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MELSEC A & Q on TCP/IP



open industrial communication concept

applicom[®]
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MELSEC A & Q Messaging on TCP/IP

Client and Server modes

The range of Mitsubishi Series A / Series Q PLCs uses TCP/IP for communication on Ethernet. The messaging used are MELSEC-A and MELSEC-Q (Mitsubishi application layer). All layers made for Mitsubishi on applicom® can be represented according to the following OSI model:

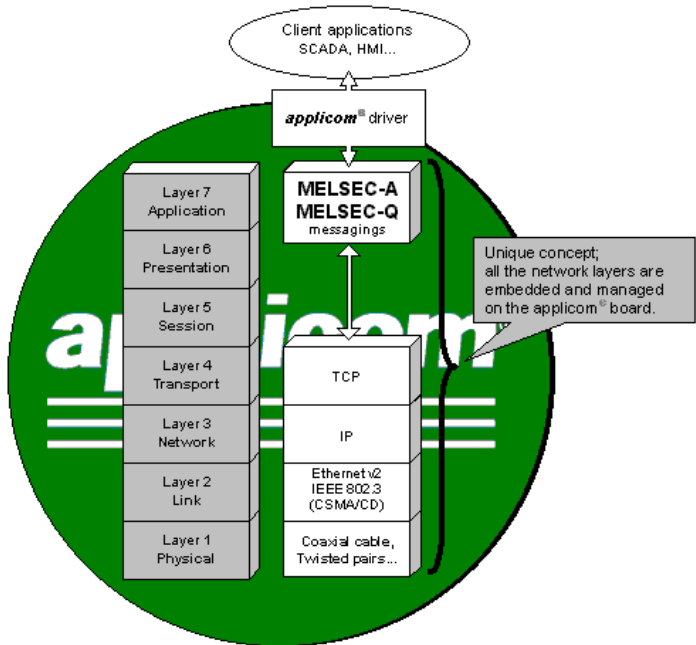


Figure 1 - applicom® functionality according to the following OSI model.

The Transport **TCP** and Network **IP** layers allow the communication, i.e. the **data transport** between the various peripherals presents on the network (PLC's, sensors, devices...).

The application layer, here the MELSEC messagings, defines the **data format of exchanges**.

The MELSEC-A messaging on applicom® interface handles exchanges with Mitsubishi Series A couplers such as:

System Range	Ethernet Driver
AnA, AnU	AJ71E71 (Connection 10Base2 et 10Base5)
AnS	A1SJ71E71-B2 (Connection 10Base2) A1SJ71E71-B5 (Connection 10Base5)

Please contact us for other supported CPU/couplers.

The MELSEC-Q messaging on applicom® interface handles exchanges with Mitsubishi Series Q couplers such as:

System Range	Ethernet Driver
QnA	AJ71QE71 (Connection 10Base2 et 10Base5)
QnAS	AJ71QE71-B2 (Connection 10Base2) AJ71QE71-B5 (Connection 10Base5)

Please contact us for other supported CPU/couplers..

The applicom® interface provides in standard the following functionality:

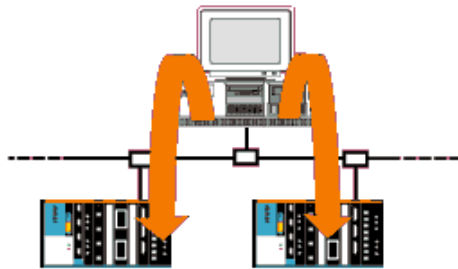
- **Client mode** multi-requests to Mitsubishi Series A / Series Q server PLCs on Ethernet TCP/IP : Reading and writing variables in the various memory areas of PLCs.
- **Server mode** for Mitsubishi Series Q access to the applicom® database and equipment monitoring. Mitsubishi Series A PLC doesn't integrate the client Melsec-A functionality.
- **Redundancy of equipment**: enables the application to dynamically change the target equipment

The use of MELSEC messagings is available on applicom® interface simultaneously with the other TCP/IP messagings from applicom® offer – TCP/IP multi-messagings –.

Client mode

MELSEC messaging

In client mode, the applicom® interface takes the communication initiative to the server equipments.



The applicom® client mode can be used to send several requests simultaneously to an equipment before having received the first response: this operation is called **multi-request**.

To send several requests simultaneously, several connections are used. The applicom® interface manages **128 connections**. Only 30 of them can be used simultaneously for all equipments.

