ibaPDA-Interface-GCOM

Data Acquisition via ABB GCOM

Manual

Issue 2.2

Measurement Systems for Industry and Energy

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, discrepancies cannot be ruled out, and we do not provide guarantee for complete conformity. However, the information furnished in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site www.iba-ag.com.

Version	Date	Revision - Chapter / Page	Author	Version SW
2.2	06-2021	New layout, new interface	RM	6.36.1

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1 About this Manual

This document describes the function and application of the software interface

ibaPDA-Interface-GCOM

This documentation is a supplement to the *ibaPDA* manual. Information about all the other characteristics and functions of *ibaPDA* can be found in the *ibaPDA* manual or in the online help.

1.1 Target group and previous knowledge

This documentation addresses qualified professionals, who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as a professional if he/she is capable of assessing the work assigned to him/her and recognizing possible risks on the basis of his/her specialist training, knowledge and experience and knowledge of standard regulations.

This documentation in particular addresses persons, who are concerned with the configuration, test, commissioning or maintenance of Programmable Logic Controllers of the supported products. For the handling of *ibaPDA-Interface-GCOM* the following basic knowledge is required and/or useful:

- Windows operating system
- Basic knowledge of *ibaPDA*
- Knowledge of configuration and operation of the relevant measuring device/system

1.2 Notations

In this manual, the following notations are used:

Action	Notation
Menu command	Menu *Logic diagram*
Calling the menu command	*Step 1 – Step 2 – Step 3 – Step x* Example: Select the menu *Logic diagram - Add - New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
File names, paths	"Filename", "Path" Example: "Test.doc"

1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:

Danger!

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- Observe the specified measures.

Warning!

The non-observance of this safety information may result in a potential risk of death or severe injury!

- Observe the specified measures.

Caution!

The non-observance of this safety information may result in a potential risk of injury or material damage!

- Observe the specified measures

Note

A note specifies special requirements or actions to be observed.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other documentation

Reference to additional documentation or further reading.

2 System requirements

The following system requirements are necessary to use the GCOM data interface:

- *ibaPDA v*6.36.1 or higher

Note

Existing I/O configurations that use the older GCOM module types “start,” “flatness,” “stop” and/or “diagnosis” are automatically converted into new GCOM generic modules if refreshing from an *ibaPDA* version <6.36.1 to a version ≥6.36.1.

- License for *ibaPDA-Interface-GCOM*
- A free Ethernet network interface, ideally only for GCOM network

Note

It is recommended to carry out the GCOM communication on a separate network.
Another network interface map may be required to avoid influencing the GCOM telegrams by the Ethernet data traffic between *ibaPDA* and other nodes in the network (file server, measurement file requests, etc.).

For further requirements for the used computer hardware and the supported operating systems, please refer to the *ibaPDA* documentation.

License information

Order no.	Product name	Description
31.001080	ibaPDA-Interface-GCOM	Extension license for an ibaPDA system for connecting to an ABB master system via GCOM

Table 1: Available GCOM interface licenses

References

1. *ibaPDA* manual
   (see http://www.iba-ag.com/de/support/downloads/ for current edition)
2. ABB Master GCOM Multidrop User’s Guide 3BSE 000 165R0001
3. ABB Stressometer Flatness Logger User’s Manual V4.0 3BSE 000 350R0801

3 GCOM Interface

3.1 General information

iba has developed an NDIS driver for implementing the ABB GCOM protocol.

The GCOM Multidrop bus (GCOM subnet) is a serial half-duplex bus for synchronous data transmission via medium communication distances.

Due to the three-layer structure, the multidrop bus connection and the segmentation that is not necessary, GCOM can easily run on external computers. See figure 2.

Application Tasks	Application
GCOM Flow Control	Transport
LLC IEEE 802.3	Data Link
MAC IEEE 802.3	
PHY IEEE 802.3	Physical

Fig. 1: 3-Layer communication model

The protocol is executed as a data link user on an IEEE 802.3 standard bus. The multidrop bus has a connection-free, unconfirmed data link service according to IEEE 802.2 class 1. The bus does not have a specific master, i.e. all stations have the same access to the bus.

Due to the sequence control and the handling of the retransmission in the GCOM layer, the GCOM subnet has a high level of security.

The GCOM subnet does not support broadcasting.

On the ABB master side, the GCOM communication software runs on a microprocessor-based communication board (DSCS 150 in MG 230/1 and MP 200/1, SC530 in AC 450).

The GCOM subnet (bus) supports up to 4 external computers on the same bus. The transmission rate is up to 10 Mbit/s.

GCOM Multidrop offers a powerful communication connection from external computers to the ABB master system (MP200, AC450).

3.2 System topologies

The following figure provides an overview of one of the possible configurations in which 2 computers are connected to the ABB master GCOM network.

