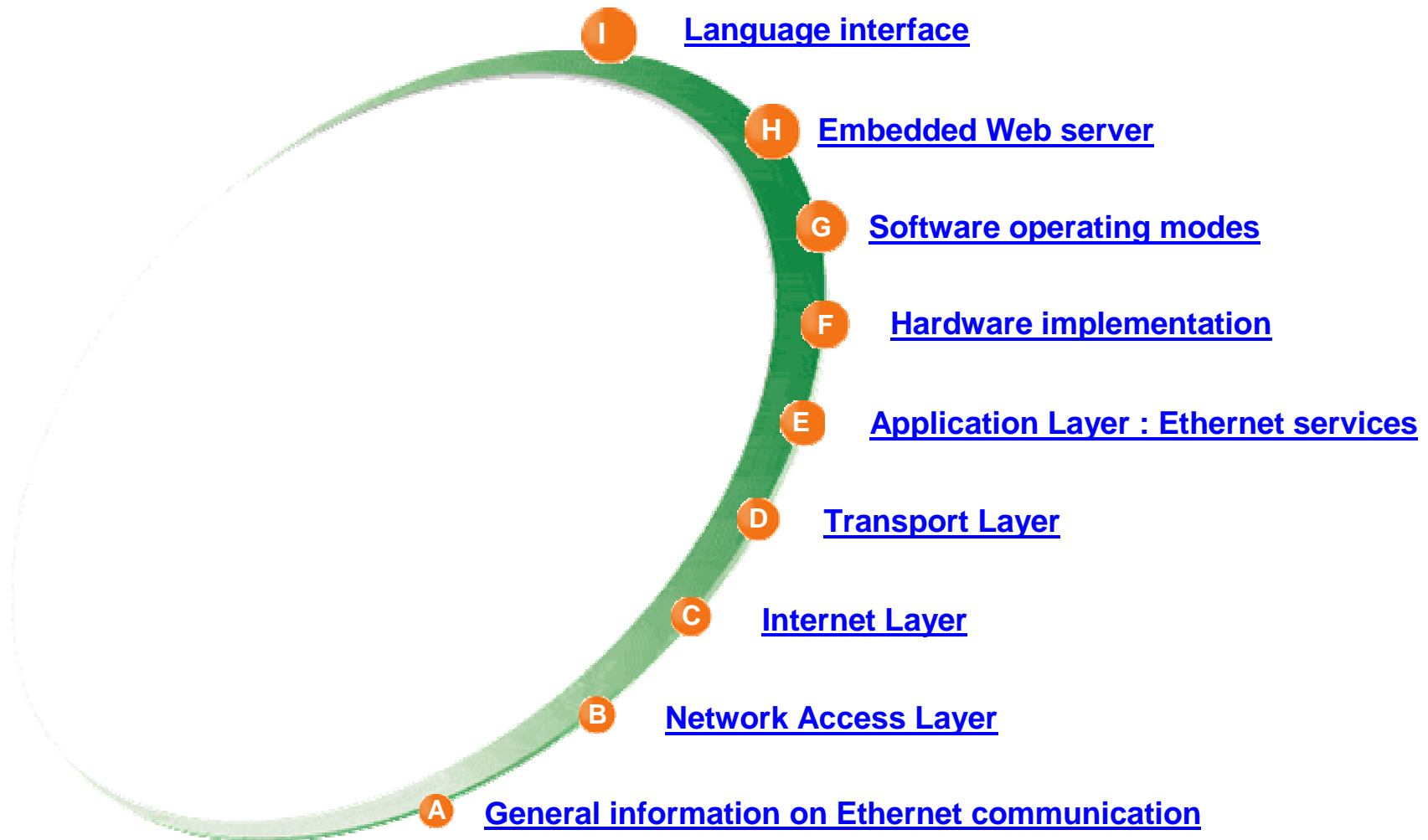
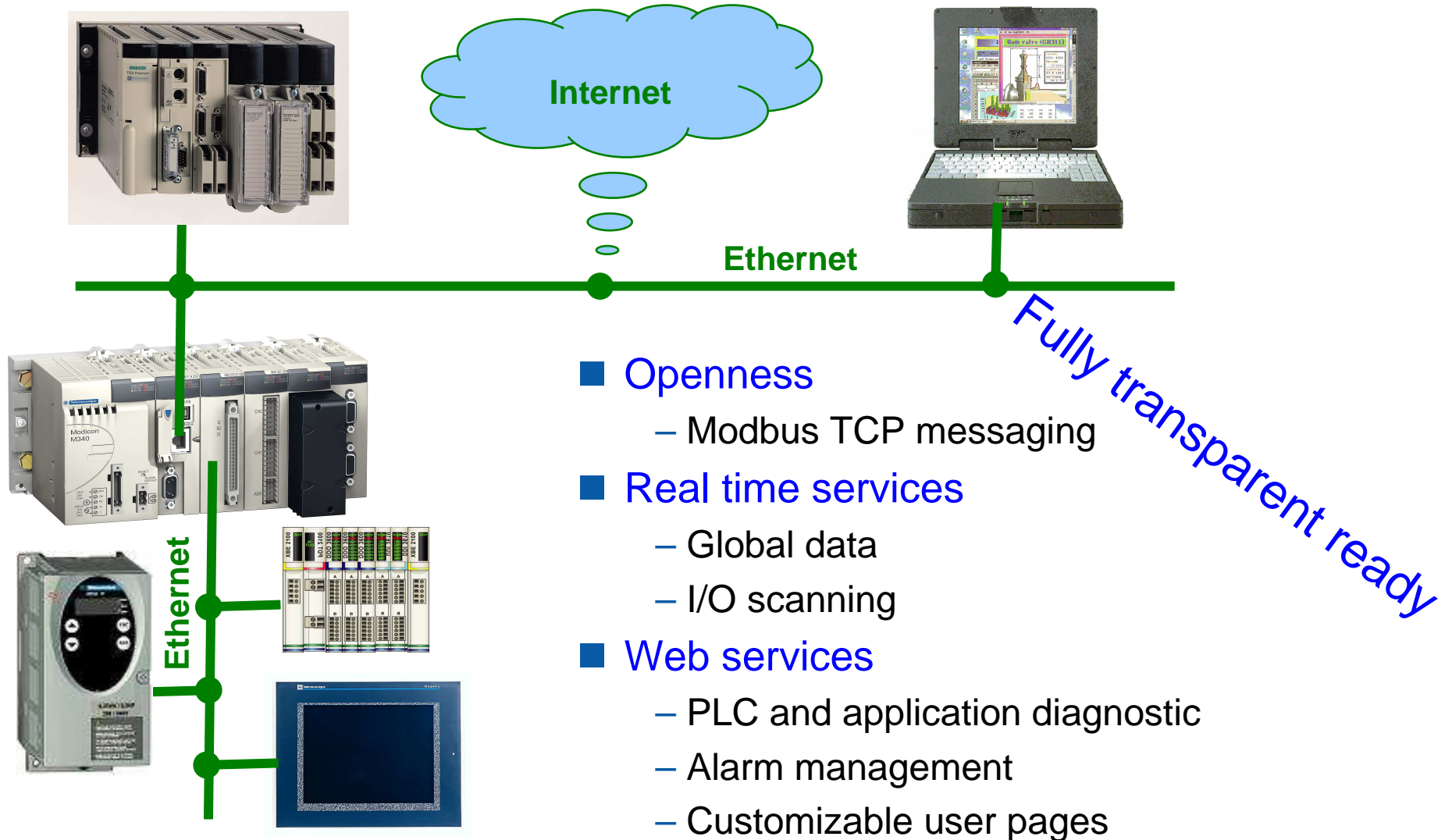


Modicon M340 : Ethernet communication

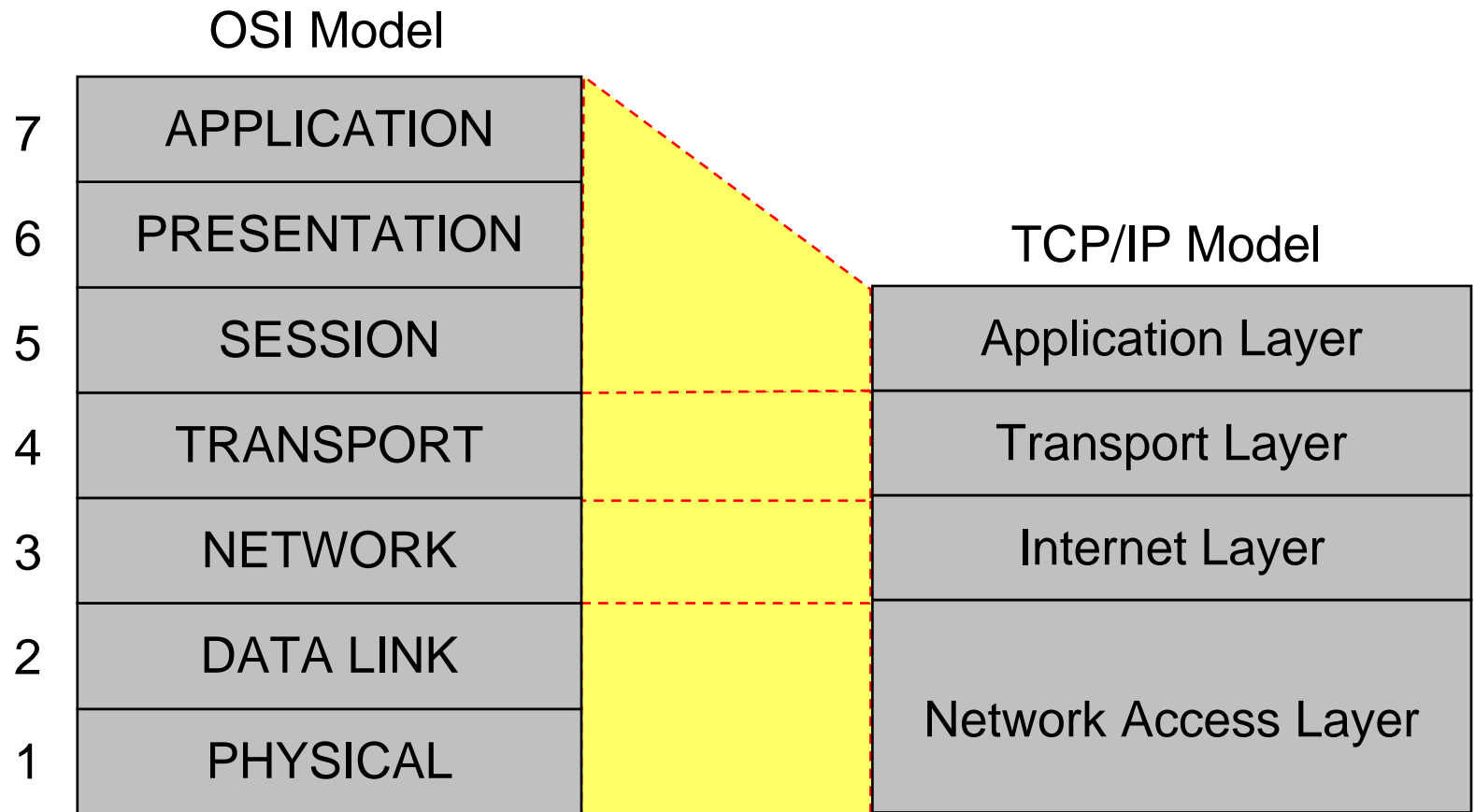


General information on Ethernet communication

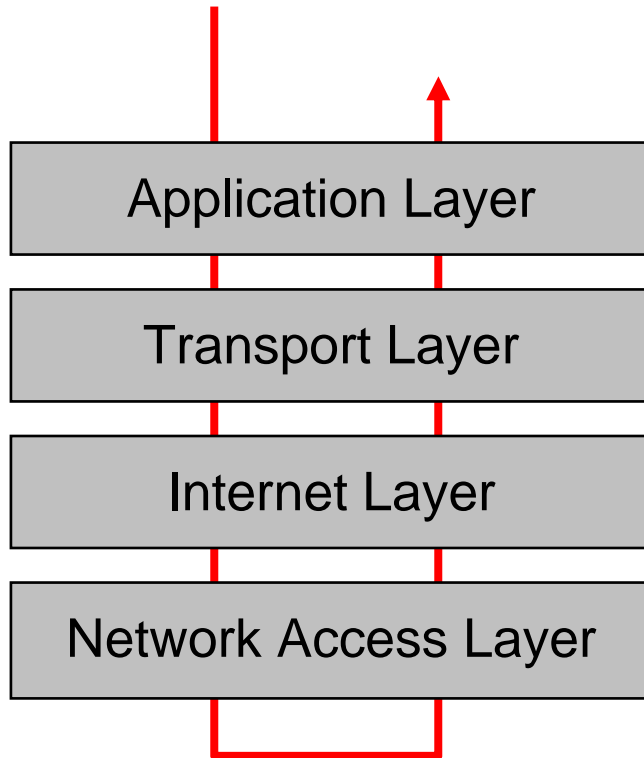
Ethernet communication overview



Correspondance between OSI Model and TCP/IP Layer Model



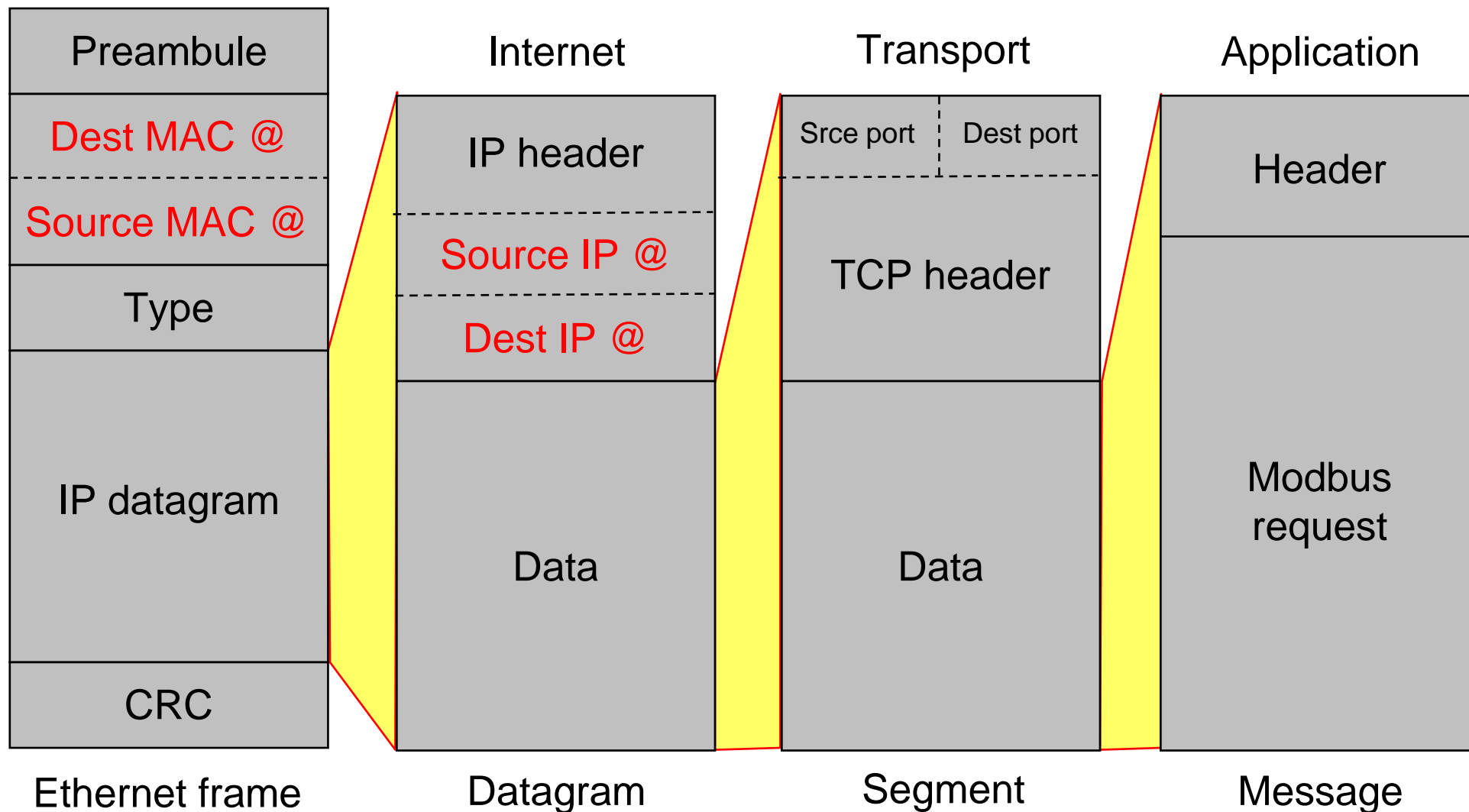
TCP / IP Layer



- Ethernet data is modified when crossing the different layers (adding a header)
- Network Access Layer defines the form to transmit the data whatever the type of physical link (Ethernet frame)
- Internet Layer defines the packet of data (datagram)
- Transport Layer manages data routing and data integrity
- Application Layer manages Modbus protocol and all standard applications (SMTP, FTP, ...)

