Profibus

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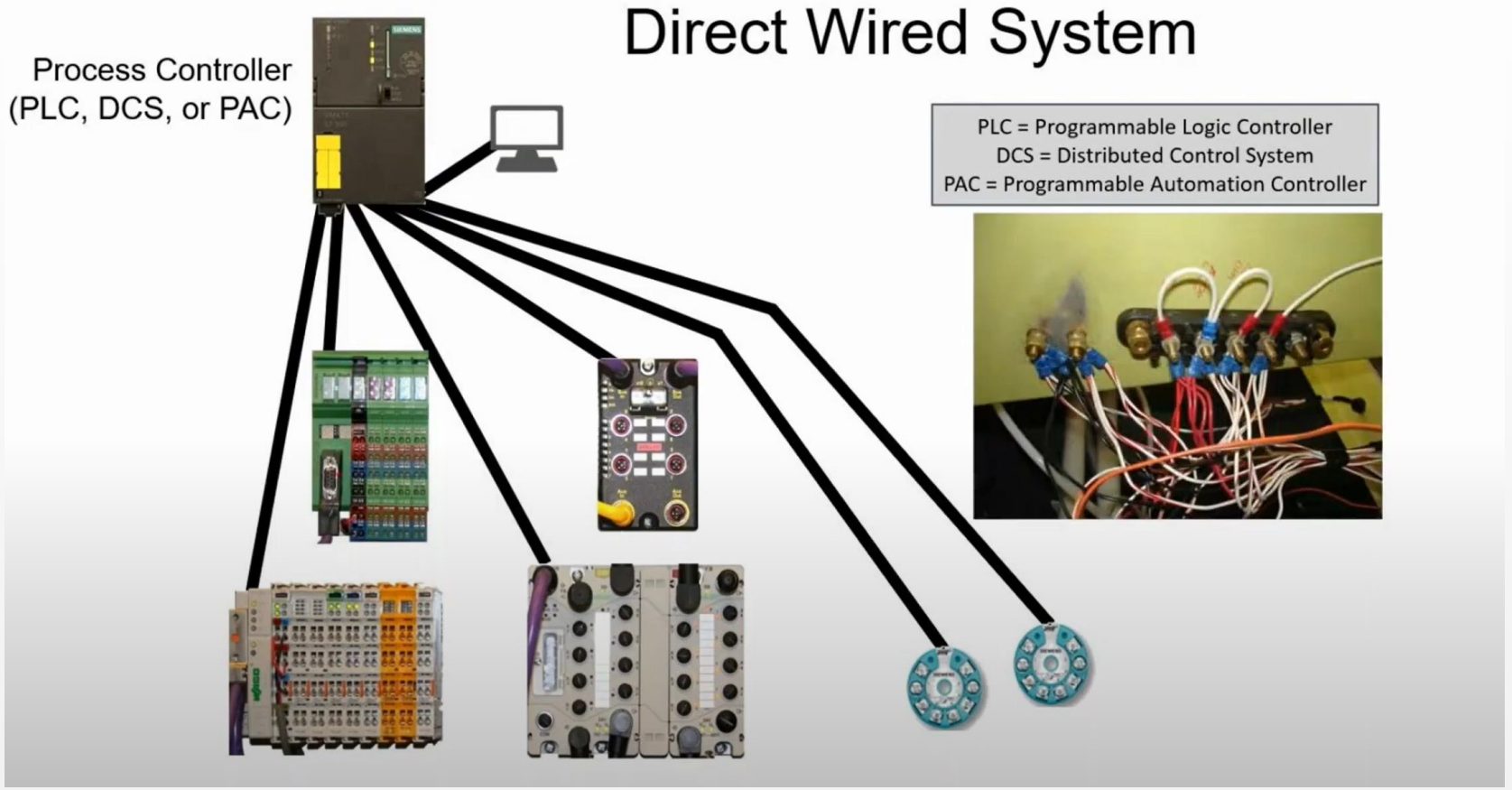
Befor PROFIBUS



Problems

- Extensive cabling due to direct wiring
- Diagnostics are limited
- Signals can be susceptible to unwanted noise interference

