

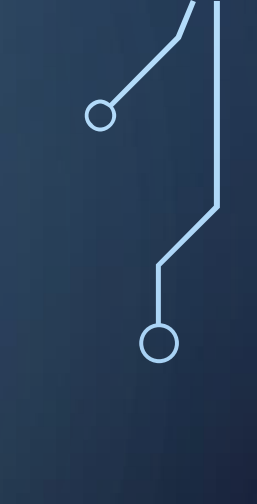
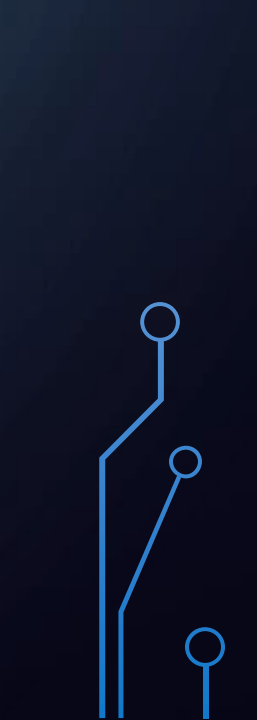
A decorative graphic on the left side of the slide, consisting of a network of white lines and small circles on a dark blue background, resembling a circuit board or a neural network.

BUS DI CAMPO (FIELDBUS)

UN'INTRODUZIONE AI BUS DI CAMPO



FONTI:

- Alessandro De Luca, presentazione «CIM: Computer Integrated Manufacturing», Università la Sapienza Roma
 - https://en.wikipedia.org/wiki/List_of_automation_protocols
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INDICE:

- Definizione di bus di campo (fieldbus)
 - Elenco dei bus di campo più diffusi
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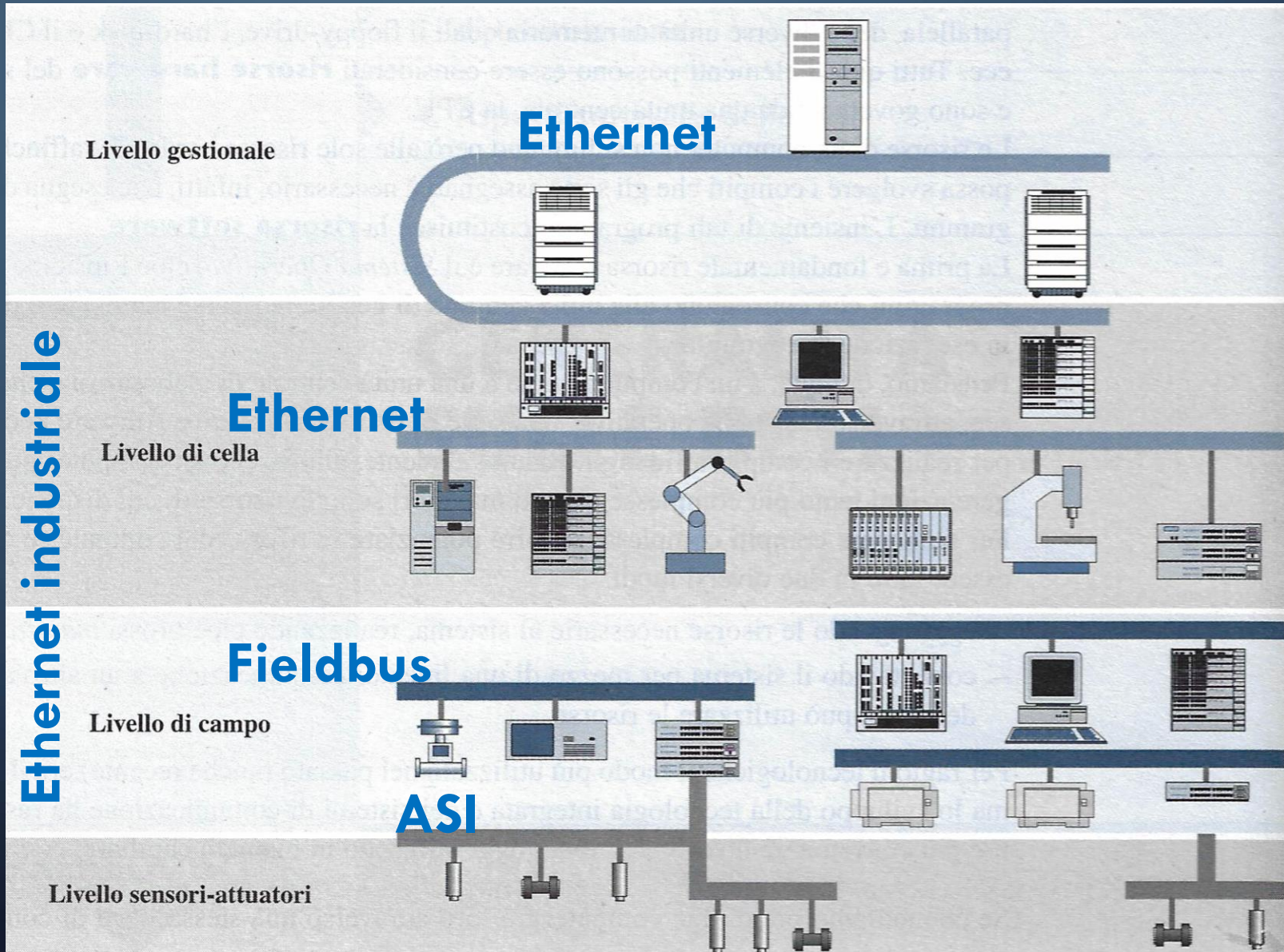