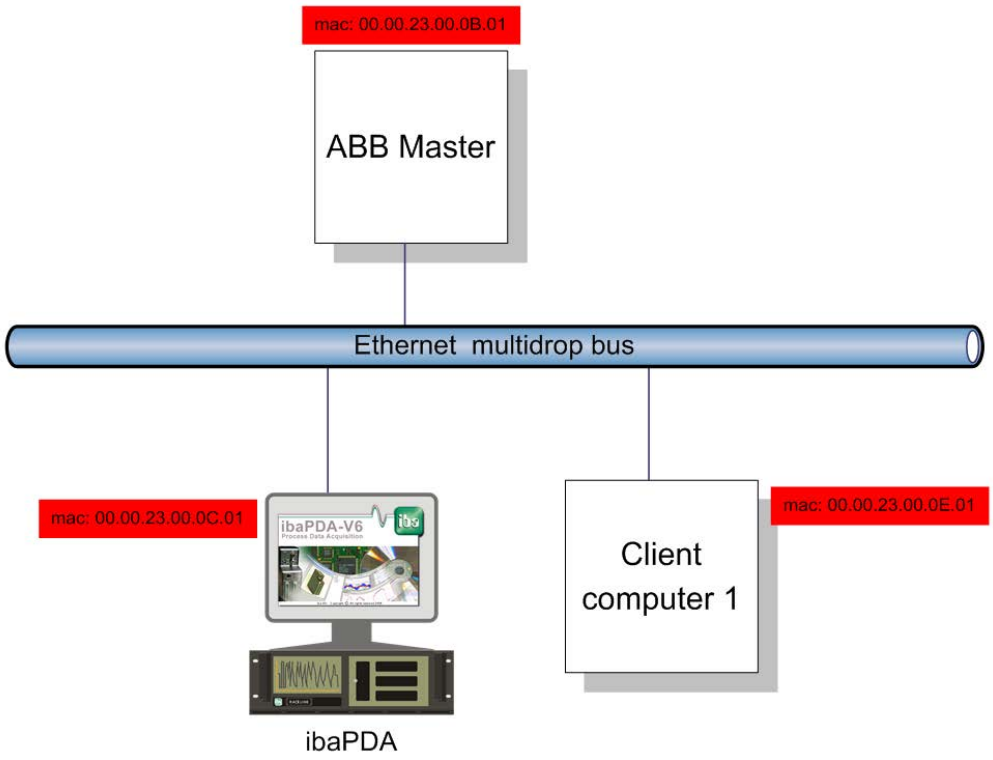


Fig. 2: Possible GCOM network topology

3.3 ibaPDA-specific implementation

The individual messages from the ABB master to the *ibaPDA* system are sent using the Data Set Communication (DSC).

You will find additional details in the GCOM user manual, chapter 3.5.4.

Since every message contains up to 24 values each of 32 bits, several data messages are sent for each logical message group. The *ibaPDA* driver buffers data messages until all components of a logical message group have arrived. Only then is the entire message transferred to the general GCOM buffer in the *ibaPDA* driver.

The general GCOM buffer has the following layout:

```
typedef struct _MEMGCOM

{

unsigned char GCOMMessages[256][100]; // 256 messages of 100 bytes

unsigned long GCOMMessageCounter[256]; // 256 message counters

unsigned long GCOMGroupCounter[256]; // 256 message group counters
```

```
unsigned long GCOMOwnMacMessageCounter;

unsigned long GCOMIAmHereMessageCounter;

unsigned long GCOMNotOwnMacMessageCounter;

unsigned long SendCounterAck;

unsigned long SendCounterIAmHere;

} MEMGCOM, *PMEMGCOM;
```

The buffer reserves 100 bytes of storage capacity for the last message of a possible message ID (according to the GCOM manual, the highest message ID value is 255). If you use logical message groups, the last message is only refreshed once all components of the message have been received. Please note that, due to their layout, the logically grouped messages are not necessarily always stored in a contiguous buffer block (e.g. if a logical message group consists of messages 1, 3 and 5).

The buffer block is followed by an array of 256 32-bit message counters; one for each message ID. The message counters count up regardless of the logical message grouping.

Then there is another array of 256 32-bit values for the logical message group counters.

In addition, the following diagnose counters are available, which are generated by the *ibaPDA* driver:

- GCOMOwnMacMessageCounter
  Number of data messages that are intended for the configured MAC address.
- GCOMIAmHereMessageCounter
  Number of received ‘I am here’ messages (both the messages sent from *ibaPDA* in active mode as well as the messages that are received at other network nodes).
- GCOMNotOwnMacMessageCounter
  Unrecognized packets that come from a MAC address that is not our own.
- SendCounterAck
  ACK messages that are sent in active mode
- SendCounterIAmHere
  'I am here' messages that are sent in active mode.

3.4 Configuration and engineering ibaPDA

Open the I/O manager, e.g., from the toolbar .

If all system requirements are met (see ↗ *System requirements*, page 6), the GCOM interface will be displayed in the signal tree.