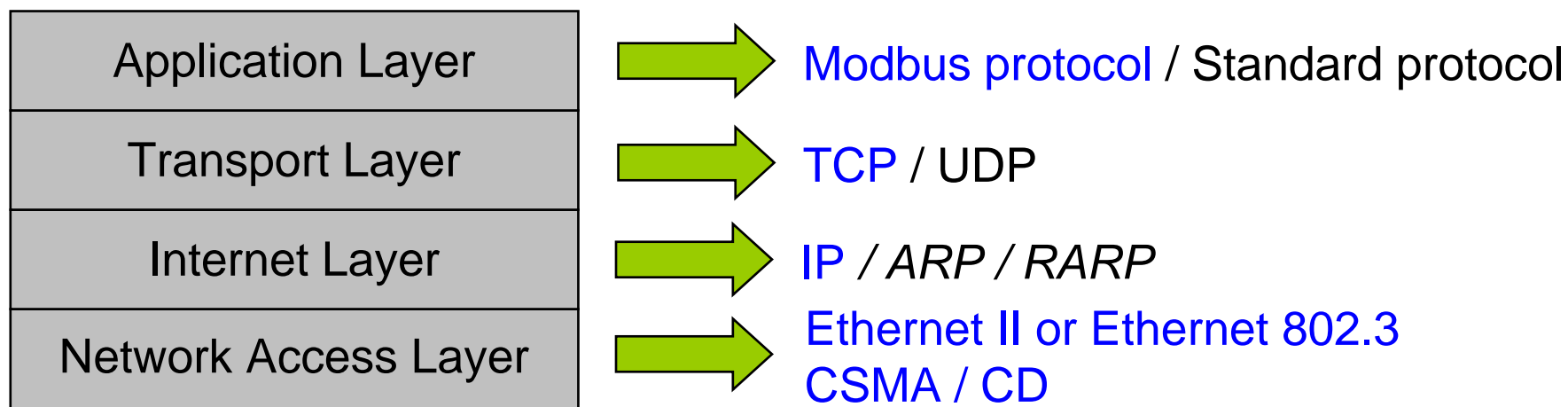
Encapsulated data

Network Access



Ethernet protocols

TCP/IP Model



TCP : Transmission Control Protocol

IP : Internet Protocol

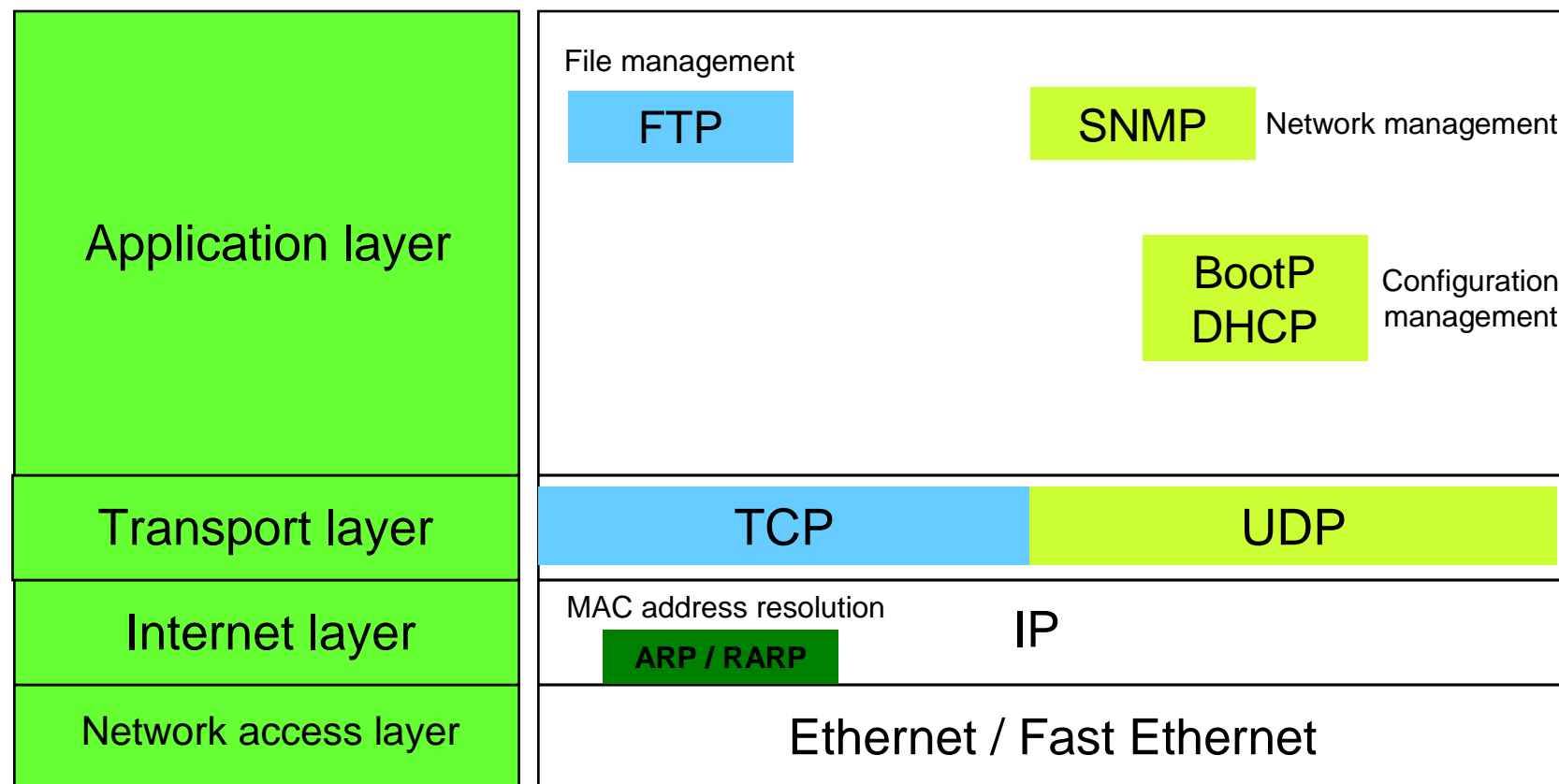
UDP : User Datagram protocol

CSMA / CD : Carrier Sense Multiple Access / Collision Domain

ARP : Address Resolution Protocol

RARP : Reverse Address Resolution Protocol

Typical TCP / IP stack



Communication protocols : ARP (*Address Resolution Protocol*) / RARP (*Reverse Address Resolution Protocol*)

Configuration protocols : BootP (*Bootstrap Protocol*) / DHCP (*Dynamic Host Configuration Protocol*)

Application protocols : FTP (*File Transfer Protocol*) / SNMP (*Simple Network Management Protocol*)

Network Access Layer

Physical Interface

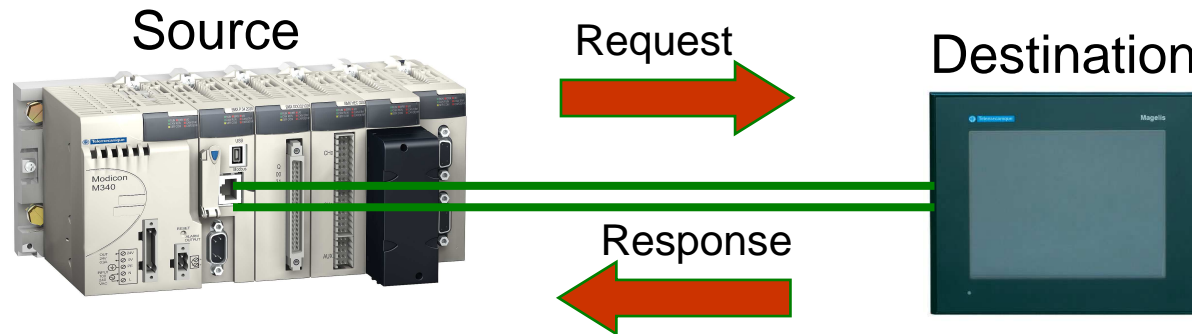
■ Ethernet

- Twisted pair / fiber optic / wireless link / coax
- 3 types of geometric arrangement for nodes and links (topology) : bus, star and ring
- RJ45 10/100 BASE-T connector

■ Modicon M340 modules

- Line speed is self adapted : 10 or 100 Mbits/s
- Half or Full duplex
- Automatic management of straight and cross-over cables

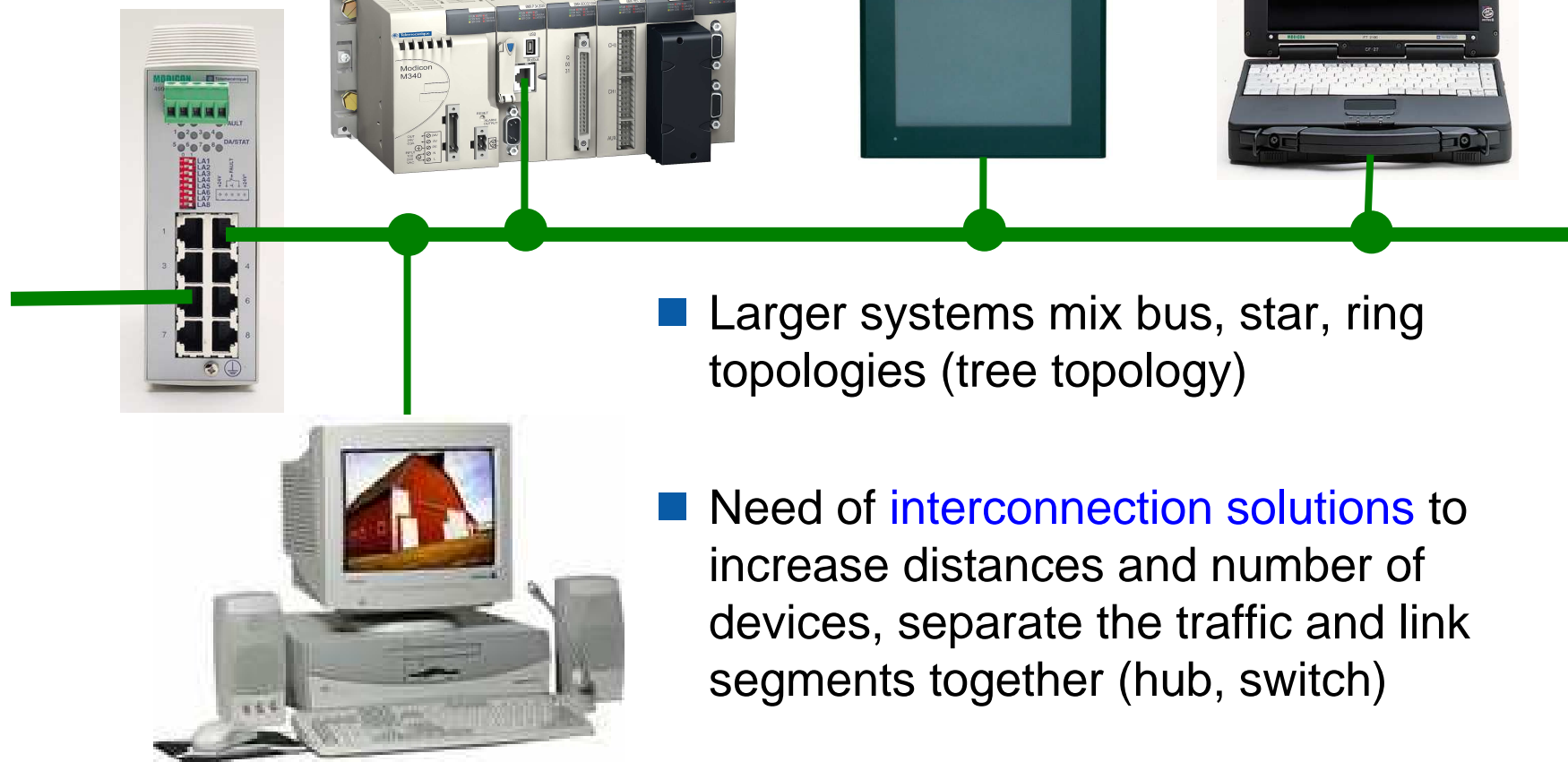
Half / Full duplex principle



- Half duplex
 - Same medium for communication
 - Signals pass in both directions but not simultaneously
- Full duplex
 - Lines for transmission and reception are separated
 - Signals pass in both direction simultaneously
 - Response time is better than half duplex

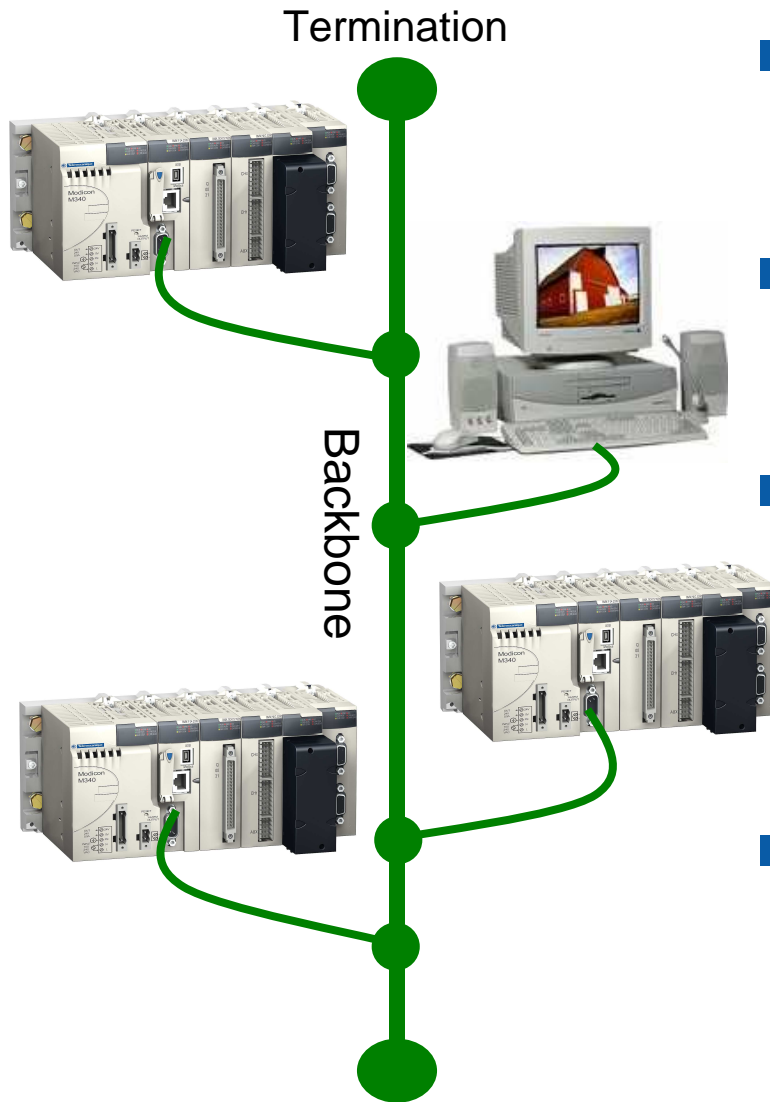
Ethernet topology

Interconnection
device



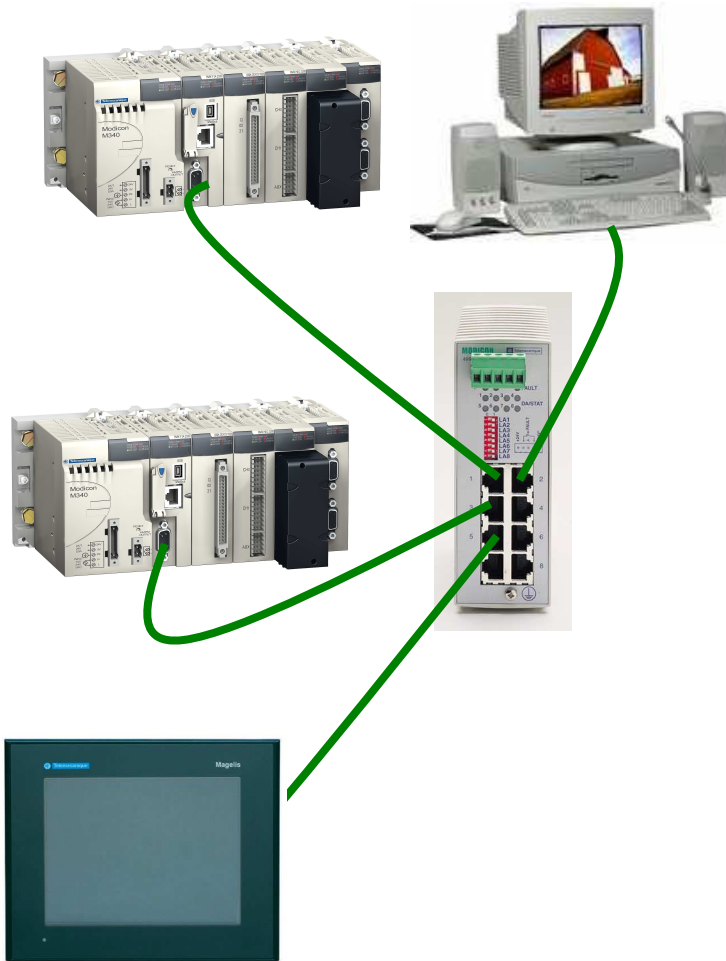
- Larger systems mix bus, star, ring topologies (tree topology)
- Need of **interconnection solutions** to increase distances and number of devices, separate the traffic and link segments together (hub, switch)

