string *ident*. 15 bytes max, upper and lower cases allowed. delete the custom client ID and use the default client ID. display custom client ID.
set **show**	**net dhcp hname** **net dhcp hname**	*hostname*	empty (not sent)		provide the DHCP server with the supplementary Host Name option, with value *hostname*. 19 bytes max, no spaces allowed, upper and lower cases allowed. Value assigned to DHCP option 12, if any.
set **show**	**net ip** **net ip**	*aaa.bbb.ccc.ddd*	192.168.1.253		change/display IP address in dotted decimal notation.
set **show**	**net mask** **net mask**	*aaa.bbb.ccc.ddd*	255.255.255.0		change/display local subnet mask
set **show**	**net gateway** **net gateway**	*aaa.bbb.ccc.ddd*	0.0.0.0		change/display the gateway IP address.
set **show**	**net metric** **net metric**	*mmm*	64 (“WLg”) 10 (others)		change/display the number of gateway hops. mmm is **1** to **255**
show	**net configport**		23		administration port
set **show**	**net authip** **net authip**	*n aaa.bbb.ccc.ddd*	Table cleared. (access control disabled)		*n:* table entry index, from **1** to **8**. *aaa.bbb.ccc.ddd*: IP address of a host allowed to act as a Modbus master toward this device. IP address **0.0.0.0** clears the entry.
set **show**	**net mdbport** **net mdbport**	*nnnn*	502		In SLAVE mode, *nnnn* define the local TCP port server the gateway will listen to in place of registered port **502**. In MASTER mode, *nnnn* define the remote TCP port server gateway will use in place of registered port **502** to establish a connection with a server.
set **show**	**net tcpto** **net tcpto**	*nnnn*	800		Supported in MASTER mode only. *nnnn* gives the time imparted for a transaction to complete, in ms (max **65535** ms). This is the maximum time during which the port server gateway will wait for an answer from the distant peripheral.
set **show**	**net exception** **net exception**	*state*	off		Turn **on** / **off** handling of exception 11 (0xB) when slave device fails to respond.

According to SLAVE or MASTER modes, the “set net slave id” command uses 2 syntaxes.

Syntax in SLAVE mode

Command			Default value	Notes	Description
set	**net slaveid**	*sa*	0		*sa :* MODBUS serial address (local) This command may be used only if no more than one MODBUS slave device is connected over the serial link. It allows to impose the MODBUS serial address for every incoming TCP request: in this case, the corresponding field of the modbus TCP frame (unit ID) is purely and simply ignored, and the slave device is identified by the client only through its IP address. For example, if the address of the modbus serial device connected to the port server serial link is 5, the command **set net slaveid 5** will assure that any requests from a TCP client connected to the port server will be transfered to the device with the correct address, independently of the unit ID specified by the TCP frame. Programming the fixed serial address to zero will disable this functionality, so that the serial address passed to MODBUS serial devices is the unit ID specified by the TCP frame.
show	**net slaveid**				

Syntax in MASTER mode

Command			Default value	Notes	Description
set **show**	**net slaveid** **net slaveid**	*fs ls fr m xx.xx.xx.xx*	0 0 0 0 0.0.0.0		*fs* : first MODBUS serial address (local) *ls* : last MODBUS serial address (local) *fr* : first MODBUS TCP ID field (remote serial address) *m* : Mode : 0 = last byte of IP address fixed 1 = last byte of IP address variable *xx.xx.xx.xx* : Remote device IP address

This command defines the correspondence between MODBUS local serial addresses (*fs* to *ls*) and remote IP addresses (*xx.xx.xx.xx*), as well as remote address (*fr*) conveyed by the ID field of MODBUS TCP frames. Up to eight ranges can be defined.
The *m* parameter (mode), when set to **0**, indicates that the destination IP address is fixed for the whole range concerned; in this case, remote devices are identified by their serial address, calculated from parameter *fr*. If *mode* is set to **1**, the last byte of the IP address will change according to the offset from the first local address. In this case, if the unit identifier field of TCP frames is not used, parameter *fr* can be set to 0 (TCP unit identifier will be set to 0xFF in this case).