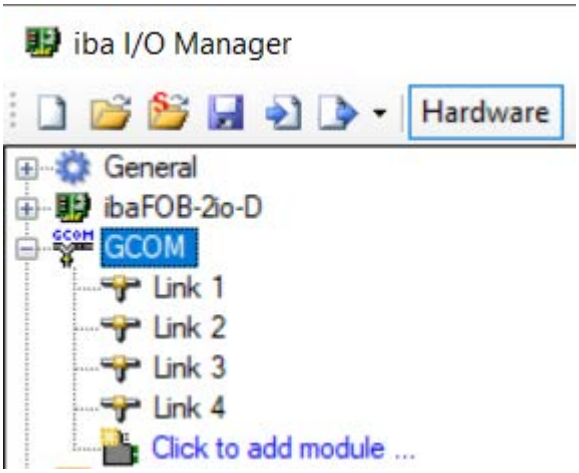


Fig. 3: GCOM interface in the I/O manager

3.4.1 Interface configuration

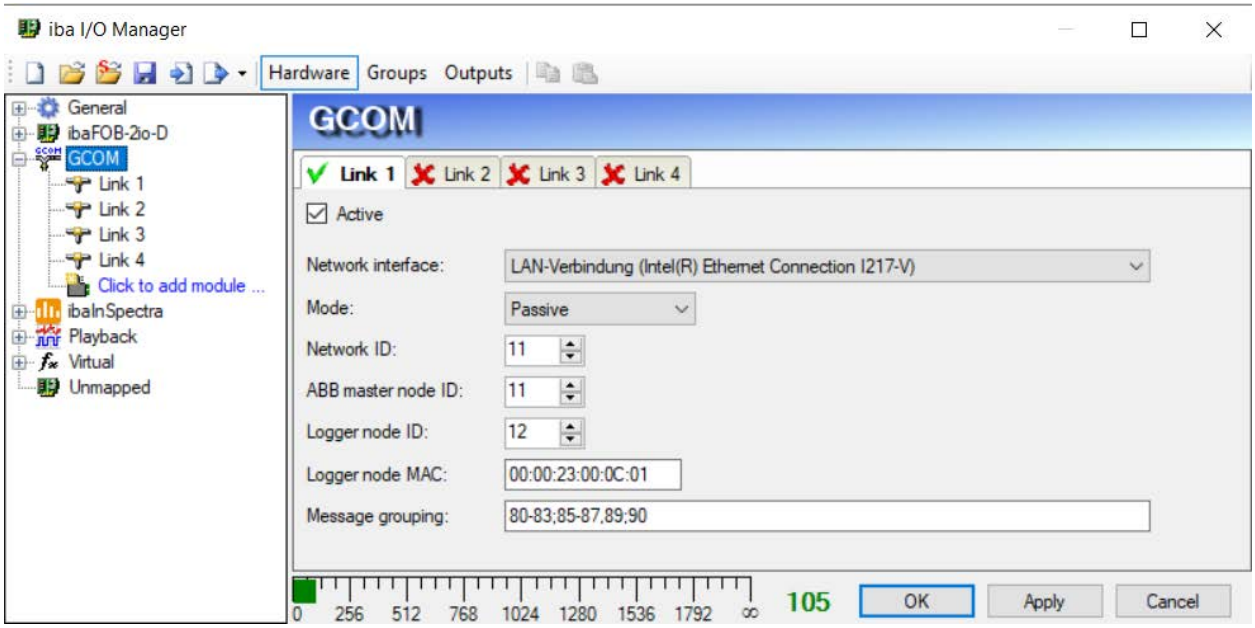


Fig. 4: Enabling and creating interface connections

As evident from the figure above, *ibaPDA* supports up to 4 GCOM connections. You can configure the following settings for each connection:

Active
By selecting the checkbox *Active*, you decide whether this connection is active or not.

Network interface
With this option you decide which NIC (network interface card) the GCOM connection should run on. The drop-down list contains all of the registered network interfaces.

Mode
With this option, you decide whether a connection should run in active or passive mode:

- *Active* mode: The *ibaPDA* system functions as an active GCOM network node, and sends ACK messages as well as "I am here" messages on the network on a cyclical basis.
  See also the GCOM user's manual, chapter 1.8.4 -1.8.6, for detailed information.
- *Passive* mode: The *ibaPDA* system behaves completely passively on the network. It collects data in this mode, but does not sent any messages in the network. This mode can be used in order to be able to use *ibaPDA* in parallel to an existing flatness logger.

Network ID
Enter the ABB master subnet that is used for the communication with the ABB master system.

ABB master node ID
Enter the ABB master node that is used in your network.

Logger node ID
Specify the node ID of the *ibaPDA* system in the ABB master subnet.

Logger node MAC
Network address to which the data messages are sent from the ABB master. Please note that this address may differ from the current MAC address of the NIC that is connected to the ABB network. The *ibaPDA* driver only evaluates messages that are intended for this MAC address.

Message grouping
Define the messages to be synchronized here. Use the following characters for the definition:

- **";"** to separate two groups
- **","** to separate two message IDs within a group

Define a range of message IDs in a group:

A maximum of 256 groups can be defined, where each group can contain 32 messages.

Default setting: 80-83;85-87;89;90

Note

If you use the same network interface for different connections that are in the active mode, do not use the same settings for network ID and logger node ID. If you do not do this, this will lead to unforeseeable results and, due to the use of the same MAC address, network disruptions.

3.4.2 Diagnostic information for every single GCOM connection

If you choose an active connection, a variety of diagnostic information will be displayed. These information is divided into three areas:

- Network adapter
- GCOM configuration
- Message counter

Network adapter

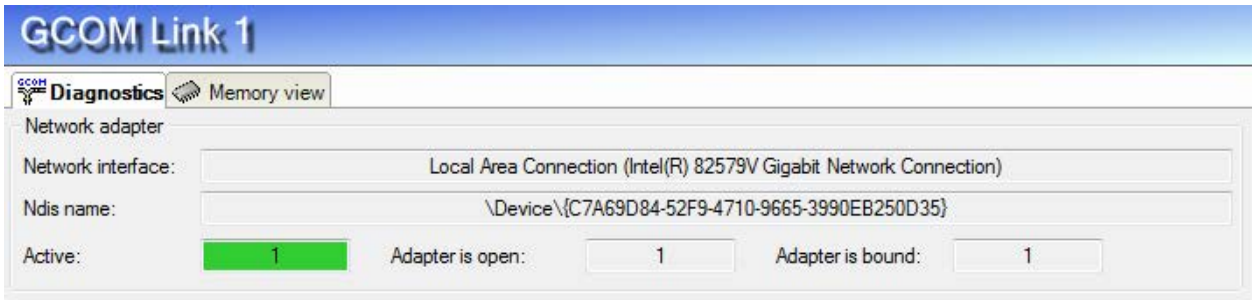


Fig. 5: GCOM interface connection, Diagnostics tab, selection of the Network adapter

In this section, you will see the selected “Network interface” and the associated “NDIS names.”

You can see whether the connection is active or not in the “Active” field.

The field “Adapter is open” should be set to 1. This means that the NDIS driver belonging to the *ibaPDA* driver could open the network interface.

The field “Adapter is bound” should also be set to 1. This means that the NDIS driver has occupied the selected network interface.