Bus topology (remind)



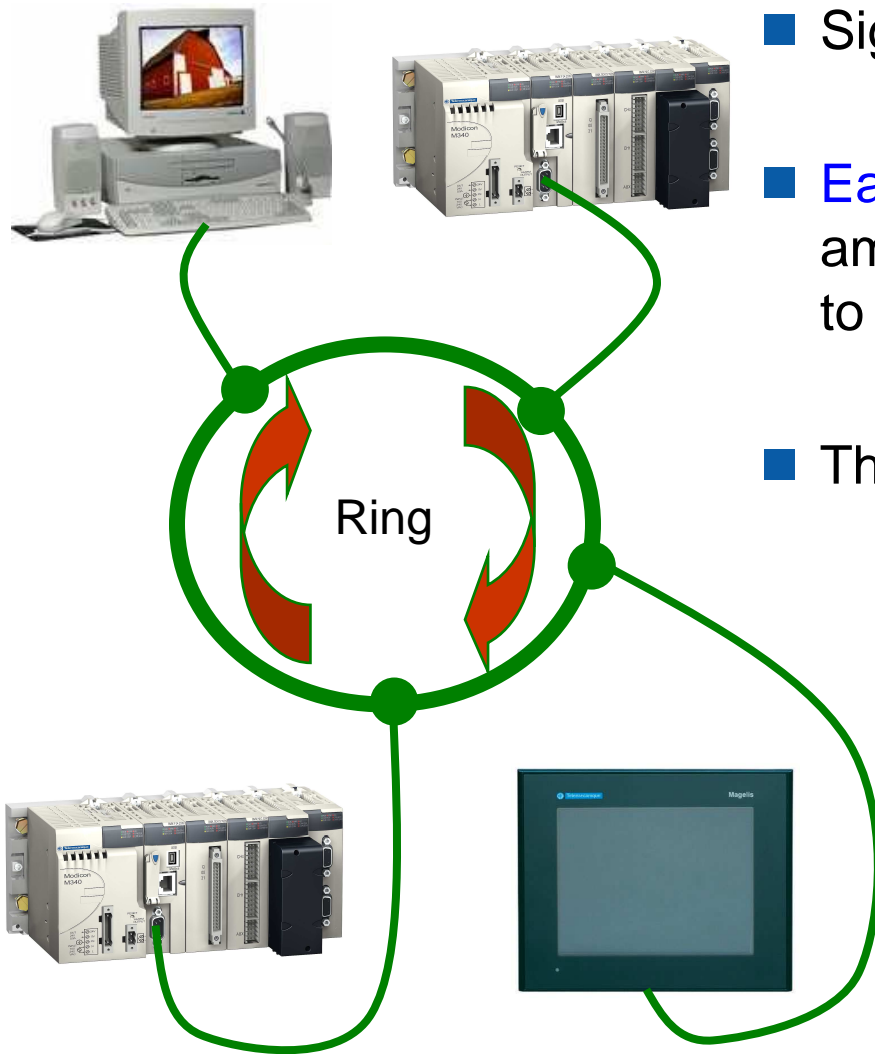
- All devices (nodes) are connected on a single cable (backbone)
- Signals travel in both directions from the source node
- If the path is broken at any point the system fails
 - Lack of termination causes excessive noise on the network and nodes are unable to determine if the network is available
- Use a backbone to interconnect other LAN sections

Star topology (remind)



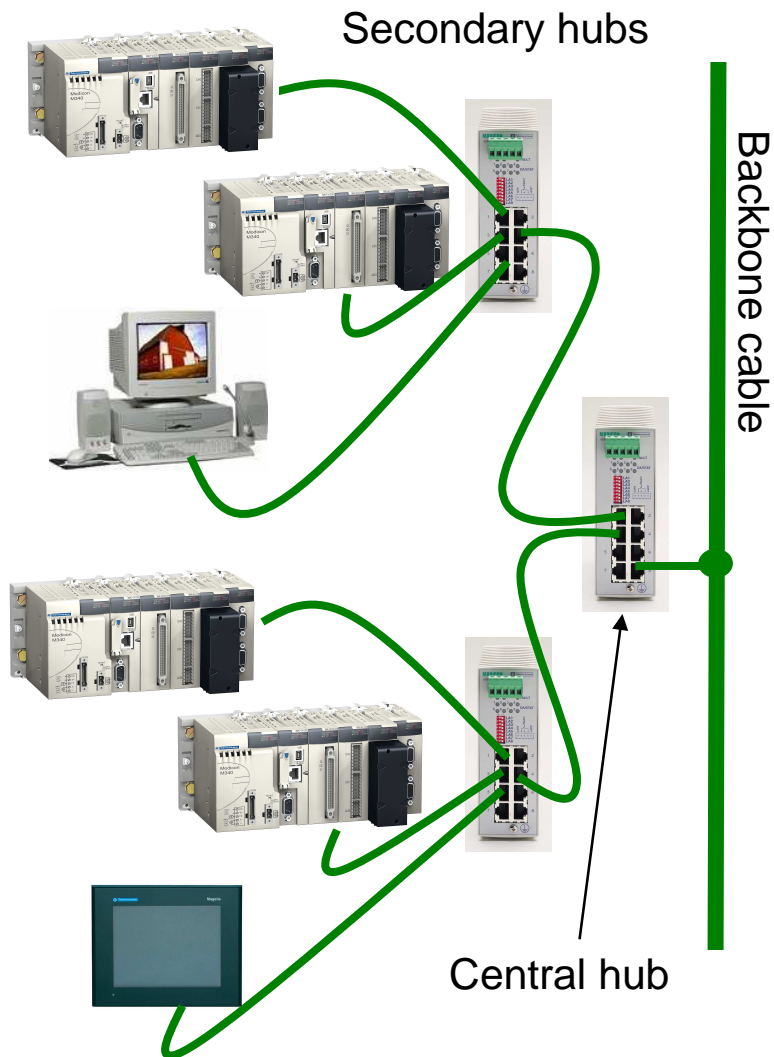
- Devices are connected through a hub or a switch
- Message enters the hub and is broadcast to all other nodes
- A failed node do not affect the other nodes
- Hubs can be daisy chained together to form larger networks
- Fast and easy to install and expand
- 100 m maximum between node and hub

Ring topology (remind)



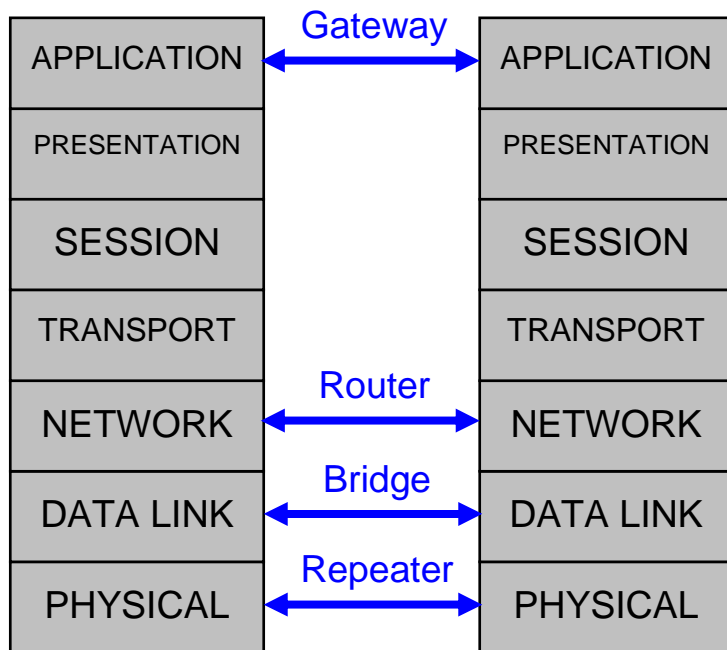
- Signals pass in one direction only
- Each device acts as a repeater which amplifies the signal before transmitting it to the next device of the ring
- The ring is broken if one device fails

Tree topology (remind)



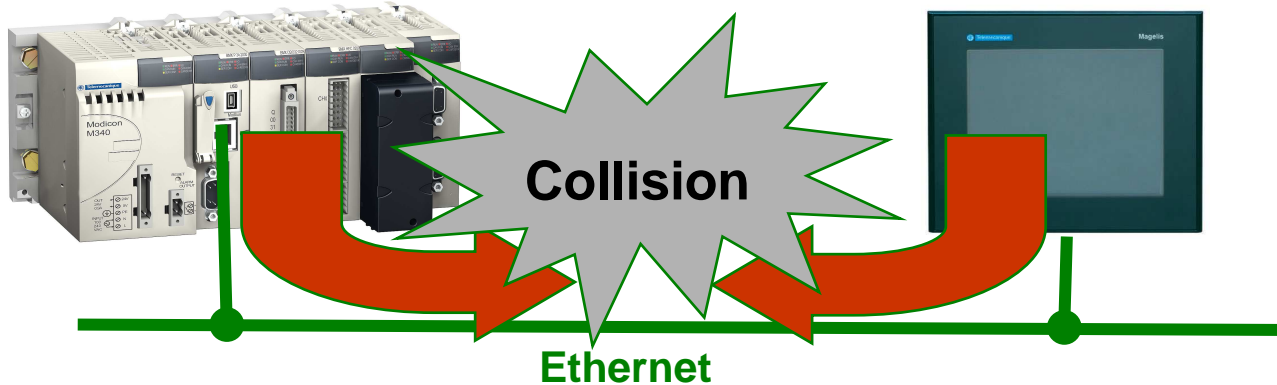
- Combines characteristics of linear bus and star topologies
- Groups of star-configured devices are connected to a linear backbone cable
- Tree topology is appropriate to expand an existing network
- Allows more devices to be attached to a single central hub
- Network isolates and prioritizes communication from different devices

Interconnection devices



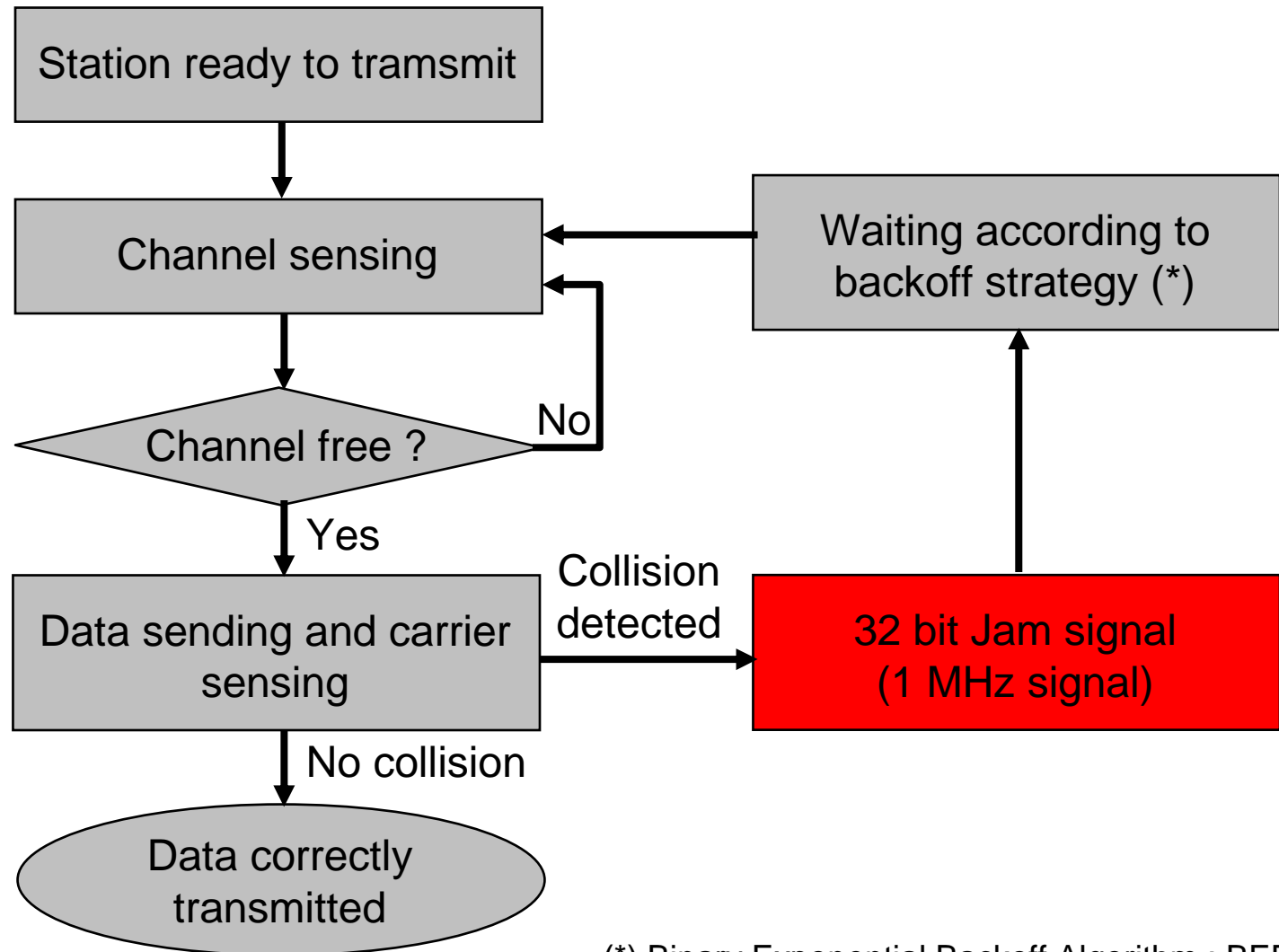
- **Gateway** to provide interconnection between 2 different networks (ie Modbus and Ethernet)
- **Router** to filter out network traffic
 - IP router **divides a network into various subnetworks**
 - **Firewall** is a router device with network security that can be configured to stop protocols, users, or type of data
- **Bridge or Switch** to create a physical segmentation
 - Provides routing of information between several physical segments
- **Repeater or Hub** to overcome signal attenuation and increase segment length (amplify and reshape the signal)

CSMA / CD access method



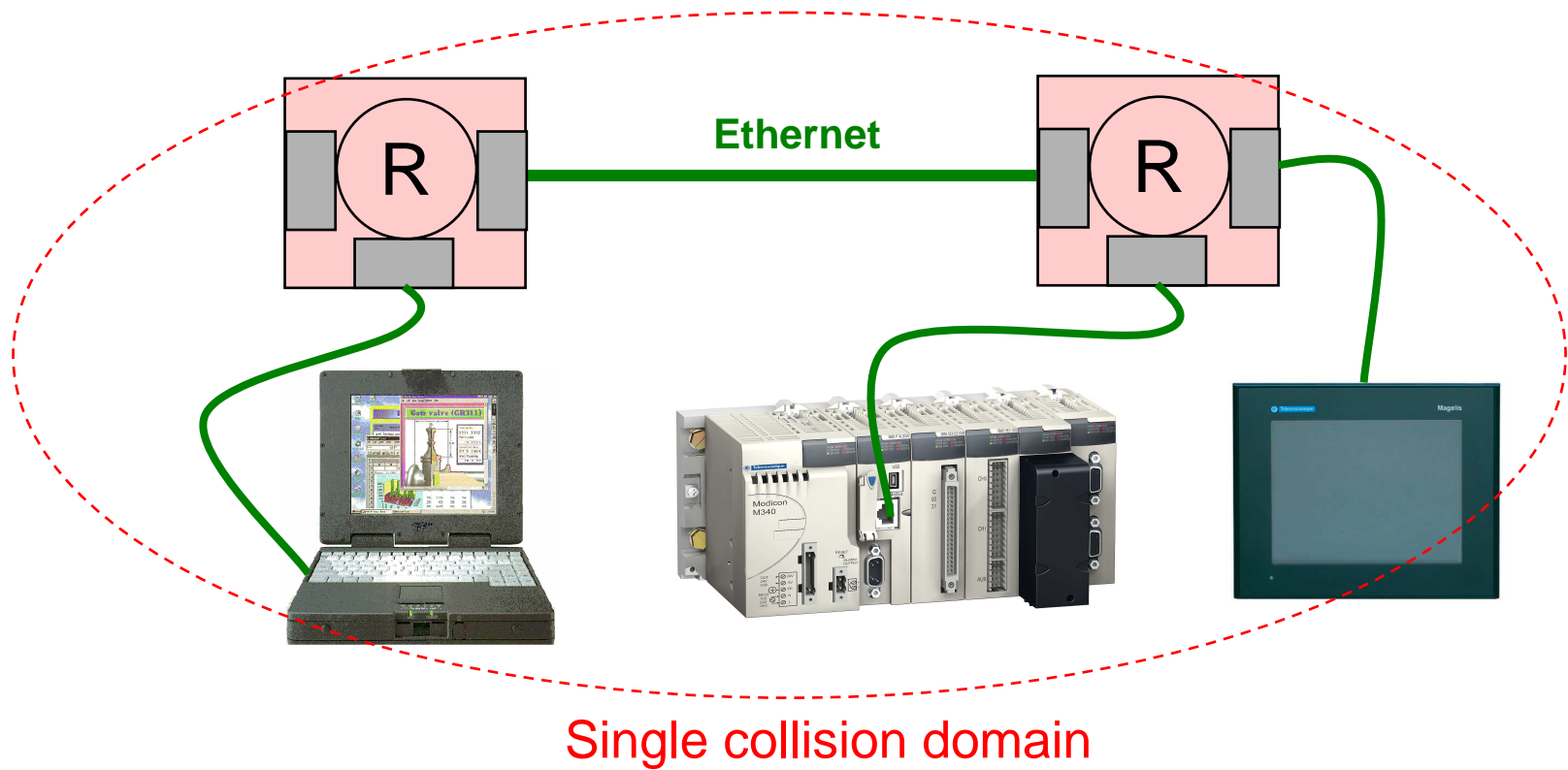
- Network access method : **CSMA / CD** (*Carrier Sense Multiple Access with Collision Detection*)
 - Before transmitting a message the device “listens” to the network
 - If the network is free the device starts to transmit then “listens” to its own message to verify that there is no collision (2 devices transmit at the same time)
 - In case of collision a jam signal is sent, the device waits for a random time then transmits again the message
- Collision signal is available in the same collision domain