TIPOLOGIE DI RETE PER LO SCAMBIO DI INFORMAZIONI

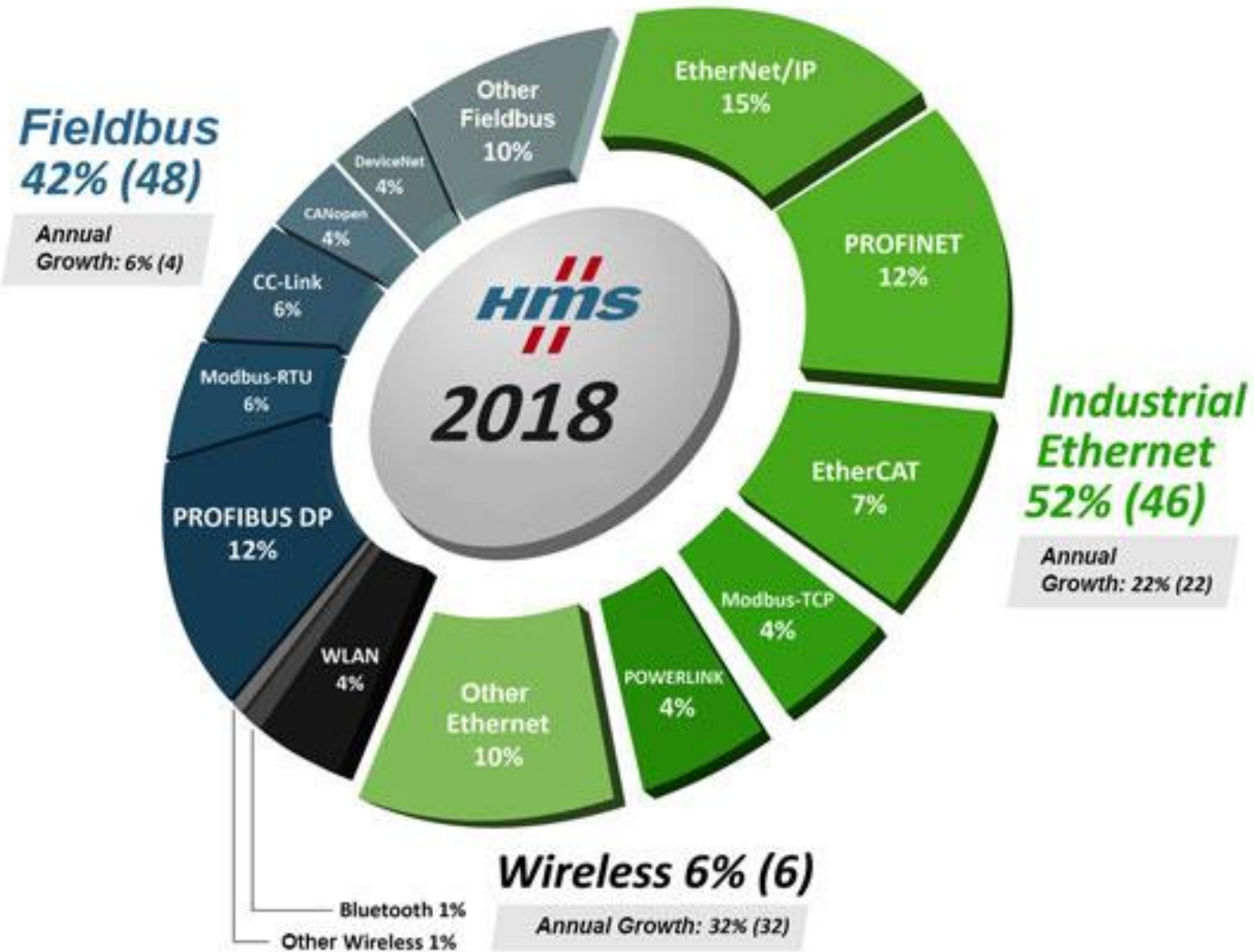
SUPERVISIONE

CONTROLLO

CAMPO



DIFFUSIONE DEI BUS DI CAMPO



DEFINIZIONE

Bus di campo (fieldbus) è il termine fissato in ambito IEC (International Electrotechnical Commission) per indicare in un processo automatizzato lo standard di comunicazione “seriale” tra i diversi dispositivi (nodi) costituenti il processo, quali:

- dispositivi di campo (sensori, attuatori, ecc.)
- dispositivi di controllo (PLC, microcontrollori ecc.)
- La comunicazione tra i nodi è gestita secondo un protocollo che è caratteristico di ogni tipo di bus di campo
 - il modello ISO/OSI è il riferimento per i protocolli
 - **non sono necessariamente utilizzati tutti i livelli ISO/OSI**

MODELLO ISO/OSI



TIPOLOGIE DI BUS DI CAMPO

- Non esiste una sola tipologia di bus di campo, ma diverse a seconda del tipo di applicazione
- Le specifiche nascono da consorzi di produttori che si associano per garantire l'interoperabilità dei loro dispositivi
 - Alcune di queste specifiche sono poi diventate a tutti gli effetti degli standard
- Un elenco esaustivo dei bus di campo esistenti può essere trovato al seguente indirizzo:

https://en.wikipedia.org/wiki/List_of_automation_protocols

PROTOCOLLI PER L'AUTOMAZIONE

I protocolli per l'automazione si dividono in varie categorie a seconda dell'utilizzo:

- protocolli per l'automazione del processo
- protocolli di sistema per il controllo industriale
- protocolli per l'automazione degli edifici
- protocolli per automazione dei sistemi di alimentazione