GCOM configuration

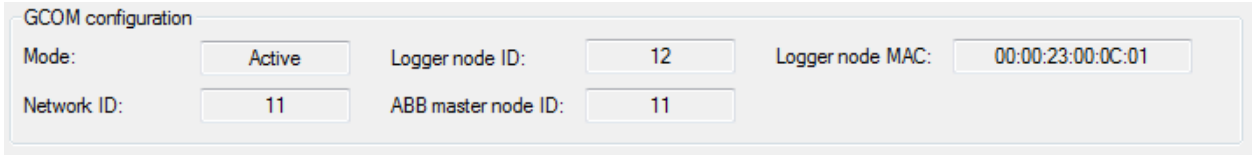


Fig. 6: GCOM interface connection, Diagnostics tab, selection of the GCOM configuration

Here you can see the parameters that were configured for this connection ↗ *Interface configuration*, page 10).

Message counters

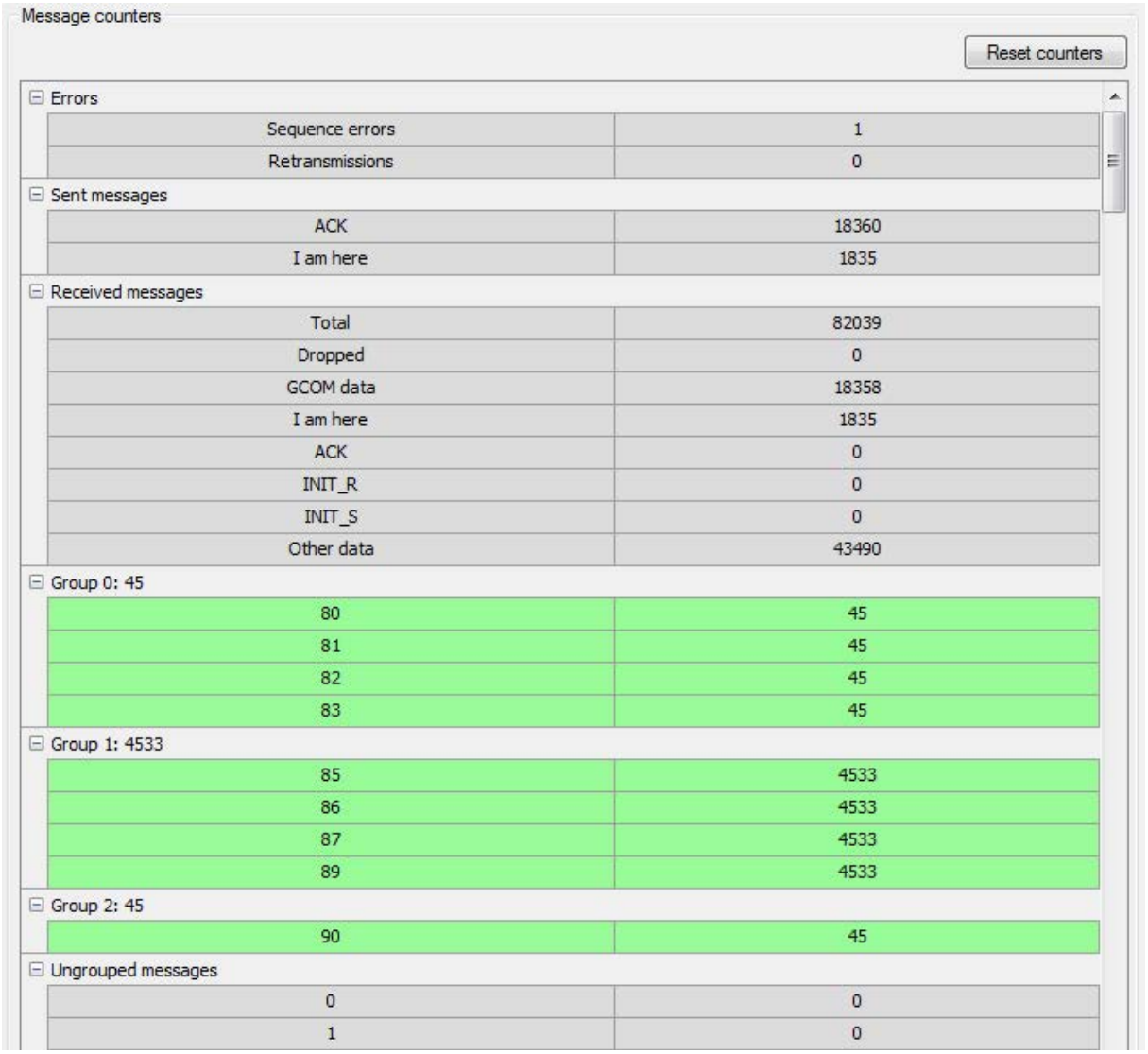


Fig. 7: GCOM interface connection, Diagnostics tab, Message counters section

In the *Message Counters* section, you will find several counters for diagnostic purposes. The table contains three categories of counters, each an additional category per group, as defined on the configuration node of the interface (see ↗ *Interface configuration*, page 10), as well as a category for messages that do not belong to the logistic message grouping.

Error

- Sequence errors
  Total number of messages that arrive with a sequence error.
  An INIT_S message is sent to the ABB master unit. The sequence counter for the received messages is reset and the signal for the received data is dropped.
- Retransmissions
  Total number of retransmitted messages received by *ibaPDA*. If a data message with the same sequence counter is received as the previous message, this is a data retransmission of the ABB master. The data message is confirmed by the *ibaPDA* system with the same sequence counter.

Sent messages

- ACK
  Total number of ACK messages that are sent to the ABB master in the “Active” mode. The counter remains on zero in “Passive” mode.
- I am here
  Total number of “I am here” messages, which are sent from *ibaPDA* in the “Active” mode. These messages must be sent every second to establish a cross reference table between station addresses on the GCOM subnet and the logic addresses (network and node no.) in the ABB master system. The counter remains on zero in “Passive” mode.