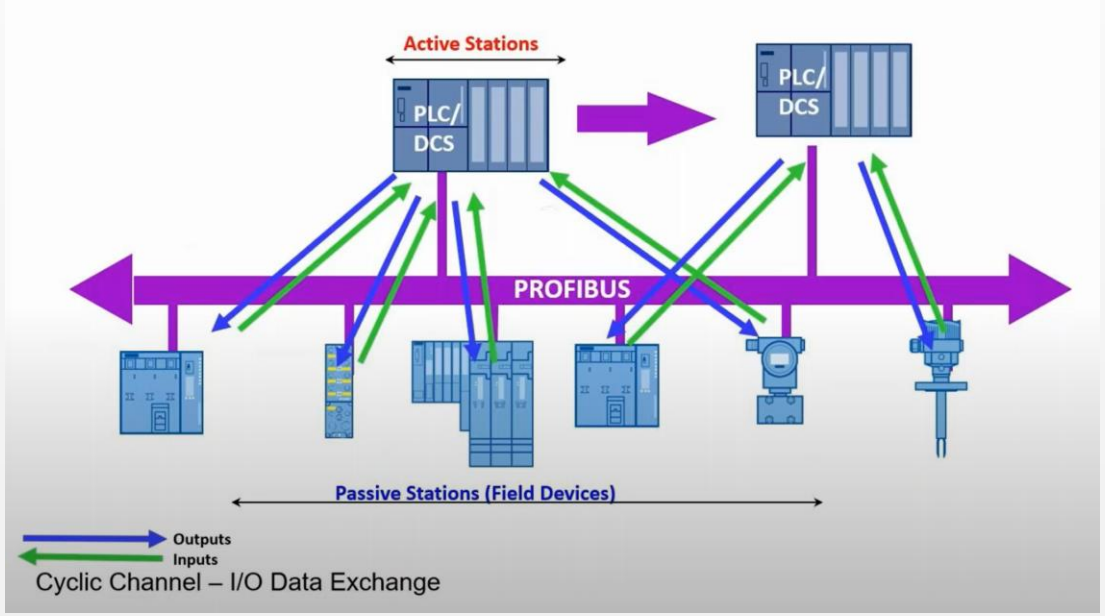
PROFIBUS => Process fieldbus

- Developed in 1989 by Siemens and PNO
- Industrial communication protocol
- Open standard
- OSI Compliant

Used in Factory automation , Process automation , Drive technology , Hybrid application

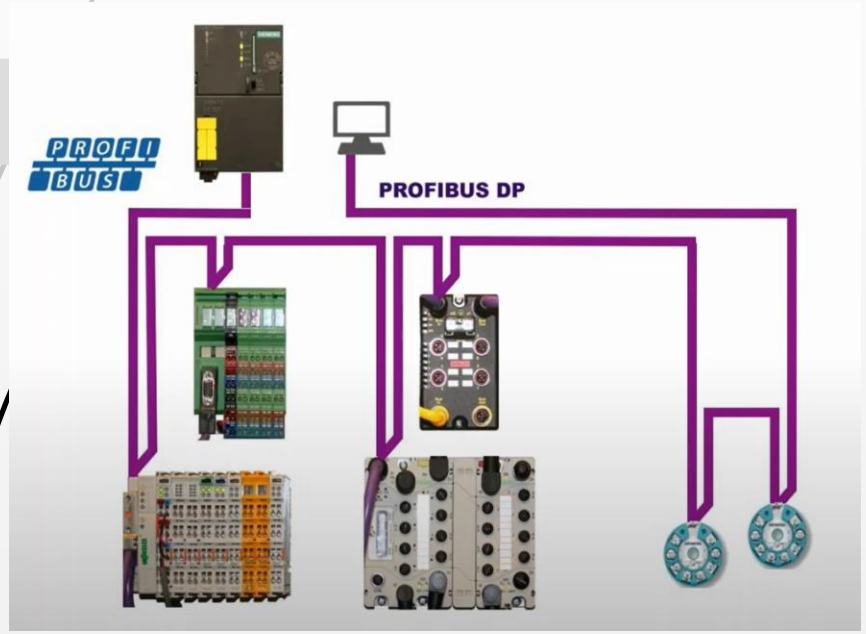
What is a fieldbus?

a field bus is a digital , serial , two-way , multi-drop communication link among controllers and its remote I/O, sensors ,acutators and inter-networking components