The applicom[®] interface can read and/or write major PLC data types thanks to applicom[®] library/DLL, DDE server, OPC server and ActiveX control:

Mitsubishi Series A

Device data type ►	Internal	Input	Output	Timer	Counter
▼ applicom[®] Data					
Bit	M, L, S, B, F, TS, TC, CS, CC	X	Y		
Word (16-bit) ^[1]	D, R, W			TN	CN
Double word (32-bit)	DD, DR, DW				
Floating point (32-bit)					
IEEE format	FD, FR, FW				

[1] : Standard and BCD format.

Mitsubishi Series Q

Device data type ►	Internal	Input	Output	Timer	Counter
▼ applicom[®] Data					
Bit	M, L, S, B, F, TS, TC, CS, CC, V, STS, STC, SB, SM, DX, DY	X	Y		
Word(16-bit) ^[2]	D, R, W SD, STN, SW Z, ZR			TN	CN
Double word (32-bit)	DD, DR, DW				
Floating point (32-bit)					
IEEE format	FD, FR, FW				

[2] : Standard and BCD format.

Maximum number of variables per request with OPC server

Data type ►	A Series		Q Series	
	Read	Write ^[3]	Read	Write ^[3]
▼ applicom[®] Data				
Bit	2032	256	7664	3128
Word	256	256	480	480
Double word	128	128	240	240
Floating point	128	128	240	240

[3] : Maximum quantity in write is always 1 if you are using PCDDDE application.

MELSEC Messaging - Client mode performance

The applicom® interface must feed back variables coming from **14 stations with 50ms time cycle.**

No inter-PLC exchange is active

Quantity of data per station :

Series A
3 tables of 256 words,
1 table of 2032 bits.

Series Q
3 tables of 480 words,
1 table of 3128 bits.

applicom® data base retrieval time

(out of application and scada to get data from 14 stations :

applicom® data base retrieval time

(out of application and supervision) to get data from 14 stations :

Series A
i.e. 10752 words and 28448 bits, 56 requests are necessary :
 $56 \text{ (requests)} / 250 \text{ (requests/s)}$

= 0,220 second

Series Q
i.e. 20160 words and 43792 bits, 56 requests are necessary :
 $56 \text{ (requests)} / 320 \text{ (requests/s)}$

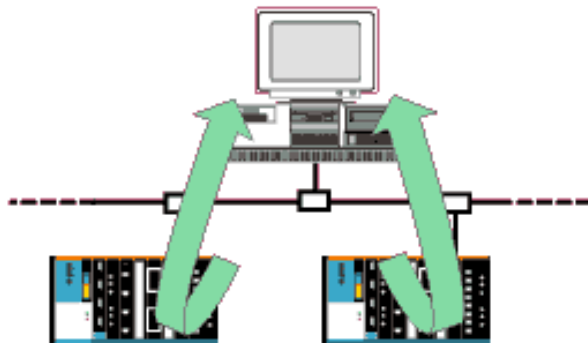
= 0,170 second

Mitsubishi Q Qeries is a little faster than A Series, but with and almost doubled quantity of exchanged data.

Server mode

MELSEC messaging

The Mitsubishi server on applicom[®] interface provides, for clients using Mitsubishi network architecture, a database of **32K Words** and **32K Bits**.



This data base, called applicom[®] Data-Base, could be access in Read and Write modes.

Without any prior configuration, Mitsubishi clients can access the applicom[®] database directly by targeting the port number 1280 (port TCP) of the applicom[®] station. The access mode is identical to that of a Mitsubishi PLC.

This functionality can not be used with Mitsubishi Series A PLC because they does not integrate the client Melsec-A functionality on Ethernet TCP/IP.

applicom[®] Data-Base management for PLC clients

Supported requests	Maximum of number variables/request		Corresponding PLC addresses	
	Series A	Series Q	Series A	Series Q
Read/Write bit (M)	2032	7664	Mo à M9255	Mo à M8191
Read/Write word (D)	256	480	Do à D9255	Do à D12287

The Mitsubishi server functionality on the applicom® database can be used to optimize information feedback. Rather than permanently polling the equipments to monitor variables which change status occasionally, the equipments can store the information to be feed back in the applicom® database only on status changes (alarm feedback). This operating mode results in:

- PLC processors less solicited.
- Network architecture less heavily loaded.
- Minimized information feedback time.

This principle can be made **reliable** by using a monitoring mechanism of PLC client connections :

- You can define in the configurator a global maximum time between the accesses of the client equipment to the applicom® Mitsubishi server. After this interval, the absence is indicated to the application by an "ACCESS STATUS WORD" in the applicom® Data-Base.
- Your application can read (or write to reset) a counter word which is located in the applicom® Data-Base words area "ACCESS INDICATOR WORD" to inform about the current number of writes made by the client device in the applicom® Data-Base.