Received messages

- Total
  Total number of messages that were received on the selected network interface.
- Dropped
  Total number of messages that could not be processed due to internal problems (memory allocation).
- GCOM data
  Total number of received GCOM messages.
- I am here
  Total number of received “I am here” messages.
- ACK
  Total number of ACK messages that were received from the ABB master. This counter should be on zero, since *ibaPDA* never sends data messages to the ABB master.
- INIT_R
  Total number of INIT_R messages that were received by the ABB master. If an INIT_R message is received, this means that the *ibaPDA* counter for received messages must be reset to 0 to re-synchronize the sequence counter.
- INIT_S
  Total number of INIT_S messages that were received by the ABB master. If an INIT_S message is received, this means that the *ibaPDA* sequence counter for sent messages must be reset to 0 to re-synchronize the sequence counter. However this is normally not necessary, since *ibaPDA* does not send any data messages to the ABB master.
- Other data
  Total number of messages received, which are not GCOM messages.

For every logical message group, a category is created in the table containing all configured message IDs (left column), including the number of received messages (right column). The header of the respective category shows the number of completely received logical messages (i.e. the minimum of all message ID counters in the group).

Message IDs that do not belong to any logical group are listed in the category “Ungrouped messages.”

Click on the button <Reset counters> to reset all counters to 0.

3.4.3 Memory view for every single GCOM connection

If you select the active link and then the *Memory view* tab, a hex viewer will be shown.

The viewer provides a view of the memory region MEMGCOM where the recomposed data messages and other diagnostic information are stored.

See chapter ↗ *ibaPDA-specific implementation*, page 8 for the layout of the MEMGCOM structure.

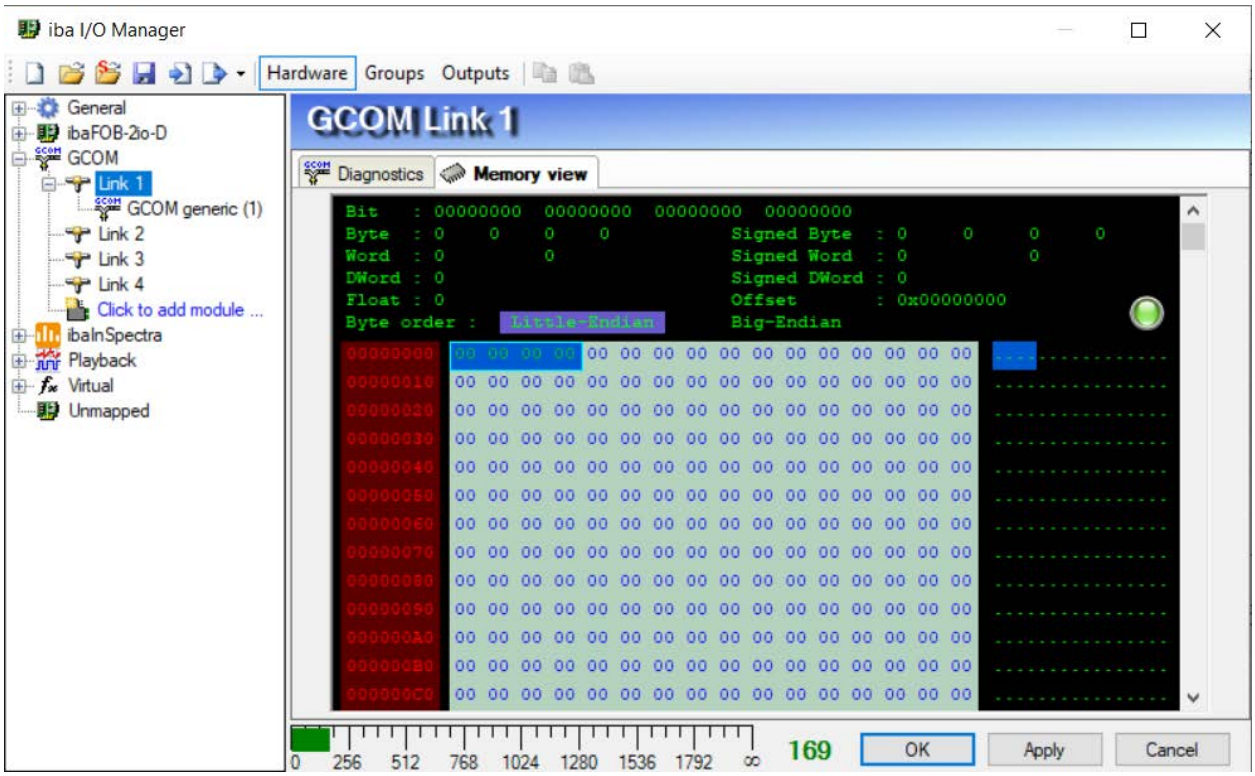


Fig. 8: Memory view of the connection

Handling of the Memory view

An experienced user can check the content of the memory address cells. To do this, right click with the mouse in the area of the memory data display and in the context menu select “To offset” to enter a certain memory address that you would like to check. Click on <OK> and the view will jump to the desired address (highlighted) and show the content.

3.4.4 Add module

Add a module by clicking below the interface or by right-clicking on the desired connection.