Observation *:* any **slaveid** command line with an fs parameter included in a range already defined will invalidate and replace the oldest. fs = 0 clears the whole table.
Examples :

set net slaveid 1 8 1 0 192.168.0.30
set net slaveid 9 16 0 1 192.168.20.0
set net slaveid 17 24 31 1 192.168.50.0

The first line defines redirection of local serial addresses 1 to 8 to the single IP address 192.168.0.30 (mode = 0), without conversion:
Local slave #1 directed to IP 192.168.0.30 ID field = 1
Local slave #4 directed to IP 192.168.0.30 ID field = 4
Local slave #8 directed to IP 192.168.0.30 ID field = 8
The second line defines redirection of local serial addresses 9 to 16 to respective IP addresses 192.168.20.0 to 192.168.20.7 (mode = 1). Parameter fr set to zero means TCP ID field set to 0xFF :
Local slave #9 directed to IP 192.168.20.0 ID field = 0xFF
Local slave #12 directed to IP 192.168.20.3 ID field = 0xFF
Local slave #16 directed to IP 192.168.20.7 ID field = 0xFF

The third line defines redirection of local serial addresses 17 to 24 to respective IP addresses 192.168.50.0 to 192.168.50.7, with respective TCP ID fields 31 to 38 :
Local slave #17 directed to IP 192.168.50.0 ID field = 31
Local slave #19 directed to IP 192.168.50.2 ID field = 33
Local slave #24 directed to IP 192.168.50.7 ID field = 38

SETTING OR DISPLAYING THE NETWORK WIRELESS PARAMETERS

All commands of the "network wireless parameters" section are only valid for wireless port servers.

Command			Default value	Notes	Description
set **show**	**net ssid** **net ssid**	*ssid*	acksys		change/display the SSID of the device. SSID is a case sensitive characters string (32 characters max). Empty character string is not allowed.
set **show**	**net mode** **net mode**	*mode*	Ad-hoc ("WLg") Infra (others)		configure/display the WIFI mode. One of **ad-hoc** or **infra**. **ad-hoc :** configure the device in AD-HOC mode . **Infra :** configure the device in infrastructure mode.
set **show**	**net channel** **net channel**	*channel*	6		In ad-hoc mode, configures the radio channel used for communication with the other device. *channel* is in the range **0** to **13**. In infrastructure mode this parameter is ignored.
set	**net wepkey**	*keynum key*	no default value		define up to 4 WEP keys. *keynum* is the key number. Range **1** to **4**. *key* is the hexadecimal key value. 10 digits (64 bits key) or 26 digits (128 bits key). ***The last 6 digits are generated by the firmware*** Example : set 64 bits WEP key : set net wepkey 1 1F2564AE12 set 128 bits WEP key : set net wepkey 1 123654875ADFEC236542541A26 ***Note : to enter a 128 bits WEP key, you must before enable 128 bits key mode. See command "set net usekey 1 128" below.***
set	**net wepkey**	*keynum* **0**			delete wepkey *keynum*
show	**net wepkey**				display all 4 WEP keys (the last 6 digits are displayed as zeroes).
set **show**	**net usekey** **net usekey**	*[keynum] [128]*			define the WEP key to use. If the *keynum* parameter is left empty, device won't use any WEP key, else device uses WEP key *keynum*. Example : Activate 64 bits WEP key set net usekey 1 Activate 128 bits WEP key set net usekey 1 128 Disable WEP key using set net usekey
set	**net auth**	*mode*	open		set the authentication mode. *mode* is one of **open**, **share** ***open*** : the device is authenticated by its MAC address. ***share*** : the device is authenticated by its WEP Key. ***This command is not valid for WL-COMETH I.***