- protocolli di lettura automatica dei contatori
- protocolli per l'automotive

PROTOCOLLI PER L'AUTOMAZIONE DEL PROCESSO

AS-i – Actuator-sensor interface, a low level 2-wire bus establishing power and communications to basic digital and analog devices

BSAP – Bristol Standard Asynchronous Protocol, developed by Bristol Babcock Inc.

CC-Link Industrial Networks – Supported by the CLPA

CIP (Common Industrial Protocol) – can be treated as application layer common to DeviceNet, CompoNet, ControlNet and EtherNet/IP

ControlNet – an implementation of CIP, originally by Allen-Bradley

DC-BUS – communication over DC power lines, originally by Yamar Electronics Ltd

DeviceNet – an implementation of CIP, originally by Allen-Bradley

DF-1 - used by Allen-Bradley ControlLogix, CompactLogix, PLC-5, SLC-500, and MicroLogix class devices

DNP3 - a protocol used to communicate by industrial control and utility SCADA systems

PROTOCOLLI PER L'AUTOMAZIONE DEL PROCESSO

DirectNet – Koyo / Automation Direct proprietary, yet documented PLC interface

EtherCAT

Ethernet Global Data (EGD) – GE Fanuc PLCs (see also SRTP)

EtherNet/IP – IP stands for "Industrial Protocol". An implementation of CIP, originally created by Rockwell Automation

Ethernet Powerlink – an open protocol managed by the Ethernet POWERLINK Standardization Group (EPSG).

FINS, Omron's protocol for communication over several networks, including ethernet.

FOUNDATION fieldbus – H1 & HSE

HART Protocol

HostLink Protocol, Omron's protocol for communication over serial links.