CSMA / CD collision detection



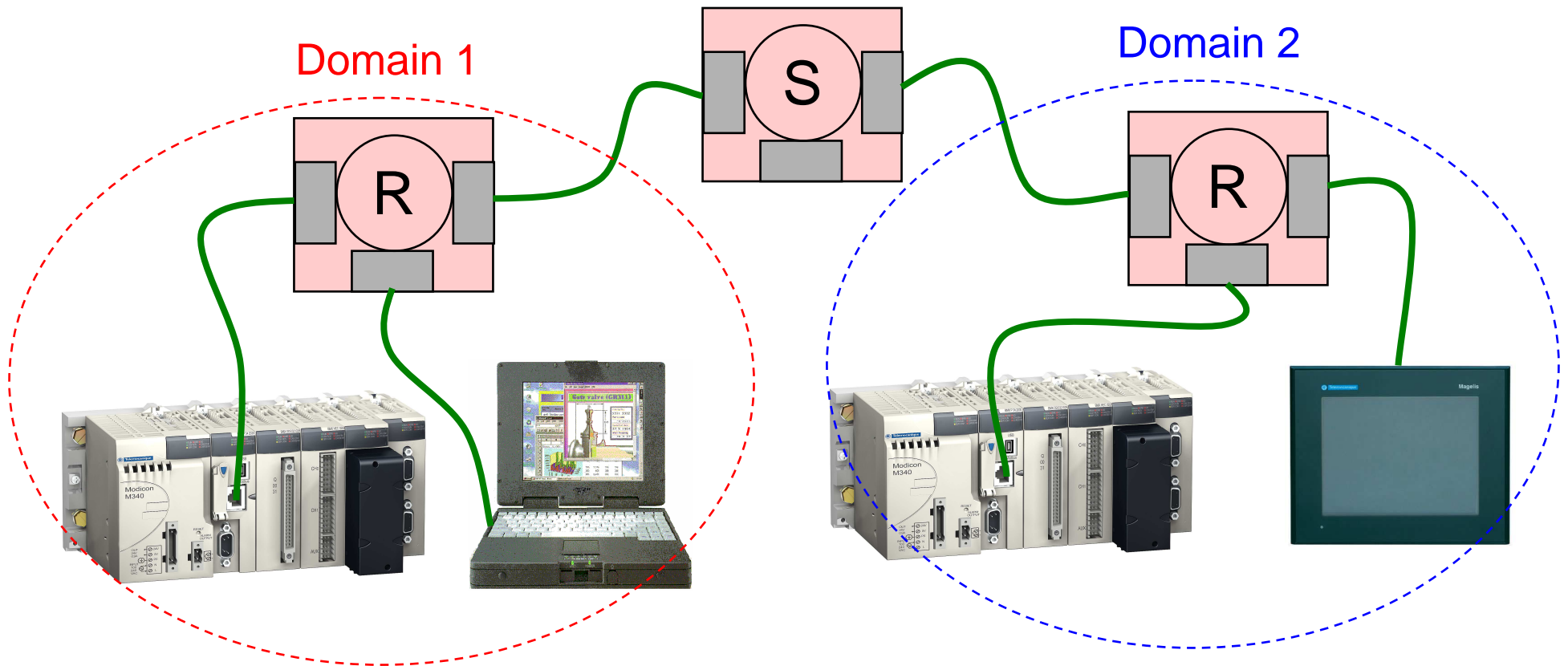
(*) Binary Exponential Backoff Algorithm : BEB

Same collision domain



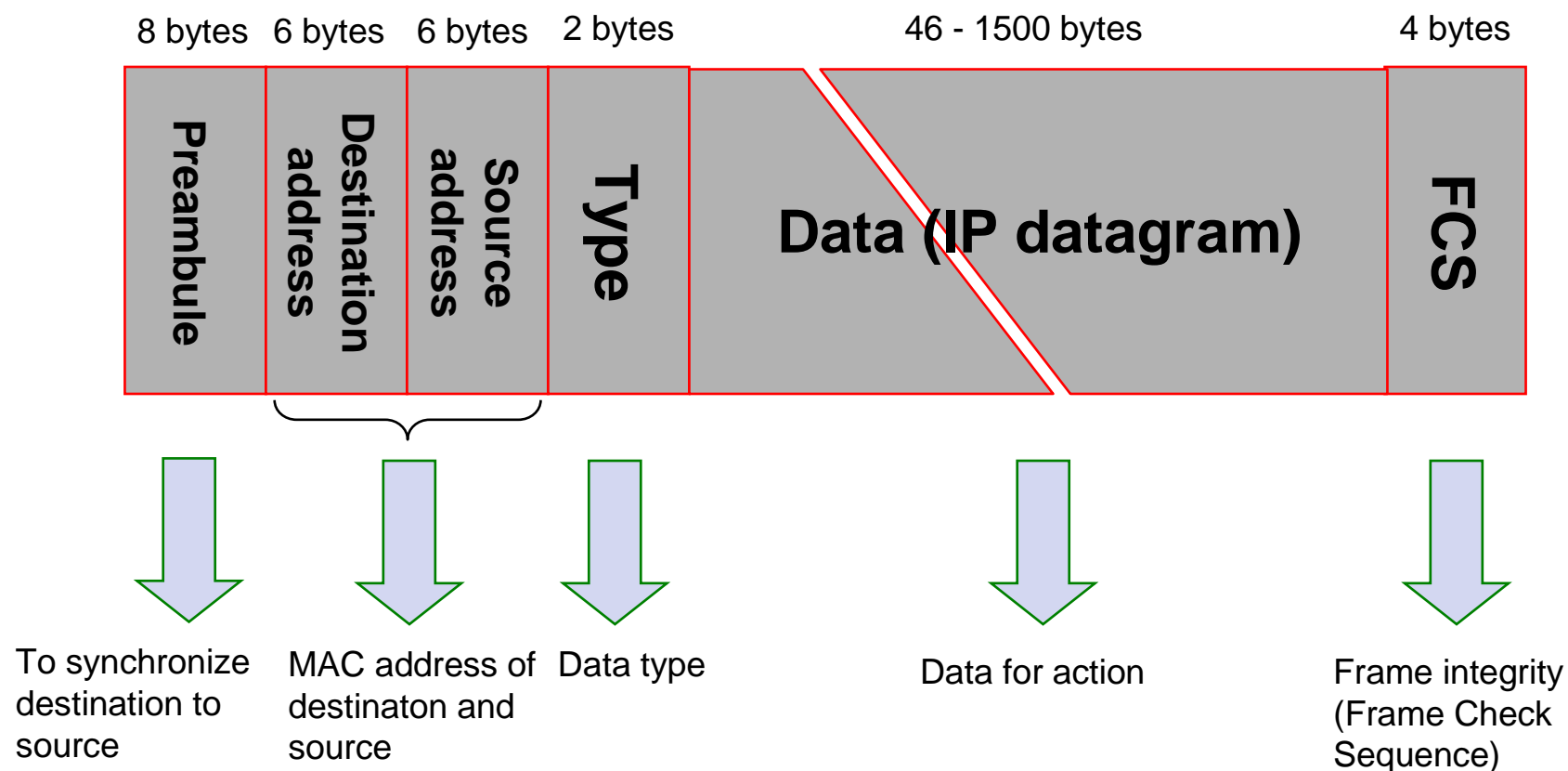
- Since repeaters (or hub) forward all the packets
- All devices are in the **same collision domain**

Separate collision domains

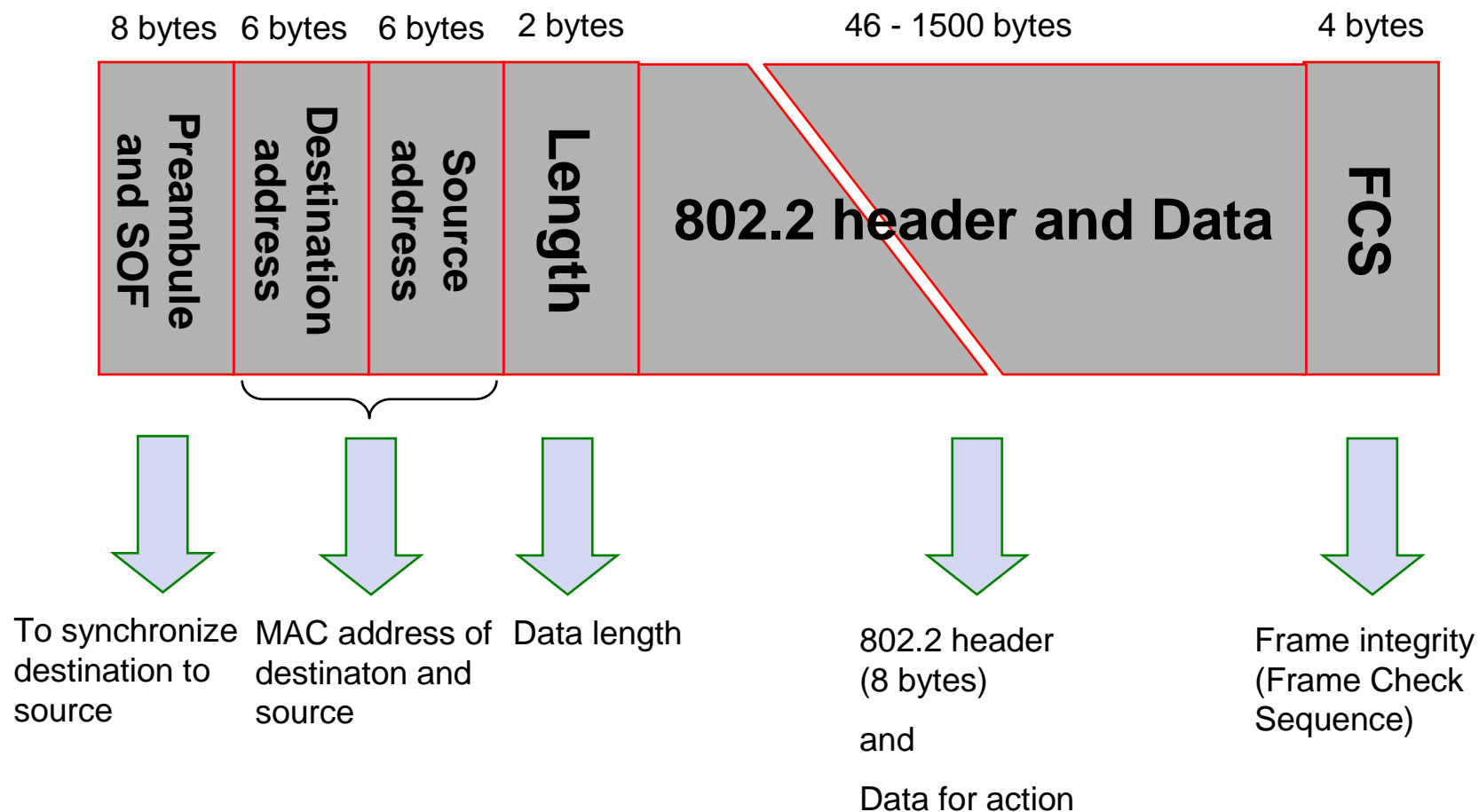


- Collision domain 1 and 2 are **separated by a switch** (or bridge or router)
- Switch receives and transmits information on separate ports
- Collision signals are not forward

Ethernet II frame



Ethernet IEEE 802.3 frame



MAC addresses

- Ethernet frame includes 2 MAC addresses

- Destination address
- Source address

- MAC address is **unique**

00	80	F4	xx	xx	xx
----	----	----	----	----	----

Manufacturer

Device number

- MAC address has 6 bytes (unicast)

- 3 first bytes are assigned to the manufacturer by IEEE (coherence and uniqueness)
 - le : 00.80.F4 for Telemecanique and 00.00.54 for Modicon
- 3 next bytes indicate the device number

00	80	F4	xx	xx	xx
----	----	----	----	----	----

Manufacturer

Group address

- Multicasting address

- First bit of 3 last bytes = 1
- Rest of bits = group address

FF	FF	FF	FF	FF	FF
----	----	----	----	----	----

- Broadcasting address : FF.FF.FF.FF.FF.FF

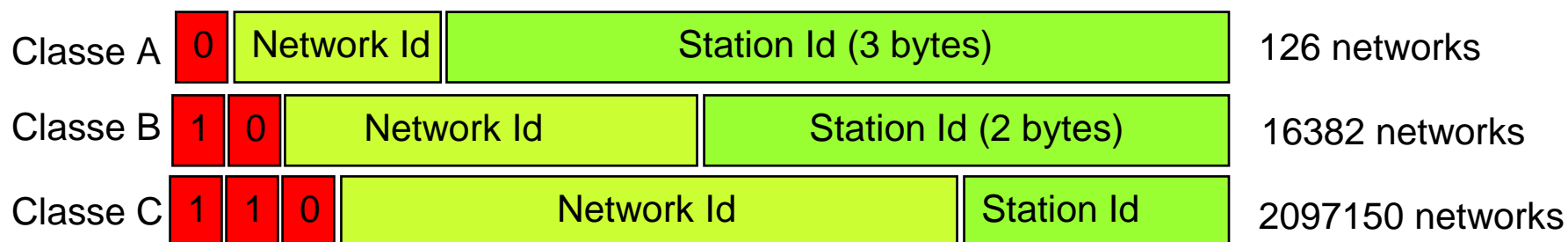
Internet Layer

IP protocol

- Manages the **packets routing**
 - Determine the next transit node depending on destination IP address
 - Direct routing if destination is on the same network
 - Indirect routing is on a different network (via a router)
- Choice of next node is depending
 - On the transmission delay
 - Flow rate
 - Security of transmission required
- Manages the **formatting of frames (datagram)**
 - Fragmentation / de-fragmentation of messages

IP address

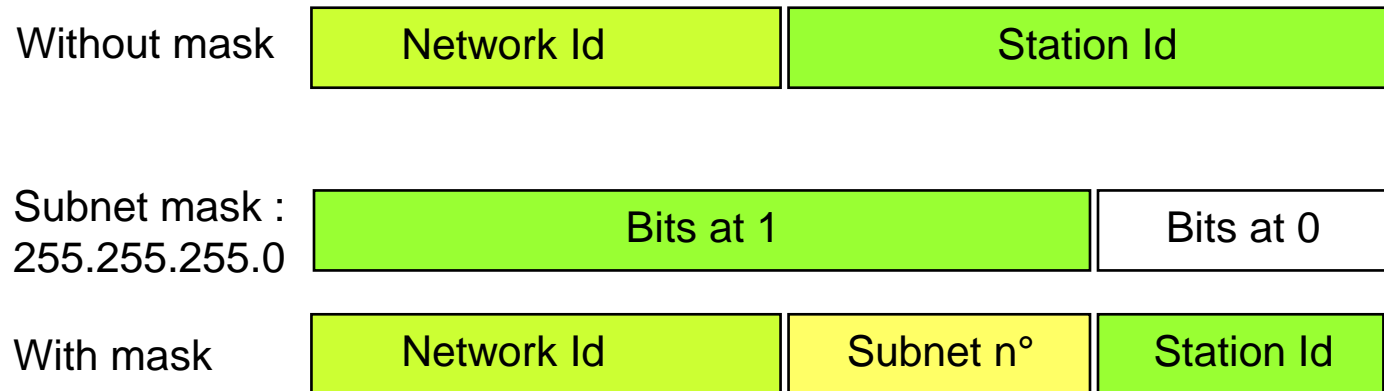
- Each device on Internet or Intranet has a **unique IP address** coded on 4 bytes, which identify the network and station addresses
- IP addresses are organized in **4 classes** : A, B, C and D
 - Classes A – C : used for normal links
 - Class D : use for multicast addresses



Class	Range	Min Submask
A	0.0.0.0 to 127.255.255.255	255.128.0.0
B	128.0.0.0 to 191.255.255.255	255.255.128.0
C	192.0.0.0 to 223.255.255.255	255.255.255.128
D	224.0.0.0 to 239.255.255.255	/

Subnetwork masking

- Allows to break down the station Id into
Subnetwork number and Station Id
- 1 IP network address for several logical sub networks