There is a type of module, which can be added to the GCOM interface:

- GCOM generic

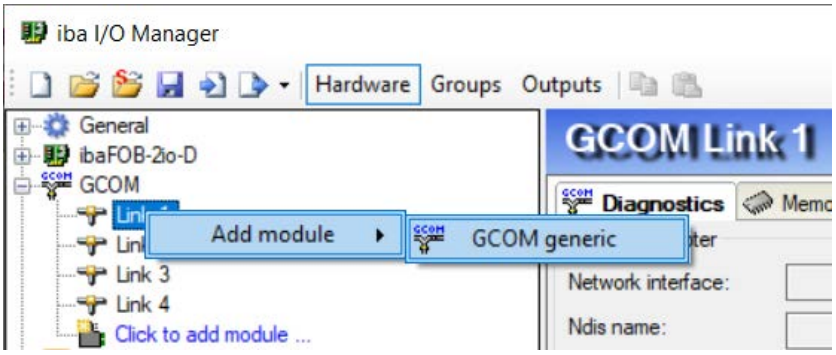


Fig. 9: Add module

3.4.5 General module settings

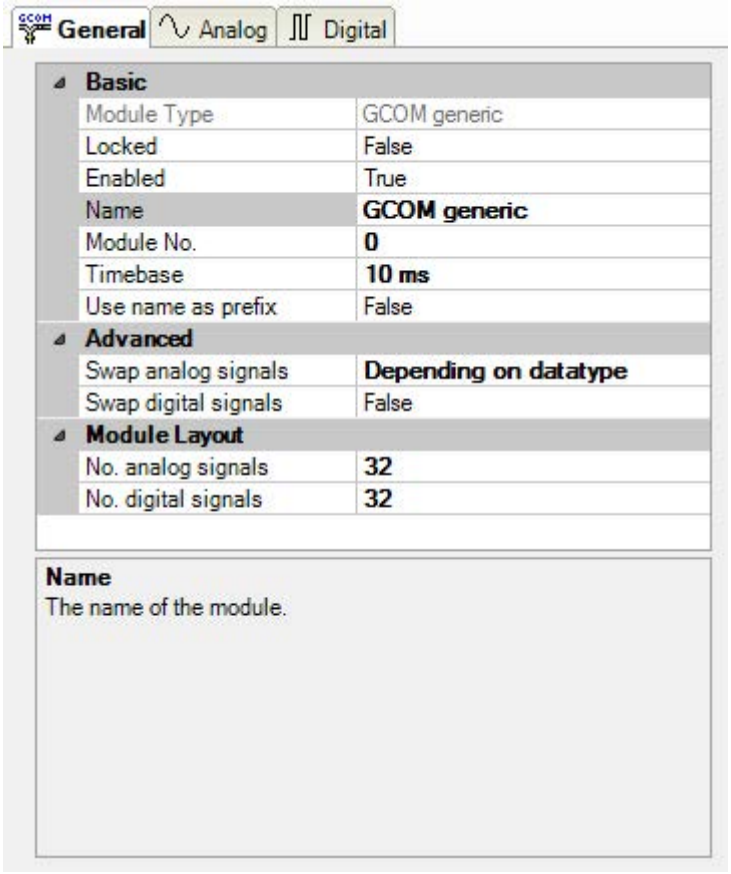


Fig. 10: General module settings

Basic settings

Module Type (information only)
Indicates the type of the current module.

Locked
A module can be locked to avoid unintentional or unauthorized changing of the module settings.

Enabled
Disabled modules are excluded from signal acquisition.

Name
The plain text name should be entered here as the module designation.

Module No.
Internal reference number of the module. This number determines the order of the modules in the signal tree of *ibaPDA* client and *ibaAnalyzer*.

Timebase
All signals of the module will be sampled on this time base.

Use name as prefix
Puts the module name in front of the signal names.

Advanced

Swap analog signals
Set the swap mode according to the signal source.
You can choose between the following 4 options:

Mode	16 bit	32 bit
No swap	AB	ABCD
Depending on data type	BA	DCBA
Swap 16 bit	AB	CDAB
Swap 8 bit	BA	BADC

Table 2: Swap modes

The swap mode to be selected depends on the swap mode of the signal source.

Swap digital signals
Choose here whether the digital signals should be swapped on a 4-byte basis.

- False: no swap (default)
- True: byte order changes from ABCD to DCBA

Note

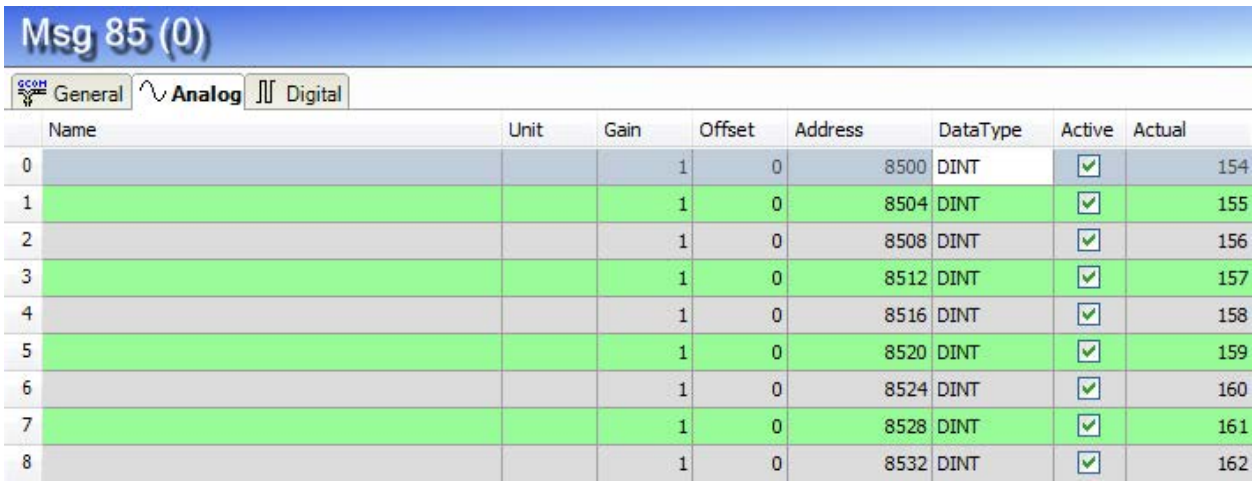
Leave the default setting “Dependent on data type” unchanged.