Diagnostics

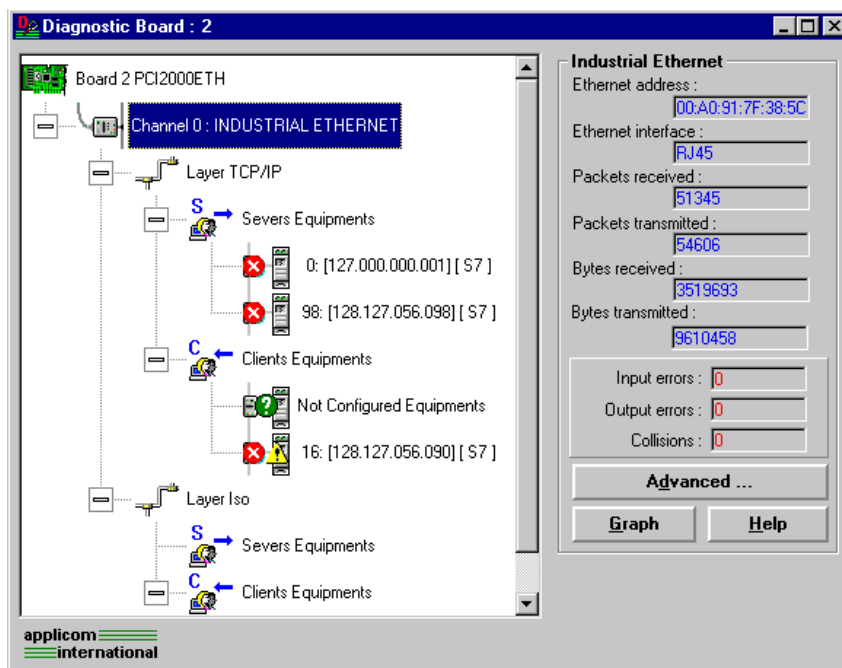
The applicom® package includes, free of charge, a set of diagnostic tools to test your communication without developing any kind of application. Those tools are an essential help to valid the good running of your industrial communication. You can use them in the same time than your applications.

They are sorted in two categories:

Diagnostic tools for network analysis

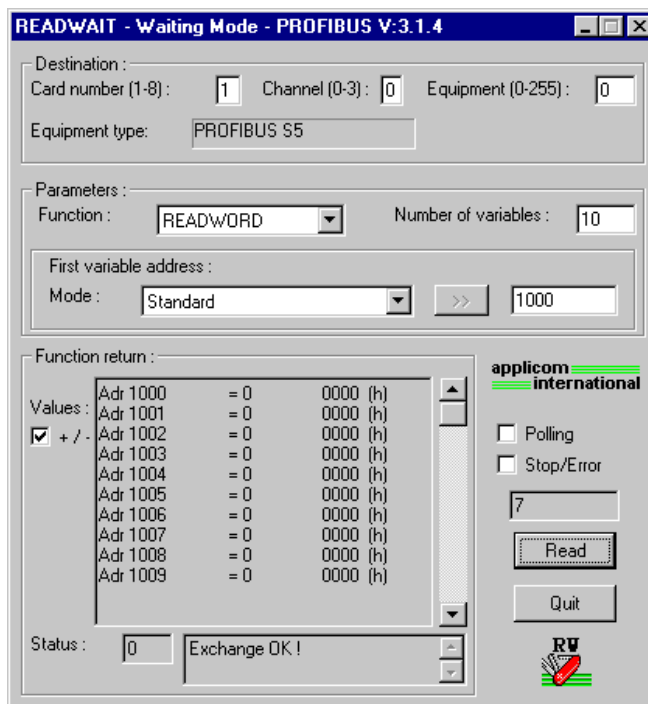
Depending of the protocol used, thus on the transport type, these tools are specialised in the network analysis. They inform you about the traffic and this in real time (load rate, emitted requests number, flow / seconds...). Two modes are available : normal or advanced.

The screen is displayed through a graphic tree representation. The object symbols inform on equipment current state (connected, active, error, not configured...).



Data access utilities

These utilities enable you to access in read and write modes to PLC data's and to applicom® Data-Base. Each access returns a status word and a text comment giving feedback result.



You can use, constantly, the applicom® diagnostic tools. These tools cohabit with your applications.

Compatible applicom® boards

ISA Bus	PCI Bus	PC/104 Bus
	PCI2000ETH	