Example with subnetwork mask

- **AND operation** between Destination address and Subnetwork mask
- Result is compared with Source address
 - Equal : the destination is local (on the same network)
 - Different : the destination is for an other network. The messages are routed to the Default gateway address
- Example with mask 255.255.240.0

Network address	139.158.000.000			
Subnetwork number	000.000.048.000			
Station number	000.000.000.010			
<hr/>				
IP address	139.158.48.10	10001011.10011110	0011	0000.00001010
Subnetwork mask	255.255.240.0	11111111.11111111	1111	0000.00000000
Result		10001011.10011110.00110000.00000000		

Transport Layer

TCP protocol

- Manages opening and closing of TCP connection
 - Client / server TCP connection via a TCP port
 - TCP / IP socket feature
- Manages data (packets) segmentation
 - TCP segment
- Manages flow control
 - Packet sending
 - Acknowledgement
- Guarantee data integrity
 - Segment checksum calculation

Ports and sockets

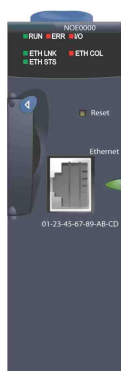
- TCP multiplexes multiple connections to a single host using **sockets and ports** (ie at same time you can open several browsers and download a FTP file)
- A port number is coded on 16 bits so a computer interface can use 65536 ports
 - Incoming packets know the IP address and the port they are destined for (destination port is a part of the TCP protocol field)
- Some famous ports
 - FTP uses port 21 (for control) and 20 (for data)
 - SMTP (Simple Mail Transfer Protocol) uses port 25
 - BootP server uses port 67
 - HTTP uses port 80
 - SNMP uses 161
 - Modbus TCP messaging uses port 502
- The combination of an IP address and a port number is a unique address named **socket**

Application Layer : Ethernet services

Ethernet services according to modules



BMX P34 2020 / 2030



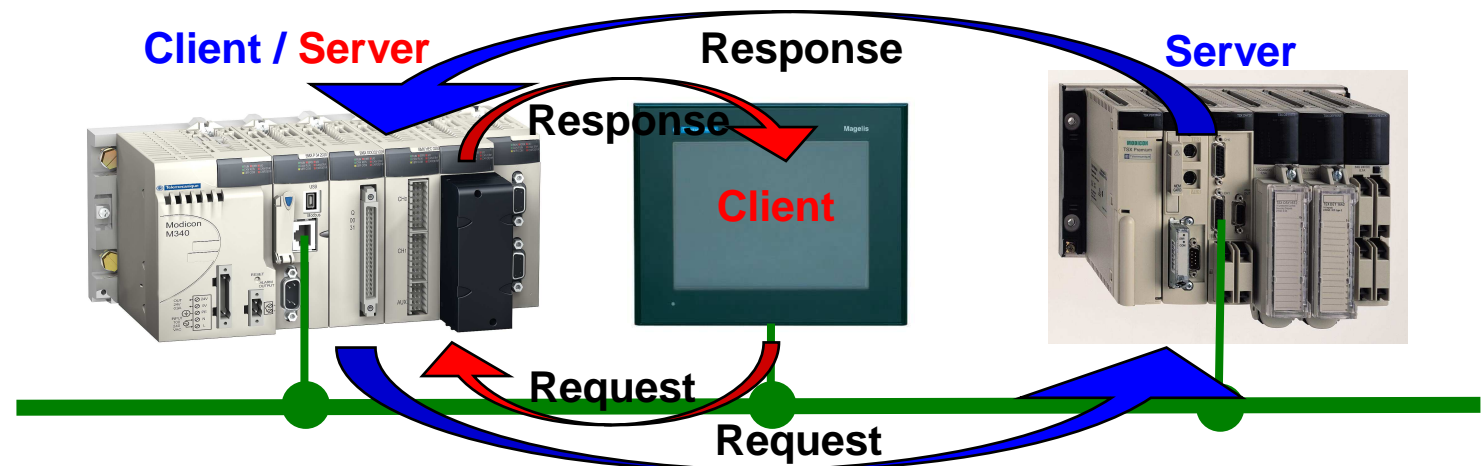
BMX NOE 0100

Service	NOE module	Processors
Modbus TCP messaging	Yes	Yes
BootP / DHCP client	Yes	Yes
DHCP server	Yes	Yes
FDR server	Yes	No
SNMP	Yes	Yes
Global data	Yes	No
I/O scanning	Yes	No
Software loading via FTP (firmware)	Yes	Yes
Embedded http server	Yes	Yes
Diagnostic from Web pages	Yes	Yes
User-customizable Web pages	Yes (*)	No

(*) with memory card installed (Class C server)

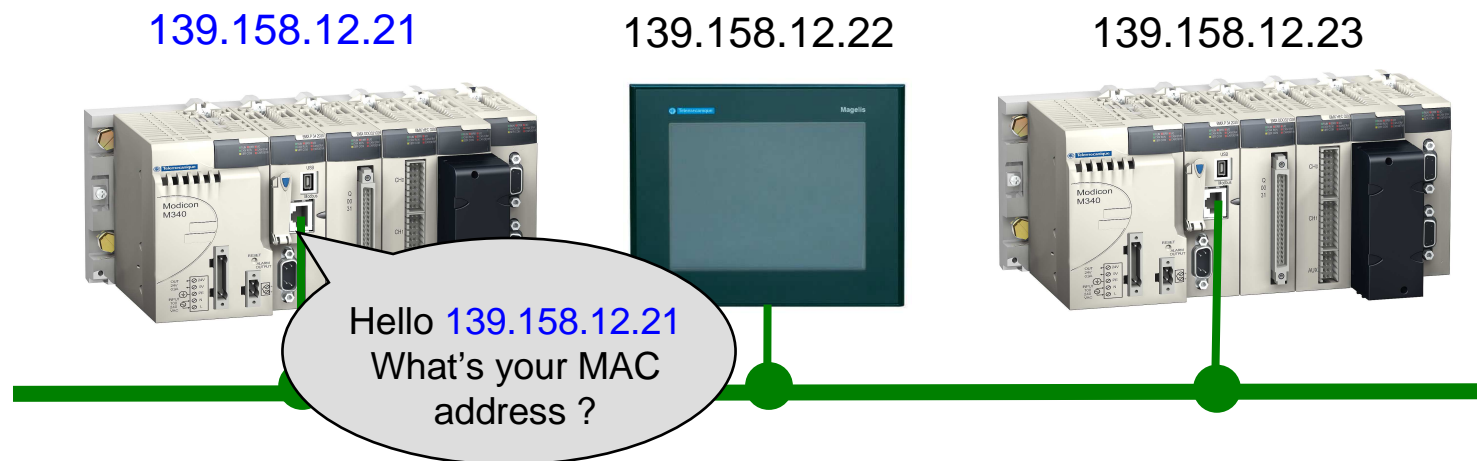
Modbus TCP messaging

- **Port 502** is reserved for Modbus TCP messaging
- Modbus messaging can be used to exchange automation data on both Ethernet TCP/IP and Internet as well as other application data (file, web pages, e-mail, ...)
- Port 502 can communicate in client mode or server mode
 - In server mode port 502 messaging can process up to 8 requests and responses (Read bits, Write words, ...) / PLC cycle
 - In client mode port 502 messaging can process up to 16 requests and responses / PLC cycle



ARP and RARP

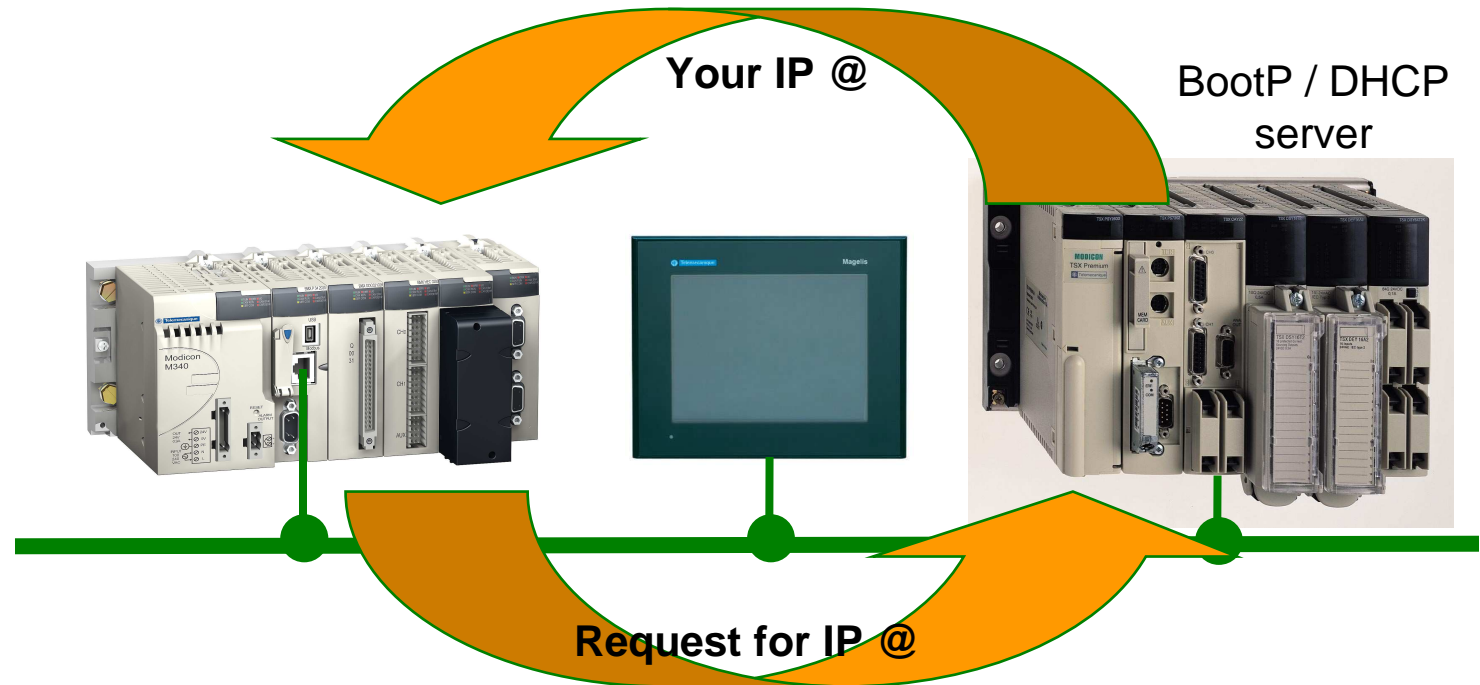
- ARP protocol is used to make correspondance between the IP addresses an the associated physical addresses (MAC address)
- The correspondance table is saved on cache memory
- When a Ethernet module is power on it broadcasts it's IP address to verify that any other module responds (the IP address is unique)



ARP : Address Resolution Protocol / RARP : Reverse Address Resolution Protocol

BootP / DHCP service

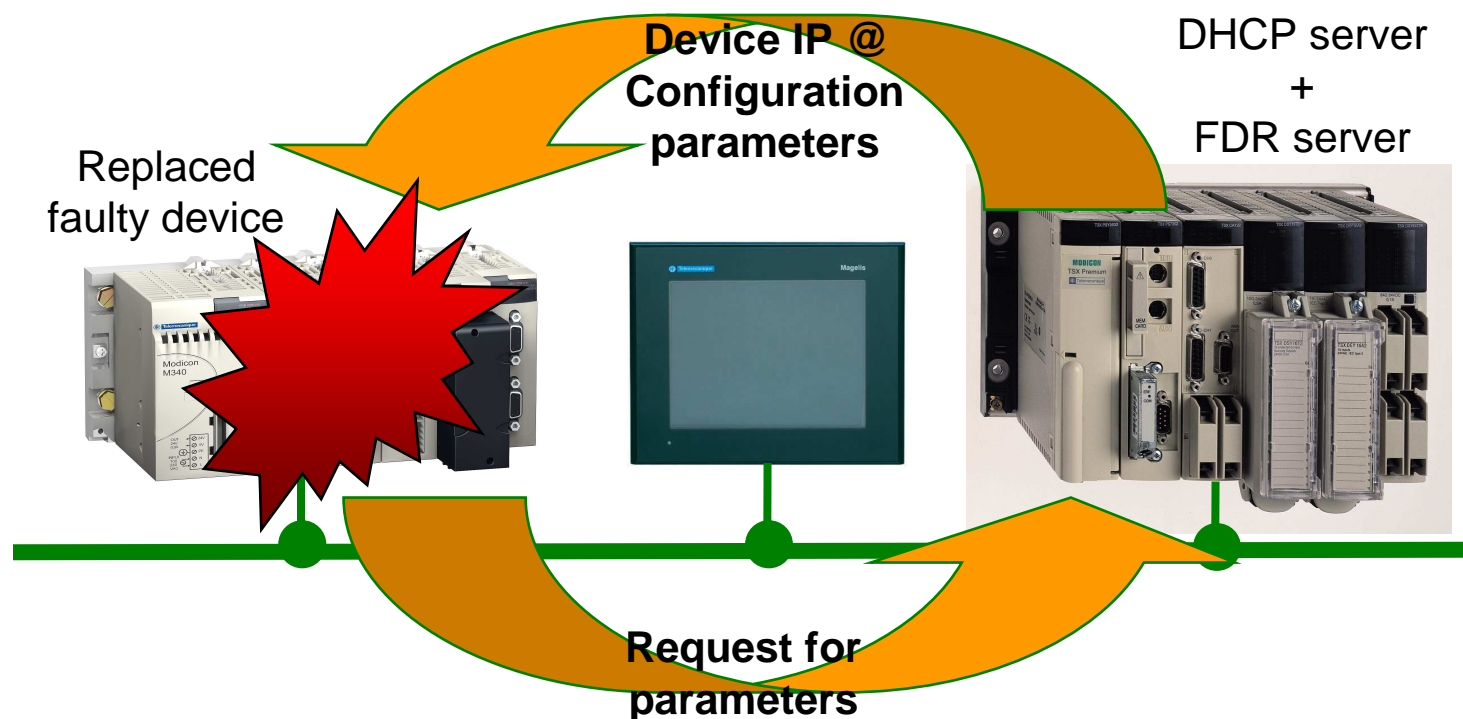
- BootP or DHCP service allows a device to get its IP address from an address server
- NOE module or Ethernet processors can be configured as a BootP client or a DHCP server.
- DHCP server also responds to a BootP request



BootP : Bootstrap Protocol / DHCP : Dynamic Host Configuration Protocol

Faulty Device Replacement service

- FDR service gives IP address and configuration parameters to a remote device
- DHCP server gives IP address from the name given to the station (Device name). FTP/TFTP server saves then recovers configuration parameters to the station
- NOE module is a FDR server

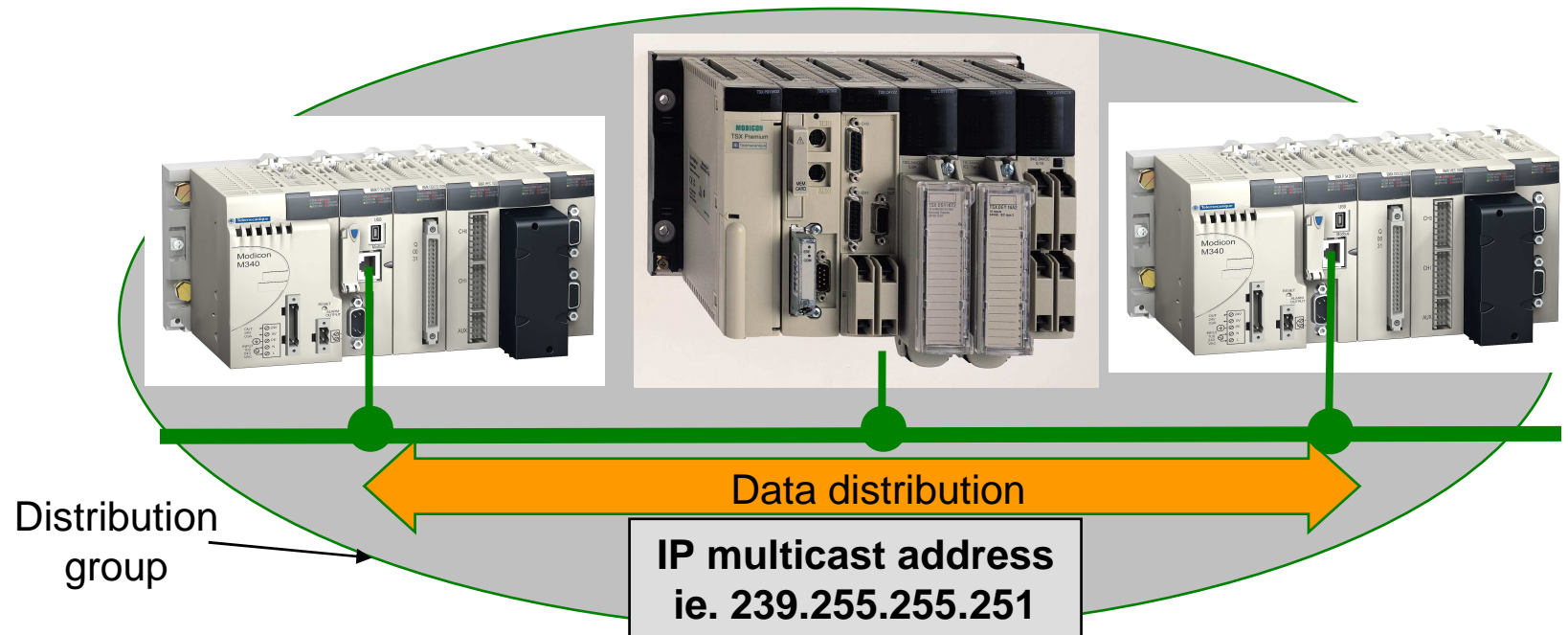


Simple Network Management Protocol

- SNMP protocol allows network administrators to monitor and control all Ethernet architecture components, ensuring rapid diagnostic if a problem occurs
 - Servers, workstations, routers, switches, ...
- Management system comprise managers and agents
 - **Manager** send requests to agents to supervise a part or the entire network (*Get_Request*, *Get_Next_Request*, *Set_Request*)
 - **Agents** : each supervised device has one or more software modules named agent that transmit to the manager information on the device (hardware information, configuration parameters, statistics, ...)
- Network management protocol uses UDP transport layer
- Each agent contains a **MIB database** (Management Information Base) which collect all objects exchanged
 - Network manager can read or write information on the MIB
 - 2 levels of MIB : standard MIB II or Schneider private MIB