Command			Default value	Notes	Description
set	**net unencrypted**	*mode*	Ignore (WLg-range) Accept (other products)		configure if the device accept or ignore the unencrypted WIFI packet. mode is one of **ignore** or **accept** **ignore** : The device ignores all WIFI packet unencrypted **accept** : The device accepts all WIFI packet unencrypted ***This command is not valid for WL-COMETH I.***
set	**net txrate**	*txrate*	automatic		set the WIFI transmit rate. *txrate* is one of **1**, **2**, **5.5**, **11**, **automatic.** **1**, **2**, **5.5** or **11:** device will always use the given transmit rate. **automatic:** device will automatically choose the appropriate transmit rate.
show	**net wlan**				Display WIFI parameters: channel, txrate, authentication mode, RF signal quality. ***authentication mode is not displayed for WL COMETH I.*** ***"WLg" products also display avaible access points around.***

SETTING OR DISPLAYING THE SERIAL PARAMETERS

Command			Default value	Notes	Description
set **show**	**serial interface** **serial interface**	*mode [option]*	rs232		*mode* : one of **rs232**/**rs422**/**4wires**/**rs485**/**2wires** *option* : **master** or **slave** for rs422 / 4wires mode, **noecho** or **echo** for rs485 / 2wires mode • On some products, only "rs232" is meaningful. Other choices will result in communication errors. See the serial port specifications of the appropriate port server user manual. • Keywords "**rs422**" and "**4wires**" are synonyms. Their meaning is identical. • Keywords "**rs485**" and "**2wires**" are synonyms. Their meaning is identical. **rs232** : setting for rs232 serial interface equipment **rs422 master** or **4wires master** : setting for master equipment in multidrop, configuration or for both equipments in point to point configuration **rs422 slave** or **4wires slave** : setting for slave in multidrop configuration. **rs485 noecho** or **2wires noecho** : setting for all devices in multidrop or point to point. **rs485 echo** or **2wires echo** : setting for all equipments in multidrop or point to point configuration. In this mode, transmitted characters on RS485 line are echoed on Lan line.
set **show**	**serial dtr** **serial dtr**	*mode*	high		DTR management**.** *mode* is one of **modem**/**high**/**low.** **modem** means the signal is used as if a modem was connected to the port (DTR ➔ the port server is on line, RTS ➔ the port server wants to send data). **Flow** means the signal is used for input flow control. **high** and **low** mean the signal is permanently set in this state.
set **show**	**serial rts** **serial rts**	*mode*	high		RTS management**.** *mode* is one of **modem**/**high**/**low**/**flow.** **modem** means the signal is used as if a modem was connected to the port (DTR ➔ the device is on line, RTS ➔ the device wants to send data). **high** and **low** mean the signal is permanently set in this state. **Flow** means the signal is used for input flow control.
set **show**	**serial dsr** **serial dsr**	*mode*	ignore		DSR management. *mode* is one of **ignore**/**modem** **Ignore** means that the signal is locally ignored. **modem** means the signal is used as if a modem was connected to the port (DTR ➔ the port server is on line, RTS ➔ the port server wants to send data).
set **show**	**serial cts** **serial cts**	*mode*	ignore		CTS management. *mode* is one of **ignore**/**modem**/ **flow** **ignore** means that the signal is locally ignored. **modem** means the signal is used as if a modem was connected to the port (DTR ➔ the port server is on line, RTS ➔ the port server wants to send data). **flow** means the signal is used for output flow control.
set **show**	**serial dcd** **serial dcd**	*mode*	ignore		DCD management**.** *mode* is one of **ignore** / **modem** **ignore** means that the signal is locally ignored. **modem** means the signal is used as if a modem was connected to the port (DTR ➔ the port server is on line, RTS ➔ the port server wants to send data).