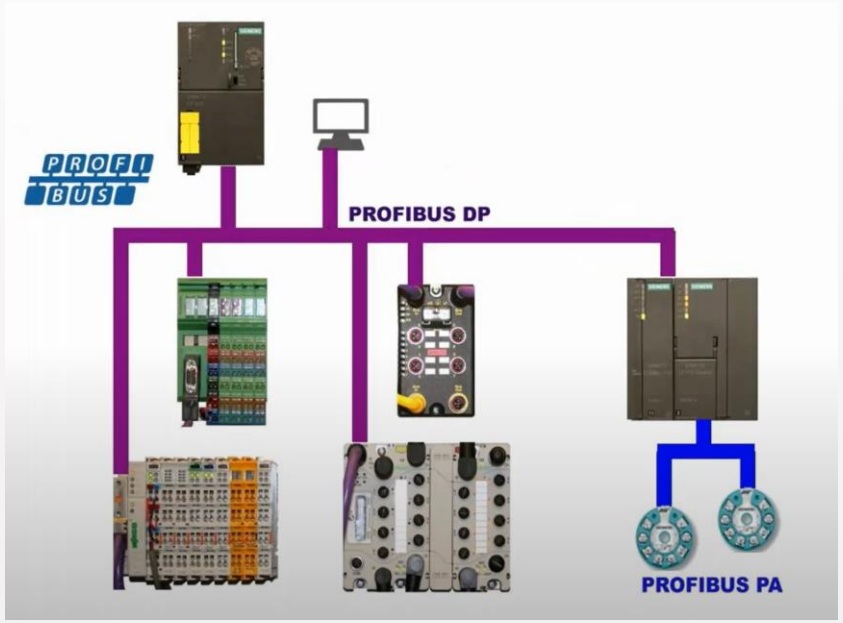


Types of PROFIBUS

1.PROFIBUS DP (Decentralized Peripherals)



2.PROFIBUS PA (Process Automation)



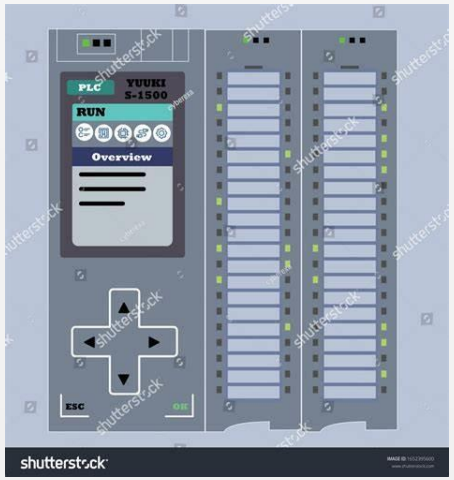
PROFIBUS DP

Two types of devices are supported

Master or active stations

Control the bus

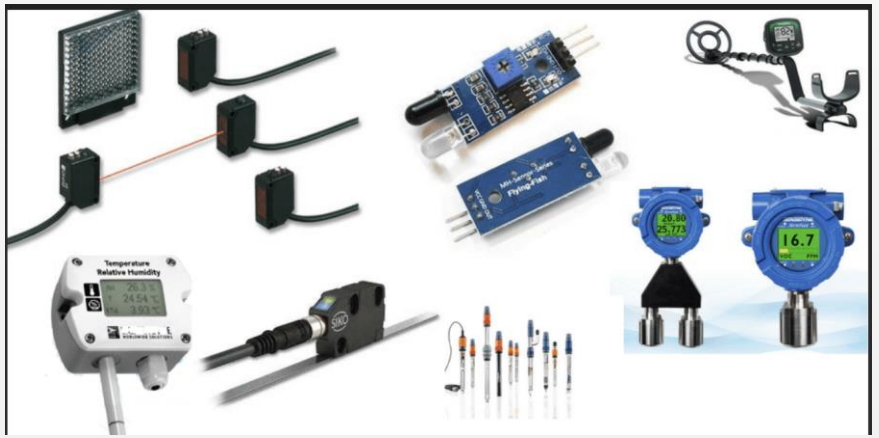
Send message without request



slave or passive stations

receive messages

Send message only on request



PROFIBUS DP

Multiple masters are allowed

Each slave assigned only to one master:

- Multiple master can read from any device
- Only one master can write to any device

PROFIBUS Communication

Two mechanism supported:

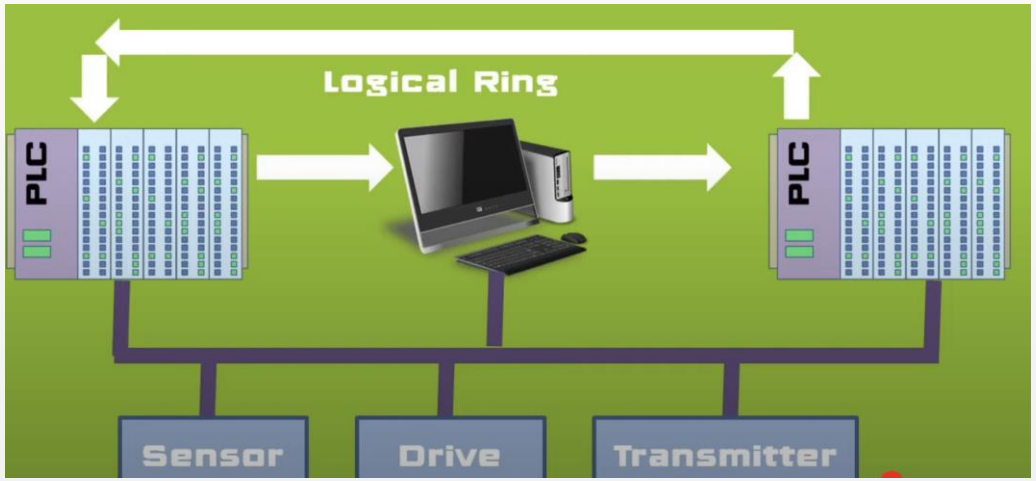
- Token passing (master to master)
- Polling (master to slave)

PROFIBUS Communication – token passing

During power up , lowest address master commences the initialization

and keeps the token with itself

When a master receives the token it can pass message to any slave or master

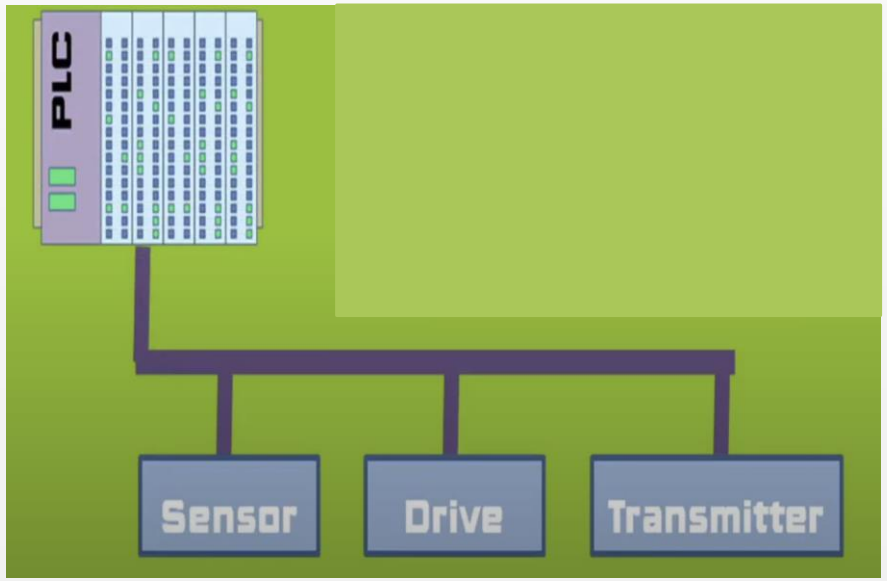


This software token is passed between the masters in ascending order, resulting in formation of a logical ring despite a bus topology.

PROFIBUS Communication – polling

The **Master** initiates communication using **Cyclic or Acyclic Messaging**.

Slaves **only respond** when queried by the Master (they never initiate communication).