Module Layout

Number of analog and digital signals
Here, you can increase or decrease the number of signals in the module. By default, 32 signals are preset. You may enter any value between 0 and 1000. The signal tables will be adjusted accordingly.

3.4.6 Signal configuration

In the *Analog* and *Digital* tabs, you can create analog and digital signals that should appear in the MEMGCOM structure. To determine the suitable offset in the MEMGCOM structure, also see ↗ *ibaPDA-specific implementation*, page 8.
The example below shows a module that maps the GCOM data message with the ID 85. The start offset of a GCOM data message with the ID n is specified as 100*n.



	Name	Unit	Gain	Offset	Address	DataType	Active	Actual
0			1	0	8500	DINT	☑	154
1			1	0	8504	DINT	☑	155
2			1	0	8508	DINT	☑	156
3			1	0	8512	DINT	☑	157
4			1	0	8516	DINT	☑	158
5			1	0	8520	DINT	☑	159
6			1	0	8524	DINT	☑	160
7			1	0	8528	DINT	☑	161
8			1	0	8532	DINT	☑	162

Fig. 11: Analog signals

Name
In the *Name* column, enter a plain text name for each signal.

Up to two lines of comment may be entered for each signal in this column.

You get the entry dialog for the comments by mouse click on the small button in the name field of the signal.

Tip

A useful feature when completing the name fields is the automatic fill function. If you enter a signal name and double-click on the column header as long as the cursor is still in the name field then all empty fields below will be filled automatically with that name. If the name is ending with a number you will get names with an incrementing number per line. You may use this function in any row of the signal table. Fields already containing names will not be overwritten.

Unit
Assignment of an engineering unit (such as °C, Ampere, Volt, N etc.) for the signal.

Gain and offset
The values for gain and offset (signal value in the zero point) describe a linear scaling characteristic curve for scaling and position.

Gain and offset can be entered directly or set by means of the two-point scaling with two pairs of applicable values.

You can open the two-point-scaling dialog with a click on the little tool button in the fields *Gain* or *Offset*. (Cursor must be on the fields to see the button .)

Address
The address specifies the offset of the first byte of this value within the MEMGCOM structure. The offset may be entered as a hexadecimal value or decimal value if the corresponding point in the context menu is selected.

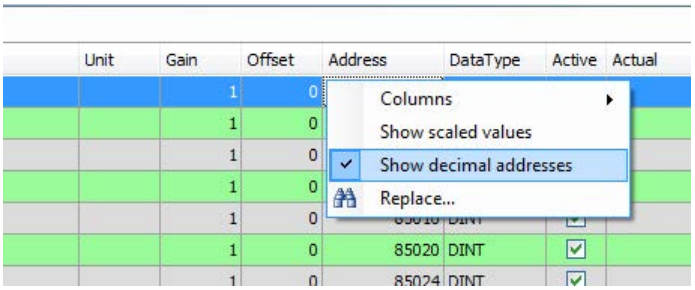


Fig. 12: Select the display of the decimal addresses

In order to get some default values for the column rows, you may use the autofill function for the columns (see *ibaPDA* manual). The addresses are incremented here depending on data type.

- Analog signals as FLOAT, DINT or DWORD: in 4-byte steps
- Analog signals as INT or WORD: in 2-byte steps
- Analog signals as BYTE: in 1-byte steps
- For digital signals, the bit no is incremented by 1, from 0 to 31; then the address is incremented in steps of 4

Note

The addresses of messages are calculated from the message ID:
Address = message ID * 100.
Example: Message ID 81 is from address 8100.

Data Type
In the fields of this column, you can select the relevant data type used for each signal. Click in the corresponding field and select the data type from the drop-down list. The address range depends on the data type. Therefore, an adjustment of address entries might be necessary after changing the data types.

Available data types:

Data type	Description	Value range
BYTE	8 bit without positive or negative sign	0 … 255
INT	16 bit with positive or negative sign	-32768 … 32767
WORD	16 bit without positive or negative sign	0 … 65535
DINT	32 bit with positive or negative sign	-2147483648 … 2147483647
DWORD	32 bit without positive or negative sign	0 … 4294967295
FLOAT	IEEE754; single precision; 32 bit floating point value	1.175·10-38 …3.403·1038
DOUBLE	IEEE754; double precision; 64 bit floating point;	2.225E-308 … 1.798E+308
FP_REAL	Fixed point real; Q15.16; 15 integer bits and 16 fractional bits;	-32768 … 32767.9999

Activating the channels
You can enable and disable every channel for acquisition with a mouse click.

Actual value
The fields in this column show the actual value of the signals. Even if the acquisition is not running yet the actual value may be displayed if the hardware is already connected and working (diagnostic feature). For digital signals, only the values 0 and 1 are shown.

4 Diagnostics

4.1 License

If the "GCOM" interface is not displayed in the signal tree, you can either check in *ibaPDA* under *General* - *Settings* - *License info* in the I/O Manager or in the *ibaPDA* service status application to see whether your license "Interface GCOM" has been properly recognized.