Command			Default value	Notes	Description
set **show**	**serial ring** **serial ring**	*mode*	ignore		RING management : *mode* : always **ignore**
set **show**	**serial baudrate** **serial baudrate**	*speed*	9600		*speed* : any baud rate from **10** bauds to **230400** bauds (up to 1'000'000 on RS422/RS485 "WLg" products)
set **show**	**serial format** **serial format**	*nbits parity nstops*	8 n 1		*nbits* is **7** or **8** bits, *parity* is one of **e, o, n, m, s** (meaning even, odd, none, mark or space), *nstops* is **1** or **2** stop bits. (*nbits*=**6** bits is also supported on the "WLg" range)
set **show**	**serial xonxoff** **serial xonxoff**	*mode*	ignore		software flow control : *mode* is one of **use** or **ignore**. Mixed (i.e. software and hardware) flow control can be set.
set **show**	**serial mode** **serial mode**	*role*	slave rtu		role is one of **master**/**slave** or one of **ascii**/**rtu**. **Warning**, set serial mode command must be called twice, one time to set the master/slave parameter, another time to set the ascii/rtu parameter. **master** indicates that a MODBUS master is on the serial link; thus the port server gateway will function in **MASTER mode**. **slave** indicates that no MODBUS master is on the serial link; thus the port server gateway will function in **SLAVE mode**. **ascii** indicates a modbus ascii frame format. **rtu** indicates a modbus rtu frame format. Changing the mode (MASTER to SLAVE or SLAVE to MASTER) clears all entries of *authip* and *slaveid* tables.
set **show**	**serial rtsdelays** **serial rtsdelays**	*before after*	0 0		Added delay surrounding a frame sent on the serial link.in ms (max **255** ms). Use this when RTS is in MODEM mode, to add a delay of *before* ms between the rise of RTS and the start of frame, and a delay of *after* ms between the end of frame and the fall of RTS.
set **show**	**serial stout** **serial stout**	*nnnn*	600		max delay between the end of the MODBUS request and the end of the answer frame on serial link, in ms (max **65535** ms).
set **show**	**serial tdsr** **serial tdsr**	*delay*	5		acceptable delay between DTR rise and corresponding DSR rise at the beginning of a data session, when DSR is in modem mode. DTR→DSR in tenth of second. **0** to **255**.
set **show**	**serial toff** **serial toff**	*duration*	5		when **DTR** is in modem mode, and the TCP connection is closed or lost, DTR will stay low for at least *duration*, expressed in tenths of second. **0** to **255**

Command			Default value	Notes	Description
set **show**	**serial silence** **serial silence**	*duration*	0 (the standard '4 chars' time is used)		This command enables to change/display the end of message (EOM) algorithm used in RTU mode. Normally, EOM is detected by a silent interval of at least 4 characters. With the help of this command, the EOM minimum silent interval may be set to the value specified by parameter *duration*, given in ms (max **65535** ms). For example, with command "*set serial silence 20*", a Modbus serial frame will be considered terminated only after a silence equal to or greater than 20 ms. In other words, it also means that gaps up to 20 ms in length between two characters of the same frame are allowed. ***WARNING:*** *Using this command may lengthen the global Modbus cycle (time between request and answer), and so requires a really good understanding of Modbus time out settings. If changed, the silence duration must be taken into account when calculating time out used either by the supervisor and the gateways*. This command is available only with wired port server (and WL-COMETH I) firmware versions 2.10.0.0 and higher, and with wireless port server firmware version 3.6.0.0 and higher.
set **show**	**serial nocheck** **serial nocheck**	*state*	off		When **serial nocheck** is set to **on**, integrity control of serial frames (length, CRC, unit #) received from slave devices is disabled, data is forwarded directly to TCP. In this mode, the TCP client is NOT alerted of potential errors. **Serial nocheck** should only be set to **on** for debugging purposes.