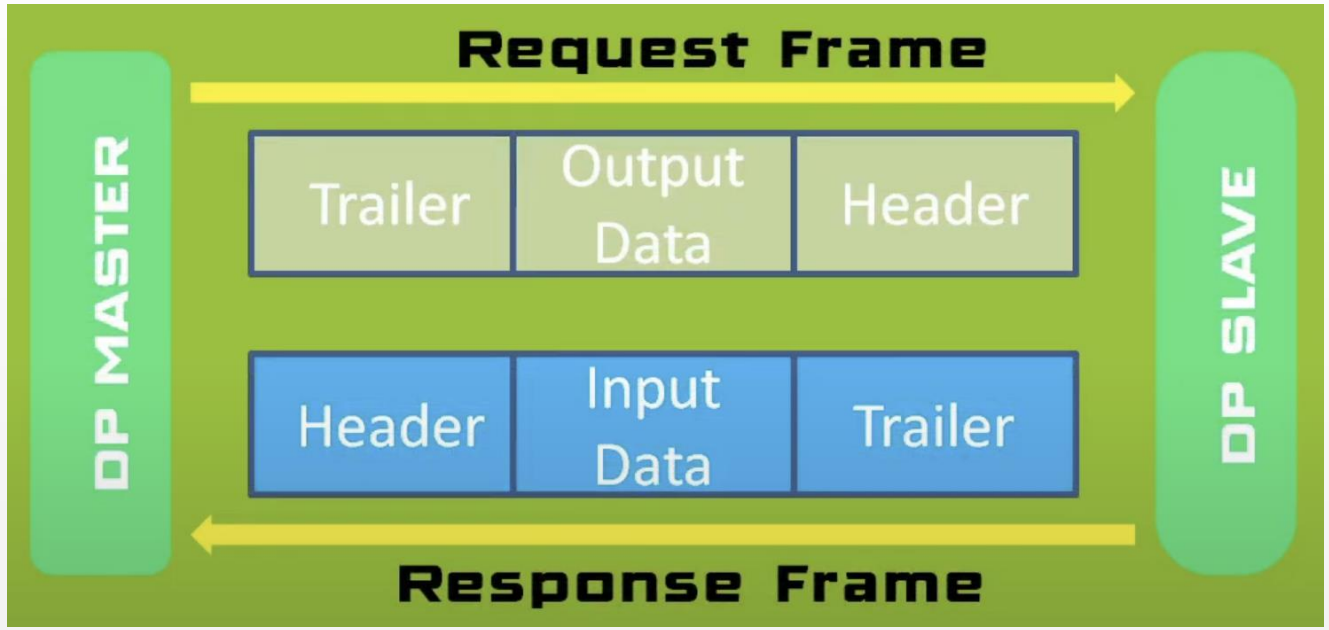


Polling-cyclic

Used for **real-time control**, where the Master continuously polls Slaves.

- **Process:**
  - The Master sends a **Cyclic Data Request**.(request frame)
  - The Slave **processes the request** and replies with data.(response frame)
  - This process repeats **at predefined intervals**.
- **Example:**
  - A **PLC (Master)** repeatedly polls a **sensor (Slave)** for temperature values every **10ms**.

Polling-cyclic



Header and Trailer sections consists of information for **addressing** , **error checking** and other **protocol related data**.

Polling-Acyclic

Used for **non-time-critical data** like diagnostics, configuration, and maintenance.

- **Process:**
  - The Master sends a **special request** (e.g., a configuration update).
  - The Slave processes the request and responds **only once**.
  - The normal cyclic process resumes.
- **Example:**
  - A **DCS (Master)** requests **firmware information** from a field device.

Error Handling in PROFIBUS

Automatic Retransmissions: If a Slave fails to respond, the Master retries.
- **Timeouts:** If multiple retries fail, the device is marked as **faulty**.
- **Checksum Validation:** Ensures **data integrity**.

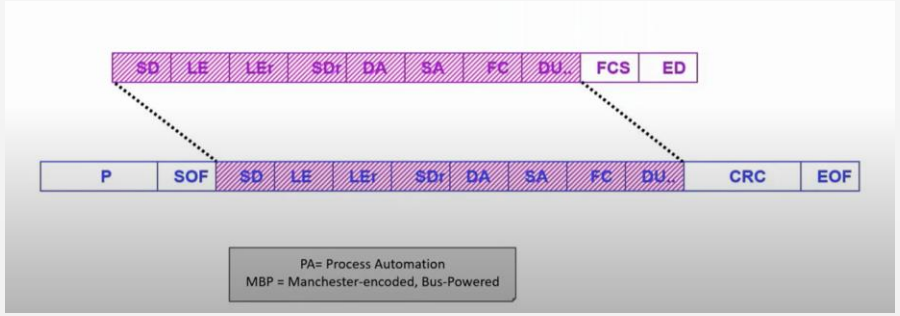
Profibus DP and PA

PROFIBUS is mainly used for high-speed input/output devices and to link intelligent devices such as drives.

- It can use different physical layers such as **RS-485 (most common)**, **wireless, or fiber optics**.

PROFIBUS PA refers to the following additional features:

- Bus powered by using the **Manchester encoded Bus Powered (MBP)** physical layer according to **IEC 61158-2**.
- **Intrinsically safe design**.
- **Configuration over the bus**.
- **Device profile**.



summary

Befor PROFIBUS

Fieldbus

Types of Profibus

PROFIBUS DP

PROFIBUS Communication

Error Handling in PROFIBUS

Comparing Profibus DP and PA

resources

What is PROFIBUS and how it works?

Online course on us.profinet.com

Siemens: PROFIBUS network manual

Thanks for your attention