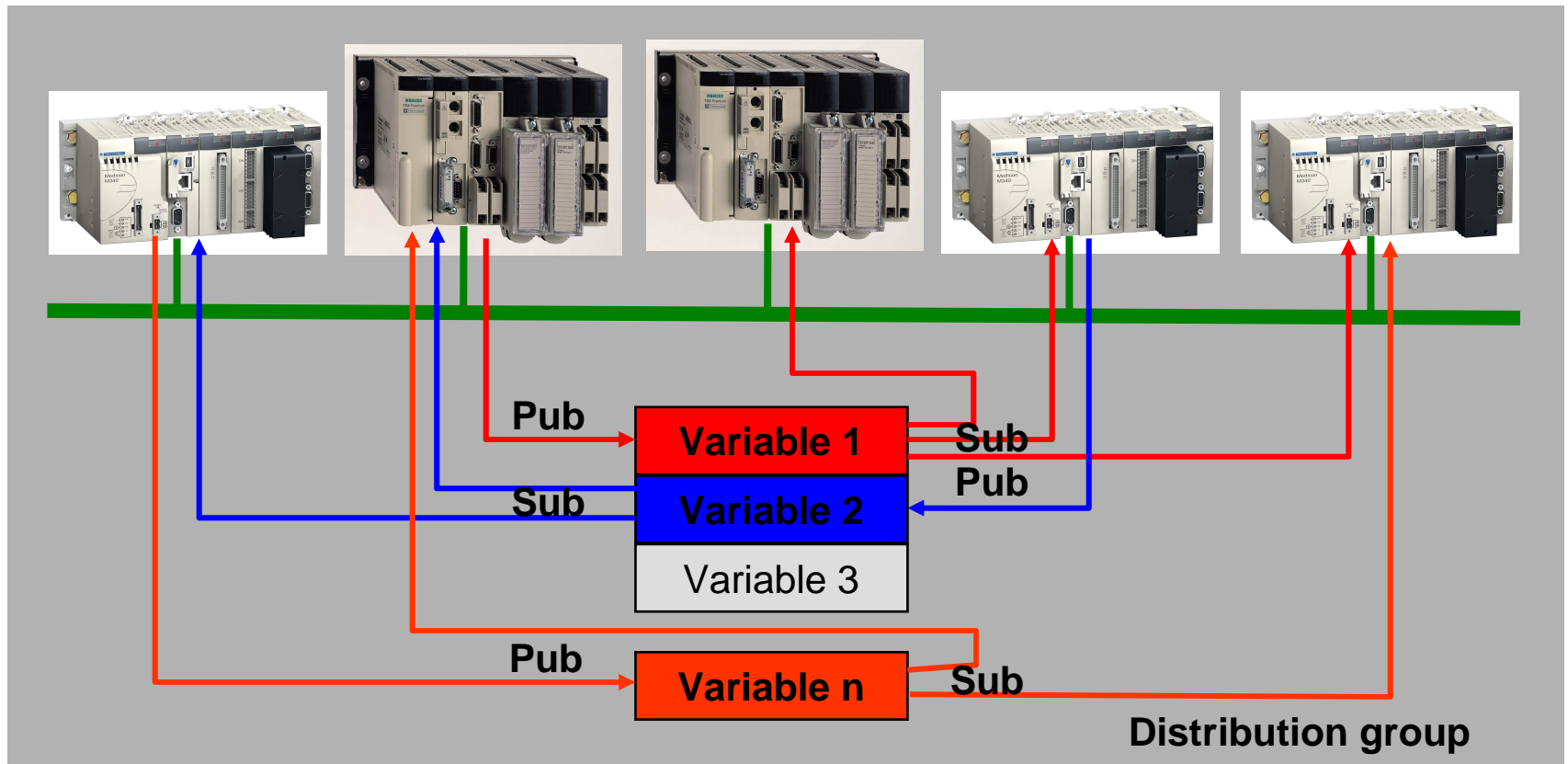
Global data service

- Automatic and real time exchanges between stations
 - Data are exchange in a same **distribution group**
 - To synchronize remote applications or share variables
- 64 stations can exchange data inside a group
 - Using standard producer / consumer mechanisms to optimize performance and maintain a minimum network load



Global data characteristics

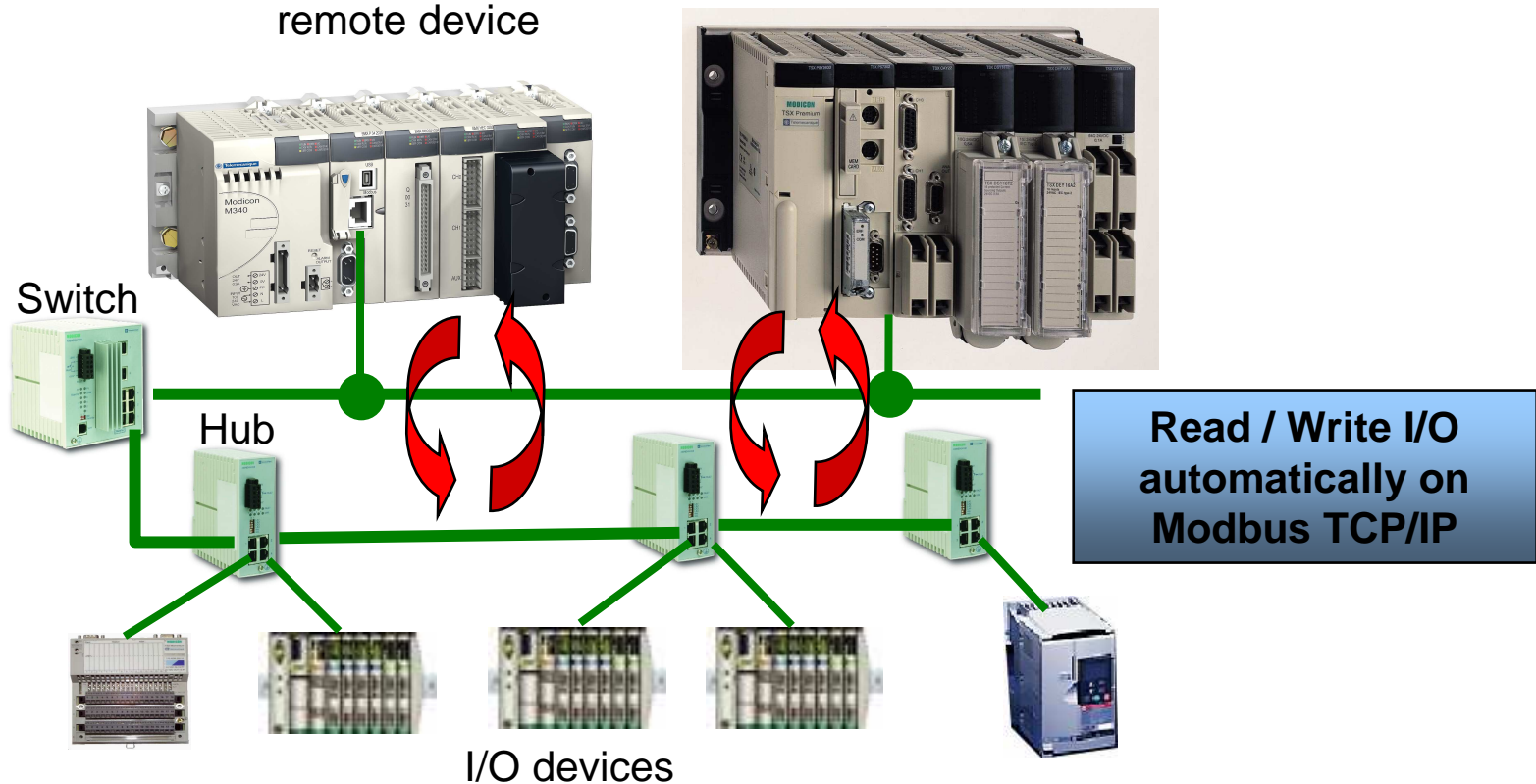
- Each station can **publish 1 variable** (up to 1024 bytes) and **subscribe from 1 to 64 variables**. A **Health** bit (status bit) indicates the validity of each subscription
- **Publish / subscribe protocol on UDP/IP** is used for data distribution



I/O scanning service

- Automatic and periodic read/write of remote Inputs/Outputs without programming

- Read zone groups the values of remote inputs
- Write zone groups the values of remote outputs
- Scanning period is independant of PLC cycle and specific to each remote device

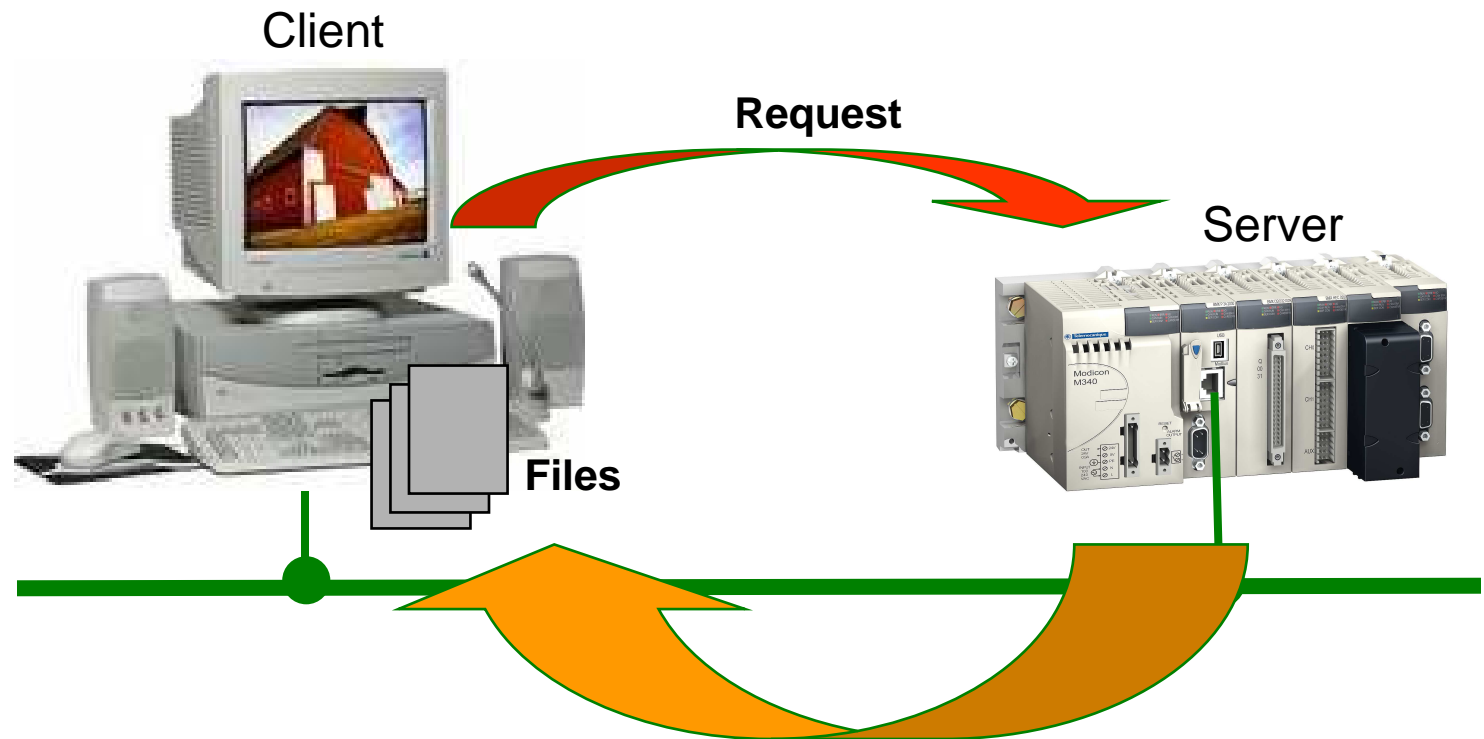


I/O scanning characteristics

- Scanning is performed only when PLC is in Run mode
- Manages TCP/IP connections with each remote device (one connection per scanned device)
- Scans inputs/outputs of the device using Modbus read/write requests on the TCP/IP profile
- Update the read and write zone in the application memory
- Refreshes the status bits for each remote device
- Applies preconfigured fallback values on a communication default

File loading via **FTP** protocol

- Protocol that enables exchange of files between 2 devices
- FTP works on a client / server principle



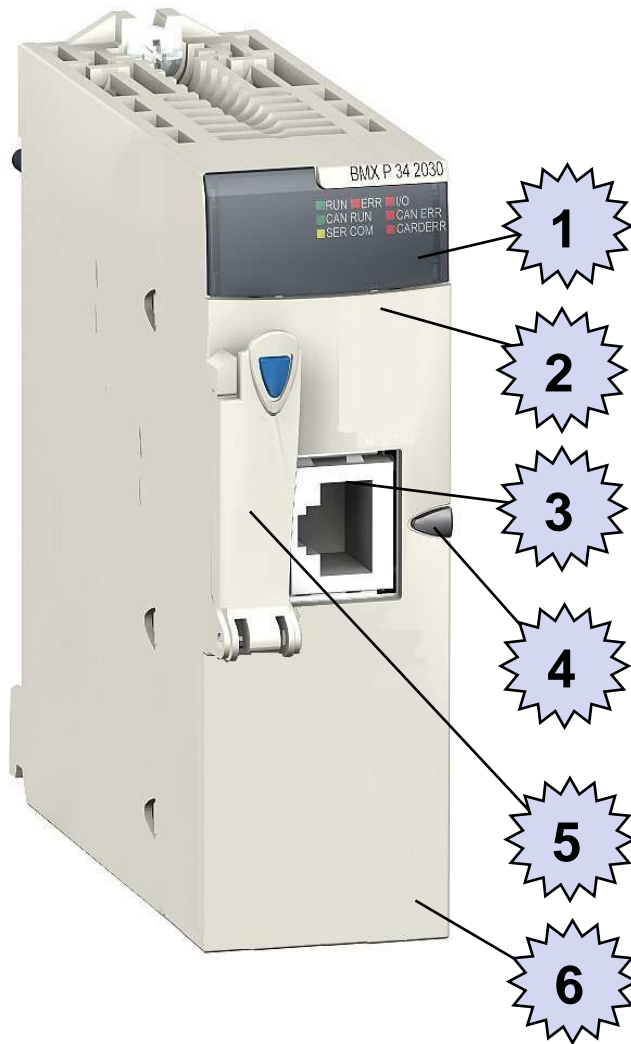
Hardware implementation

Processors with an integrated Ethernet port



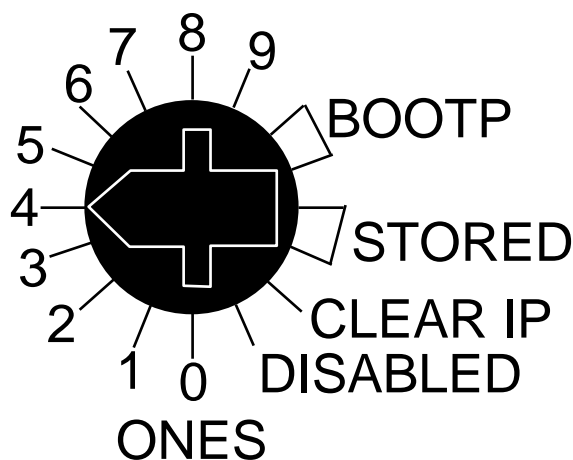
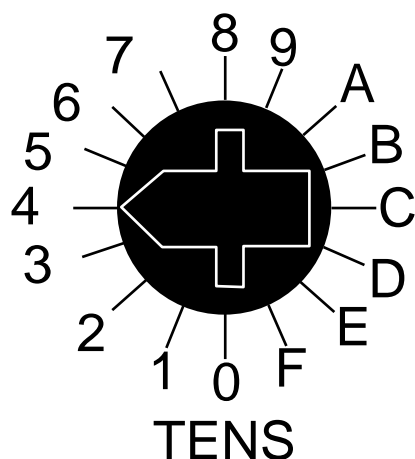
- Modules **BMX P34 2020 / 2030**
- Display panel (1)
- MAC address (2)
- Ethernet port (3)
- Green color location ring (4)
- SD memory card slot (5)
 - Store Schneider Web pages (Class B server)
- Rotary switches (on the back of the module)