SETTING OR DISPLAYING PARAMETERS FOR THE "WLG" RANGE OF DEVICES

Command			Default value	Notes	Description
set	**wlan**				Run the wizard asking for the WiFi parameters
show	**wlan**				Display the WiFi parameters.
set	**wlan** *{options….}*				Change specific WiFi parameters (you can specify one or more of the following parameters) :
		state	on		*state*=**on** or **off** .Turns radio card on or off
		topology	adhoc		*topology*= one of **infra** or **adhoc**
		ssid *string*	acksys		change the ssid of the device. *string* is a case sensitive characters string.
		band	bg		change the radio protocol: *band*= one of **bonly gonly bg ah** (standard 802.11 protocols)
		superag	sagoff		*superag*= one of **sagoff sagon sagdyn sagstatic** Super AG mode is an atheros card feature.
		region	eu		*region*= one of **il us hk ca au fr eu jp sg kr** (standardized code of the world region).
		chan *channels*	auto		List of channels checked for access points. Available values depend on the region and the band. **auto** allows to scan all the channels allowed in the region.
		antennas	diversity		*antennas*= one of **diversity main aux** If your product has only one antenna, choose diversity or main. If your product has 2 antennas you can choose diversity to use both antennas or specify which antenna you want to use (main or aux).
		tx rate	best		you can enforce a specific standard bit rate. "**best**" selects the best rate available for the given band and reception quality.
		tx power	high		you can change the radio output power *tx power* = one of **high medium low**
		roaming	0 (off)		set the reception level under the bridge will search another access point. The reception level can be specified in units of dBm with negative values, or in percentage with positive values.
					example: `set wlan infra ssid myssid ah low` this command will be change to infrastructure mode with ssid "myssid" and radio protocol 802.11a/h and a low transmit power.

Command			Default value	Notes	Description
set	**wkey**				Run the wizard asking for the WiFi security parameters
show	**wkey**				Display the WiFi security parameters.
set	**wkey** *{option}*				Change specific WiFi security parameters (you can specify one or more of the following parameters) :
		method	off		*method*= **off** (no security or WEP key), **personal** (uses WPA protocol with a pre-shared key) or **enterprise** (not implemented)
		protocol	wpa		*protocol*= **wpa** or **wpa2**
		cipher	tkip		*cipher*= **tkip** or **aes**. Usually TKIP is used together with WPA and AES is used together with WPA2.
		password *str*	unspecified		change the pre-shared key to *str.*
ping	*ip-adress*				Sends ICMP ECHO-REQUEST four times to the specified destination. The answer (or timeout indication) will be displayed a few seconds after the prompt.
stat					Displays various indications for technical support purpose.
rxfifo	*state*		on		reserved for factory tests. DO NOT CHANGE.

NOTES

(1) This group of commands allows to retrieve or set globally the ACKSYS device server configuration.

(2) **Security note:** sensitive data, like login and password information, are conveyed in clear text by the following commands. You must take any step to protect these data from disclosure. As a basic protective step, the commands themselves can only be used by a logged-in operator.

(3) **Usage note:** Some data conveyed by these commands should be kept unique to a device. This applies especially to the IP and MAC addresses in the 'common' parameters. You should either avoid to change this unique data or to restore them after using the 'set' commands.

(4) **Usage note:** Some parameters take effect immediately, as specified elsewhere. Beware that the parameters you change do not affect the device at the moment you set them. For example, if you change the DHCP Client Id, this will take effect at the next lease expiration, which could happen soon.

(5) Use this group of commands to improve buffering of outgoing network data.

(6) **Usage note:** When in RFC2217 mode, and for the purpose of these commands, any change in the control signals and the line state trigger the same actions as an arrival of 7 or 8 characters. This behavior of control signals and line state could change in the future.

(7) **Usage note:** For the purpose of these commands, "send to the client application" means that the data is queued for transmission as soon as possible. The reception at the client side may be delayed by network contention, client not acknowledging data fast enough, packet lost, etc.

(8) **Usage note:** When a delay is specified as a number of characters duration, it is converted at run-time into a count of milliseconds (based on the character size and baud rate), and rounded up to the next millisecond.

(9) **Character strings** can be naked or quoted. If naked, they start at the first non-space character, they finish at end of line, and can include any "authorized character". If quoted, they start at the first character after the opening double quote, they finish either at end of line or at the first encountered double quote, and can include any "authorized character" except the double quote itself. The authorized characters are: **A** to **Z**, **a** to **z**, **0** to **9**, ***** ,**?**, **"**, **–**, **underscore**, **.**, **:**, **space**.