Interbus, Phoenix Contact's protocol for communication over serial links, now part of PROFINET IO

PROTOCOLLI PER L'AUTOMAZIONE DEL PROCESSO

MECHATROLINK – open protocol originally developed by Yaskawa, supported by the MMA

MelsecNet, and MelsecNet II, /B, and /H, supported by Mitsubishi Electric.

Modbus PEMEX

Modbus Plus

Modbus RTU or ASCII or TCP

OSGP – The Open Smart Grid Protocol, a widely use protocol for smart grid devices built on ISO/IEC 14908.1

OpenADR – Open Automated Demand Response; protocol to manage electricity consuming/controlling devices

Optomux – Serial (RS-422/485) network protocol originally developed by Opto 22 in 1982. The protocol was openly documented[1] and over time used for industrial automation applications.

PieP – An Open Fieldbus Protocol

PROTOCOLLI PER L'AUTOMAZIONE DEL PROCESSO

Profibus – by PROFIBUS International

PROFINET IO

RAPIDnet – Real-time Automation Protocols for Industrial Ethernet

Honeywell SDS – Smart Distributed System – Originally developed by Honeywell. Currently supported by Holjeron.

SERCOS III, Ethernet-based version of SERCOS real-time interface standard

SERCOS interface, Open Protocol for hard real-time control of motion and I/O

GE SRTP – GE Fanuc PLCs

Sindec H1 – Siemens

SynqNet – Danaher

TTethernet – TTEch

MPI – Multi Point Interface

PROTOCOLLI DI SISTEMA PER IL CONTROLLO INDUSTRIALE

MTConnect

OPC

OPC UA

OMG DDS

PROTOCOLLI PER L'AUTOMAZIONE DEGLI EDIFICI

1-Wire – from Dallas/Maxim

BACnet – for Building Automation and Control networks, maintained by ASHRAE Committee SSPC 135.

C-Bus Clipsal Integrated Systems Main Proprietary Protocol

CC-Link Industrial Networks, supported by Mitsubishi Electric

DALI

DSI

Dynet

EnOcean – Low Power Wireless protocol for energy harvesting and very lower power devices.

INSTEON - SmartHome Labs Pro New 2-way Protocol based on Power-BUS.

KNX – Standard for building control. Previously EIB/EHS/BATIBus

LonTalk – protocol for LonWorks technology by Echelon Corporation

PROTOCOLLI PER L'AUTOMAZIONE DEGLI EDIFICI

Modbus RTU or ASCII or TCP

oBIX

UPB - 2-way Peer to Peer Protocol

VSCP

xAP – Open protocol

X10 – Open industry standard

Z-Wave - Wireless RF Protocol

ZigBee – Open protocol for Mesh Networks

PROTOCOLLI PER AUTOMAZIONE DEI SISTEMI DI ALIMENTAZIONE

DNP3 – Distributed Network Protocol

IEC 60870-5

IEC 61850

IEC 62351 – Security for IEC 60870, 61850, DNP3 & IEC 61850-5 protocols

PROTOCOLLI DI LETTURA AUTOMATICA DEI CONTATORI

ANSI C12.18

DLMS/IEC 62056

IEC 61107

M-Bus

OMS

ZigBee Smart Energy 2.0

Modbus

ANSI C12.21

ANSI C12.22

BUS PER L'AUTOMOTIVE

Controller Area Network (CAN) – an inexpensive low-speed serial bus for interconnecting automotive components

DC-BUS – physical layer for communication over DC power lines, originally by Yamar Electronics Ltd

FlexRay – a general purpose high-speed protocol with safety-critical features

IDB-1394

IEBus

J1708 – RS-485 based SAE specification used in commercial vehicles, agriculture, and heavy equipment.

J1939 and ISO11783 – an adaptation of CAN for agricultural and commercial vehicles

Keyword Protocol 2000 (KWP2000) – a protocol for automotive diagnostic devices (runs either on a serial line or over CAN)

BUS PER L'AUTOMOTIVE

Local Interconnect Network (LIN) – a very low cost in-vehicle sub-network

Media Oriented Systems Transport (MOST) – a high-speed multimedia interface

Vehicle Area Network (VAN)

UAVCAN - a lightweight protocol for in-vehicle communication over CAN or Ethernet