Module NOE



- Modules **BMX NOE 0100**
- Display panel (1)
- MAC address (2)
- Ethernet port (3)
- Green color location ring (4)
- SD memory card slot (5)
 - Store Web pages (Schneider and user) and log files (FDR server)
 - Class B server by default (*BMX RWS B008M*)
 - Class C server with *BMX RWS C016M* memory card
- Reset button (6)
- Rotary switches (on the back of the module)

Rotary switches



- 2 rotary switches used to **set IP address** of device
- **CLEAR IP**
 - Device uses **default IP address** based on MAC address (4 last bytes in hexadecimal values are converted in decimal)
 - Example : MAC address 00.00.**54.10.2D.12** gives the derived IP address **84.16.45.18**
- **BOOTP**
 - Device gets an IP address from a BootP server
- **STORED**
 - Device uses application's configured IP address
 - If IP address not configured module use default IP address
- **Device name**
 - **TENS** (xx = 0 to 15) and **ONES** (y = 0 to 9) digits
 - Uses to define the default device name of the module to obtain IP address from a **DHCP server**
 - BMX_2020_xxy / BMX_2030_xxy / BMX_0100_xxy
- **DISABLED**
 - Port will not respond to communication

Visual diagnostic of communication line



- Colors and flashing patterns of the LEDs indicate the status and operating condition of the communication line

Label	Color	Pattern	Meaning
ETH LNK	Green Flashing	ON Flashing	Link detected Communication activity
ETH COL	Red	ON	Collision detected
ETH STS	Green	ON 2 flashes 3 flashes 4 flashes 5 flashes 6 flashes 7 flashes	Communication OK Invalid MAC address Link not connected Duplicate IP address Waiting for a served IP address Safe mode – default IP Configuration conflict

Software operating modes

Principle to configure an Ethernet network

■ Create the logical network (1)

- Add a new network
- Choose Ethernet and define the name of the logical network

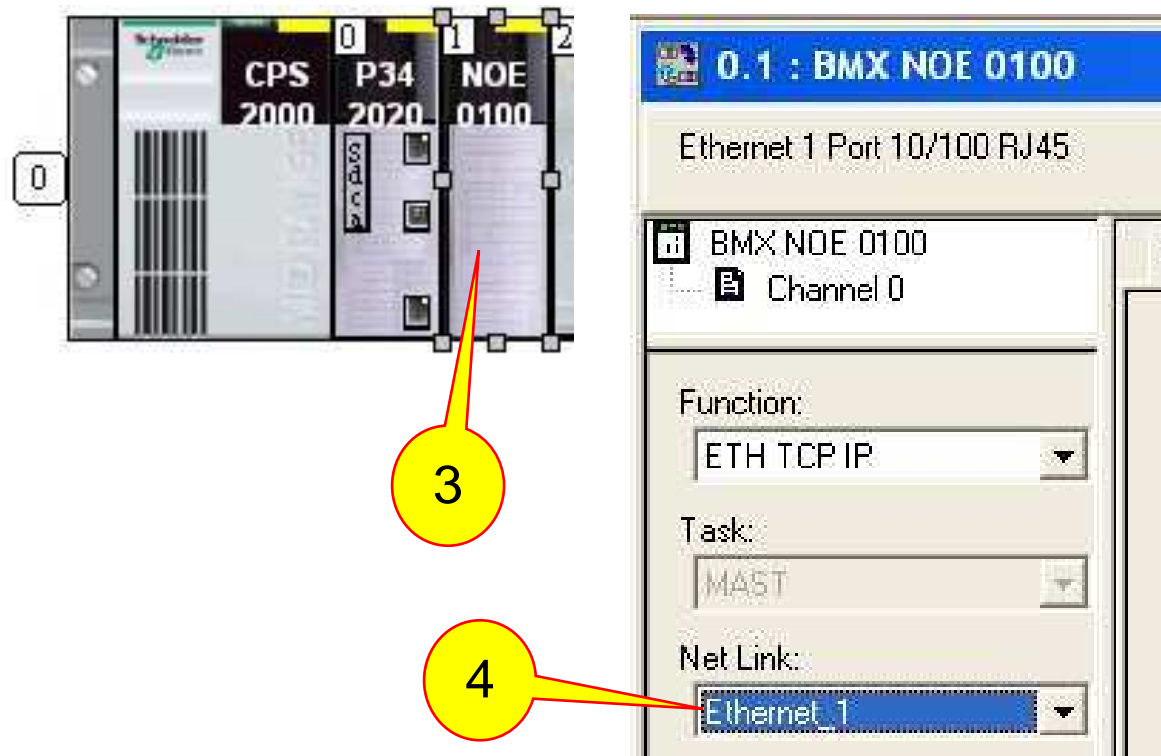
■ Configure the logical network (2)

- From the application browser open logical network (ie Ethernet_1)
- Configure the network : messaging, global data, ...(see following slides)

The image shows two overlapping software windows. The background window is titled 'Add Network' and has a 'List of available Networks:' dropdown menu with 'Ethernet' selected. A yellow callout with the number '1' points to this dropdown. The foreground window is titled 'Ethernet_1' and shows configuration fields. A yellow callout with the number '2' points to the 'Module IP Address' section, which includes 'IP Address', 'Subnetwork Mask', and 'Gateway Address' fields, all set to '0.0.0.0'. Other fields include 'Model Family' (set to 'NOE 0100'), 'Module Address' (Rack, Module, Channel), and a 'Module' list on the right. At the bottom, there are tabs for 'IP Configuration', 'Messaging', 'IO Scanning', 'Global Data', 'SNMP', 'Address Server', and 'Bandwidth'.

Principle to configure an Ethernet network (cont)

- Define the communication module (3)
 - Processor or NOE module
- Associate the logical network to the communication module (4)



Configuration of IP parameters

The screenshot shows the 'IP Configuration' tab of a web interface. It features a rotary switch for 'IP address configuration' set to 'Configured', fields for IP address (139.158.12.11), Subnetwork mask (255.255.0.0), and Gateway address (0.0.0.0). Below this is another rotary switch for 'From a server' set to 'From a server', with a 'Device Name' field. At the bottom, the 'Ethernet configuration' section has a rotary switch set to 'Ethernet II' and a radio button for '802.3'.

Ethernet parameters are configured

Ethernet parameters are allocated by a server

Ethernet frame format

Position rotary switch to STORED (*)

Position rotary switches to BOOTP or use device name

Configuration of TCP/IP messaging

Remote devices which can access to port 502 of the module

Enable access control to the module

IP Configuration | **Messaging** | IO Scanning | Global Data | SNMP

Bridging

☐ Bridge ☐ Slot

Connection configuration

	Access	IP address
1	<input checked="" type="checkbox"/>	139.158.12.21
2	<input checked="" type="checkbox"/>	139.158.12.22
3	<input checked="" type="checkbox"/>	
4	<input checked="" type="checkbox"/>	
5	<input checked="" type="checkbox"/>	
6	<input checked="" type="checkbox"/>	

Access Control ☒

Configuration of I/O scanning

Enable IO scanning

Module Address: Slot, Module, Channel

Module Utilities:

- IO Scanning: YES
- Global Data: NO
- Address Server: NO

Module IP Address:

IP Address: 0.0.0.0 Subnetwork Mask: 0.0.0.0 Gateway Address: 0.0.0.0

IP Configuration | Messaging | **IO Scanning** | Global Data | SNMP | Address Server | Bandwidth

MW zones: From 10 to 24 Write Ref. From 300 to 314

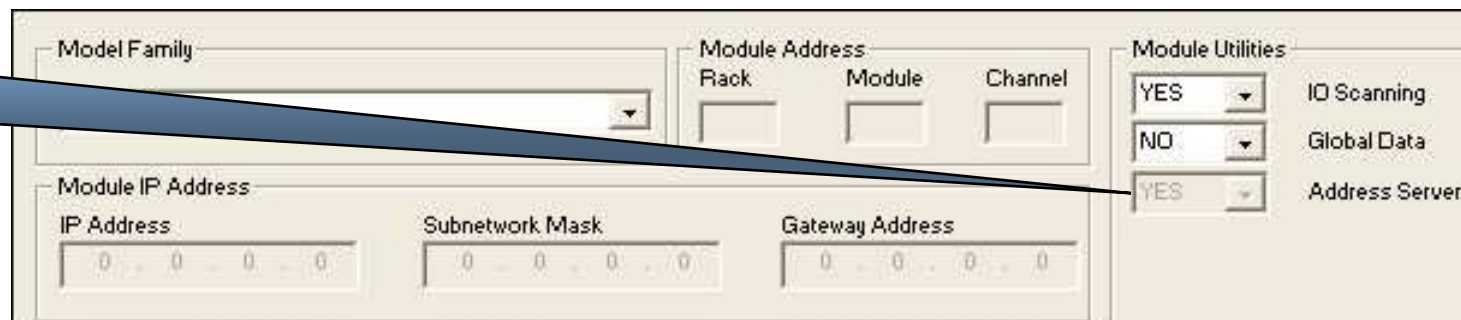
peripherals

	IP address	Unit ID	Health Timeout (ms)	Repetitive rate (ms)	RD Master Object	RD Slave Index	RD length	Last value (Input)
1	139.158.12.31	255	1500	60	%MW10	0	10	Hold last
2	192.158.12.32	255	1500	60	%MW20	0	5	Hold last
3								
4								
5								
6								
7								

List of scanned devices

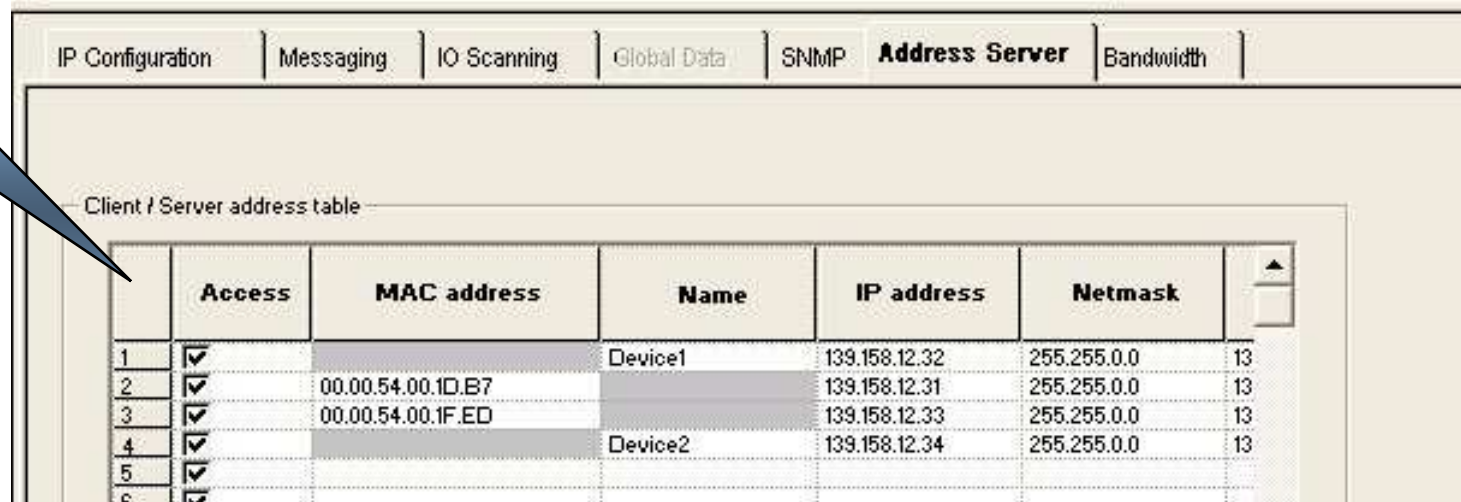
Configuration of address server

Enable
address server
BooP / DHCP



Model Family: [dropdown]
Module Address: Rack [input] Module [input] Channel [input]
Module IP Address: IP Address [0 . 0 . 0 . 0] Subnetwork Mask [0 . 0 . 0 . 0] Gateway Address [0 . 0 . 0 . 0]
Module Utilities: YES [dropdown] IO Scanning
NO [dropdown] Global Data
YES [dropdown] Address Server

IP parameters
of served
devices



IP Configuration | Messaging | IO Scanning | Global Data | SNMP | **Address Server** | Bandwidth

Client / Server address table

	Access	MAC address	Name	IP address	Netmask	
1	✓		Device1	139.158.12.32	255.255.0.0	13
2	✓	00.00.54.00.1D.B7		139.158.12.31	255.255.0.0	13
3	✓	00.00.54.00.1F.ED		139.158.12.33	255.255.0.0	13
4	✓		Device2	139.158.12.34	255.255.0.0	13
5	✓					
6	✓					

Configuration of SNMP agent

IP address of managers

Agent information

The screenshot shows a web-based configuration interface for an SNMP agent. At the top, there is a navigation bar with tabs: IP Configuration, Messaging, IO Scanning, Global Data, **SNMP**, Address Server, and Bandwidth. The main content area is divided into several sections. The 'IP address managers' section contains two IP address manager fields, both set to 0.0.0.0. The 'Agent' section contains fields for 'Location (SysLocation)' and 'Contact (SysContact)', both set to 'MyLocation' and 'MyContact' respectively. There is a checkbox for 'SNMP manager' which is unchecked. The 'Community names' section contains three fields: 'Set' (public), 'Get' (public), and 'Trap' (public). The 'Security' section contains a checkbox for 'Enable "Authentication Failure" trap' which is unchecked. Two blue callout boxes are present on the left: one pointing to the IP address manager fields labeled 'IP address of managers', and another pointing to the Agent section fields labeled 'Agent information'.

Tab	IP Configuration	Messaging	IO Scanning	Global Data	SNMP	Address Server	Bandwidth
IP address managers							
IP address manager 1		0 . 0 . 0 . 0		IP address manager 2		0 . 0 . 0 . 0	
Agent							
Location (SysLocation)		MyLocation				<input type="checkbox"/> SNMP manager	
Contact (SysContact)		MyContact					
Community names				Security			
Set		public		<input type="checkbox"/> Enable "Authentication Failure" trap			
Get		public					
Trap		public					

Configuration of Global data

Model Family: NOE 0100

Module Address: Rack, Module, Channel

Module Utilities: YES (IO Scanning), YES (Global Data), YES (Address Server)

Module IP Address: IP Address (0.0.0.0), Subnetwork Mask (0.0.0.0), Gateway Address (0.0.0.0)

Global data configuration:

- Health time out: 200 ms
- Distribution period: 1 *10ms
- Multicast filtering: ☐
- Group address: 239.255.255.255
- Group name: Group_1

Enable Global data

IP address of distribution group

Bandwidth checking

The screenshot shows the 'Ethernet_1' configuration window. At the top, there are fields for 'Model Family' (CPU 2020, CPU 2030), 'Module Address' (Rack: 0, Module: 0, Channel: 3), and 'Module Utilities'. Below these are 'Module IP Address' fields: 'IP Address' (139.158.12.21), 'Subnetwork Mask' (255.255.0.0), and 'Gateway Address' (139.158.12.100). The 'Bandwidth' tab is selected, showing 'Global Data information' with 'Estimated Global Data publication inside the group (per second)' set to 0, and 'Messaging information' with 'Estimated Modbus/TCP messages received (per second)' set to 100. A 'Bandwidth estimation' bar chart shows a red segment (IO scanning) and a green segment (Unused). Below the chart, a legend shows: IO scanning (yellow, 0), Global data (blue, 0), Messaging (red, 100), and Unused (green, 400). On the right, the 'Ethernet environment' section shows 'Potential CPU Load' with a slider and 'Isolated'/'Mastered' checkboxes. Three callout boxes provide instructions: 'Define number of transactions per second' points to the 'Messaging' tab; 'Define number of publications per second' points to the 'Estimated Global Data publication' field; and 'Theoretical estimation of bandwidth' points to the 'Bandwidth estimation' bar chart. A fourth callout box, 'Adjust the Ethernet port capacity', points to the 'Potential CPU Load' slider.