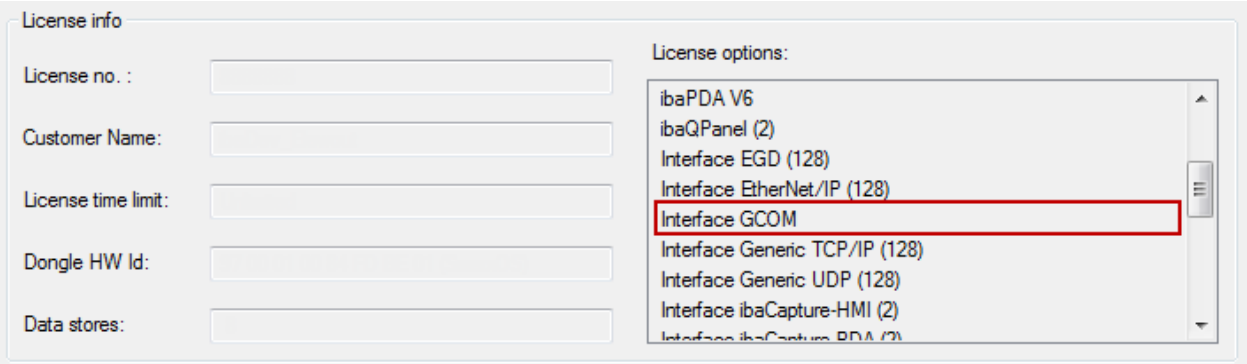


Fig. 13: Display of the license in the ibaPDA I/O Manager, example GCOM

4.2 Log files

If connections to target platforms or clients have been established, all connection-specific actions are logged in a text file. You can open this (current) file and, e.g., scan it for indications of possible connection problems.

The log file can be opened via the button <Open log file>. The button is available in the I/O Manager:

- for many interfaces in the respective interface overview
- for integrated servers (e.g. OPC UA server) in the *Diagnostics* tab.

In the file system on the hard drive, you will find the log files in the program path of the *ibaPDA* server (...\Programs\iba\ibaPDA\Server\Log\). The file names of the log files include the name or abbreviation of the interface type.

Files named `interface.txt` are always the current log files. Files named `Interface_yyyy_mm_dd_hh_mm_ss.txt` are archived log files.

Examples:

- `ethernetipLog.txt` (log of EtherNet/IP connections)
- `AbEthLog.txt` (log of Allen-Bradley Ethernet connections)
- `OpcUAServerLog.txt` (log of OPC UA server connections)

4.3 Connection diagnostics with PING

PING is a system command with which you can check if a certain communication partner can be reached in an IP network.

Open a Windows command prompt.

Enter the command “ping” followed by the IP address of the communication partner and press <ENTER>.

With an existing connection you receive several replies.

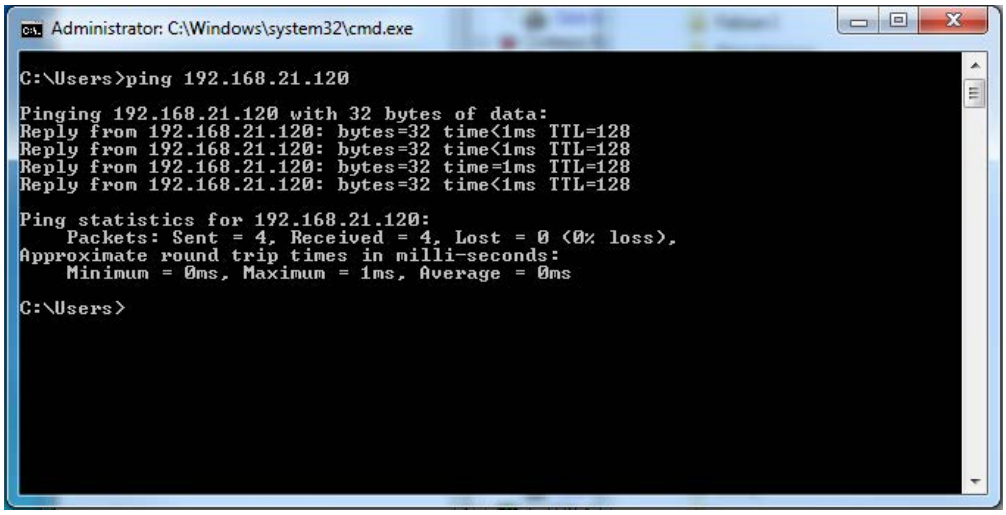


Fig. 14: PING successful

With no existing connection you receive error messages.

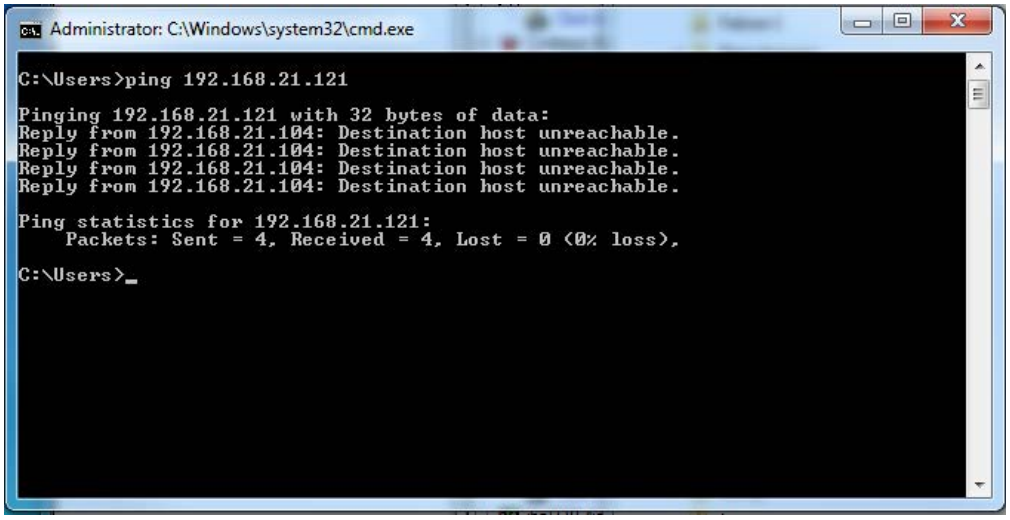


Fig. 15: PING unsuccessful

5 Support and contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

Email: support@iba-ag.com

Note

If you need support for software products, please state the license number or the CodeMeter container number (WIBU dongle). For hardware products, please have the serial number of the device ready.

Contact

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