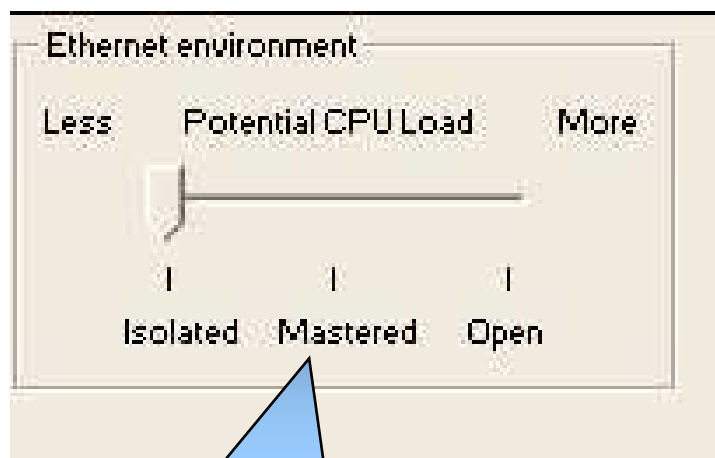
Define number of transactions per second

Define number of publications per second

Theoretical estimation of bandwidth

Adjust the Ethernet port capacity

Ethernet port capacity



Adjust the Ethernet port capacity of the processor (Isolated by default)

- Performance of Ethernet communication is depending of the number of exchanges
 - Application (messaging Modbus TCP/IP, I/O scanning, Global data, HTTP or FTP requests)
 - Unexpected exchanges
- **NOE module can manage 2000 messages/s** (incoming + outgoing) but the embedded port of a processor can manage only 500 messages/s with a CPU load lower than 50%
- Depending of your Ethernet environment you can adjust the port capacity of the processor to exchange more than 500 messages/s
 - Isolated network : if the number of messages is lower than 700 per second the CPU load for Ethernet never exceed 50%
 - Mastered network : CPU can absorb 1400 messages per second, but Ethernet can use until 80% of CPU ressources
 - Open network : CPU can absorb 2100 messages per second, but Ethernet can use 95% of CPU ressources
- If the network is disturbed or the number of messages greater than 500 per second, **it's recommended to use a BMX NOE module**

Module debugging

The screenshot shows the '0.0 : Ethernet' configuration window. On the left, a tree view shows 'Ethernet' and 'Channel 3'. The main area has tabs for 'Config', 'Debug', and 'Fault'. The 'Debug' tab is active, showing 'Address information' (MAC: 00.80.F4.01.FE.21, IP: 139.158.12.21, Subnet: 255.255.0.0, Gateway: 139.158.12.100), 'Messages' (Open connections, Non-authorized, Messages refused, Messages received, Messages sent), and 'Message traffic (msg./sec)' (700). The bottom right shows 'IO Scanning' and 'Global data' tables. Callouts on the left point to these sections: 'Module zone' (top left), 'Channel zone' (tree view), 'Address information' (top right), 'Messages statistics' (middle right), 'Messages traffic' (bottom right), 'IO scanning' (bottom right), and 'Global data' (bottom right).

Module zone

Channel zone

Address information

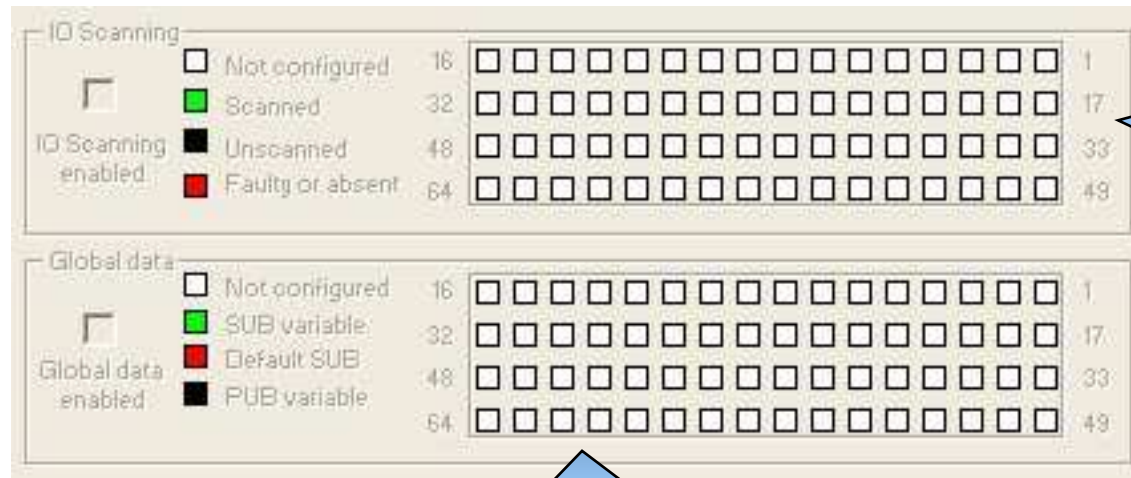
Messages statistics

Messages traffic

IO scanning

Global data

Debugging IO scanning and global data



If IO scanning function is activated display the status of each configured device : scanned, faulty or absent (1)

If Global data function is activated display the status of the global data variables : SUB (2) or PUB

- (1) No Modbus request is sent to the device when Not configured or Unscanned
- (2) Default SUB when the subscribed variable is not received in the health timeout limit

Embedded Web server

Web services

- **Standard Web services** are available on Ethernet processors and NOE communication module
 - Rack display
 - Data editor
 - Ethernet diagnostic pages (Global data, messaging, ...)
 - Statistic page

- **User Web pages** and user files are available on NOE module equipped with a *BMX RWS C016M* memory card (Class C server)

- By default communication NOE module is equipped with a *BMX RWS B008M* memory card that can save user files (Class B server for FDR service)

Web server : home page



Access to Setup, monitoring or diagnostic pages :

Username : USER (in caps)

Password : USER (in caps)

Setup : Security page



The screenshot displays the web interface for the BMX NOE 0100 B device. The left sidebar contains a tree view with 'Setup' and 'Security' options. The main content area shows the 'SECURITY' page with two sections: 'HTTP access rights' and 'Data Editor Write Password'. Each section has input fields for 'Username', 'New password', and 'Confirm password', followed by a 'Change' button. A large yellow arrow points from the 'Security' link in the sidebar to the 'HTTP access rights' section. A blue callout box contains the following text:

Change the passwords
HTTP access rights controls the Web site access
Data editor write password used to save a table in the data editor

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Monitoring : data editor pages

The screenshot displays the BMX NOE 0100 B monitoring interface. The top navigation bar includes 'Home' and 'Documentation'. The left sidebar shows the 'Monitoring' menu with 'Data Editor' selected, and sub-options 'Lite' and 'Standard'. A yellow arrow points from 'Standard' to the main content area. The main content area shows the 'DATA EDITOR' window with a table of variables. The table has columns: Symbol, Address, Data type, Value, Format, and Status. The table is currently empty. A blue callout box contains the text: 'Create a table of variables to display / modify their values (Standard)' and 'Visualize data from a table (Lite)'. The bottom of the interface shows the 'FactoryCast™' logo and copyright information: 'Copyright © 1998-2006, Schneider Automation SAS. All rights reserved.'

Create a table of variables to display / modify their values (Standard)
Visualize data from a table (Lite)

Data editor : create a table

The screenshot shows the Telemecanique BMX NOE 0100 B Data Editor interface. The main window has a menu bar (Home, Documentation, URI), a toolbar, and a sidebar with 'Monitoring' and 'Data Editor' (Lite, Standard). The 'DATA EDITOR' window displays a table with columns: Symbol, Address, Data type, Value, Format, and Status. A yellow arrow points to the 'Empty' table entry. A 'New table' dialog box is open, showing 'Name' as 'Table1' and 'Type' as 'FactoryCast'. The dialog has 'OK' and 'Cancel' buttons. A blue callout box on the right contains a 5-step instruction list.

DATA EDITOR

Rate: 200 IP address: 139.158.12.21

Symbol	Address	Data type	Value	Format	Status
Empty					

New table

Name: Table1

Type: FactoryCast

OK Cancel

Stopped

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1 – Select table Empty in the list
2 – Click on New object icon
3 – Enter name of the table
4 – Define the scan time
5 – Save the table (password)

Data editor : add variable / modify value

Save the table

Animate the table

DATA EDITOR

Rate 200 IP address 139.158.12.21

Empty Table1

Symbol	Address	Data type	Value	Format	Status
%MW0		INT	100	DECIMAL	OK
%S6		BOOL	1	BOOLEAN	OK
%MW10		INT	0	DECIMAL	OK
%S0		BOOL	0	BOOLEAN	OK

Symbol Address

Type Format

Value Read only ☐

List of variable

Add a variable (select first free line of the table and define parameters)
In animation mode modify the value of selected variable (not Read only)

Diagnostic pages : statistics

BMX NOE 0100 B

Home Documentation

Monitoring Control Diagnostics

ETHERNET STATISTICS

Status: **Running Link**

Reference: **BMX NOE 0100**

Rack: **0**

Slot: **1**

Transmit Speed: **100 MB**

Host Name: **139.158.12.21**

MAC Address: **00 80 f4 02 2e 47**

IP Address: **139.158.12.21**

Subnet Mask: **255.255.0.0**

Gateway Address: **139.158.12.99**

Transmit Statistics		Receive Statistics		Functioning Errors	
Transmits	0	Receives	10718	Missed Packets	0
Transmit Retries	0	Framing Errors	0	Collision Errors	0
Lost Carrier	0	Overflow Errors	0	Transmit Timeouts	0
Late Collision	0	CRC Errors	0	Memory Errors	0
Transmit Buffer Errors	0	Receive Buffer Errors	0	Net Interface Restarts	1
Silo Underflow	0				

Reset Counters

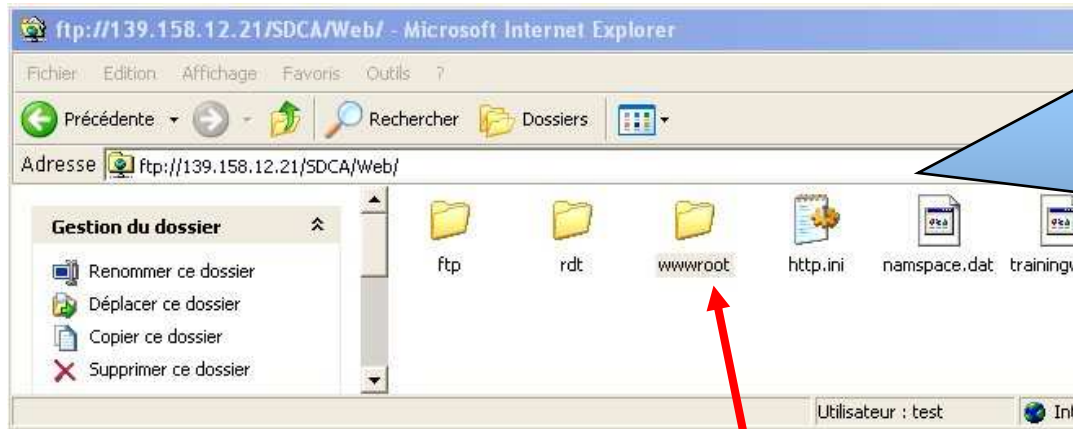
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Ethernet parameters of the module (IP address, MAC address, ...)

Access to diagnostic pages : rack viewer, global data, IO scanning, messaging, ...

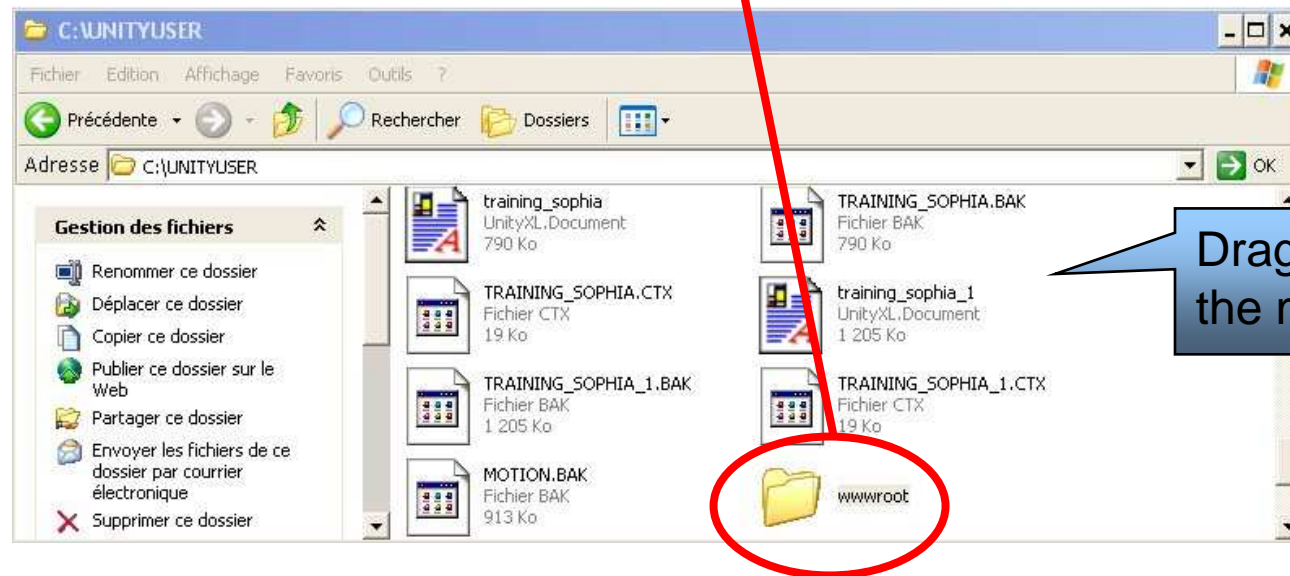
Statistics on Ethernet : number of packets transmit & received, errors, ...

Transfer to the module (ftp server)



Connect to the module with Internet Explorer

- IP address in ftp
- Username : *test*
- Password : *testingpw*
(i.e. *ftp://test:testingpw@139.158.12.21*)



Drag and drop from your PC to the module

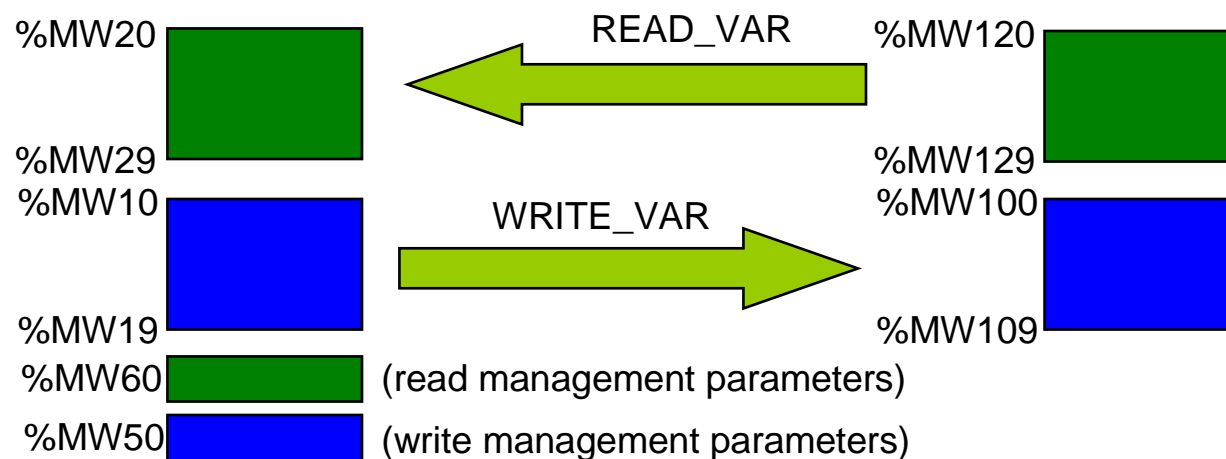
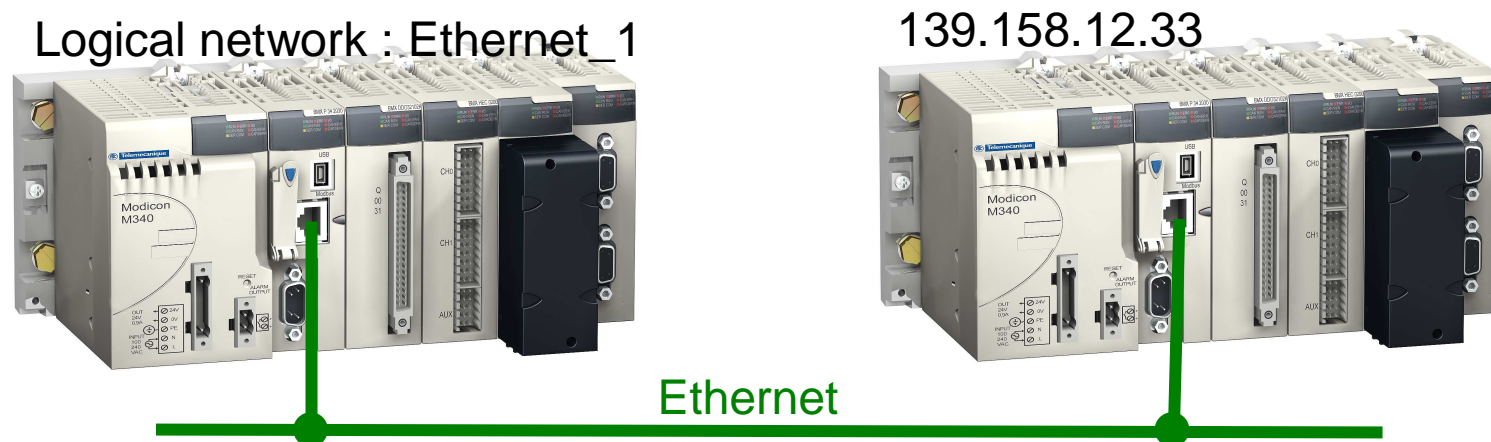
Language interface

IODDT for Ethernet communication

■ 2 IODDTs

- T_COM_STS_GEN for all communication protocol
- T_COM_ETH_BMX for Ethernet communication

Example of Read / Write data



Program to write data

