

PROFIBUS/PROFINET

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AGENDA

- ☐ INTRODUCTION.
- ☐ PROFIBUS.
- ☐ PROFINET.
- ☐ APPLICATIONS.
- ☐ IMPLEMENTATION.
- ☐ CONCLUSION.

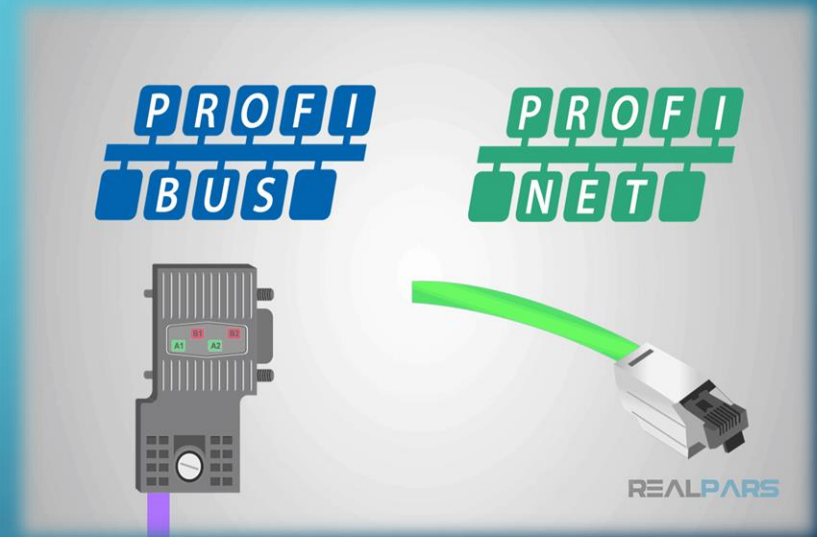
INTRODUCTION

PROFINET:

- **Advanced industrial Ethernet-based communication protocol.**
- **Real-time data transfer and high-speed performance.**
- **Seamless integration with existing systems.**

PROFIBUS:

- **Established industrial communication standard.**
- **Reliable and versatile fieldbus technology.**
- **Enables seamless automation connectivity.**



PROFINET

- Ethernet-based communication protocol.
- Developed by PROFIBUS & PROFINET International.
- Real-time communication for industrial Automation.
- Supports motion control, safety, energy management, and diagnostics.



PROFIBUS

- **Fieldbus communication protocol.**
- **Developed by PROFIBUS & PROFINET International.**
- **Works for different topologies such as star.**
- **Supports various device types, including sensors, actuators, controllers, and drives.**



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ARCHITECTURE

PROFIBUS

- **Centralized controller (PLC) and decentralized peripherals.**
- **PROFIBUS DP for factory automation.**
- **PROFIBUS PA for process automation.**
- **Controller acts as the master, peripherals as slaves.**

PROFINET

- **Controller (PLC) and IO devices.**
- **PROFINET IO for real-time communication.**
- **PROFINET CBA for component-based automation.**
- **Flexible and scalable architecture**

DATA LAYERS

PROFIBUS

- **Physical Layer:**
 - Based on RS-485(Slow speed).
 - Transmission rates 9.6 Kbps, 12 Mbps, and 45 Mbps.
- **Data Link Layer:**
 - PROFIBUS DP and PROFIBUS PA protocol.
 - Provides error checking and correction

PROFINET

- **Physical Layer:**
 - Use Ethernet Technology(High Speed).
 - Transmission rates 10 Mbps, 100 Mbps, and 1 Gbps.
- **Data Link Layer:**
 - Ethernet II and IEEE 802.3 protocol.
 - Provide communication with a maximum cycle time of 31.25 μ s.

COMMUNICATION REQUIREMENT

■ Bandwidth:



Profibus DP can handle up to 12 Mbit/s.

Profinet up to 100 Mbit/s.

■ Latency:

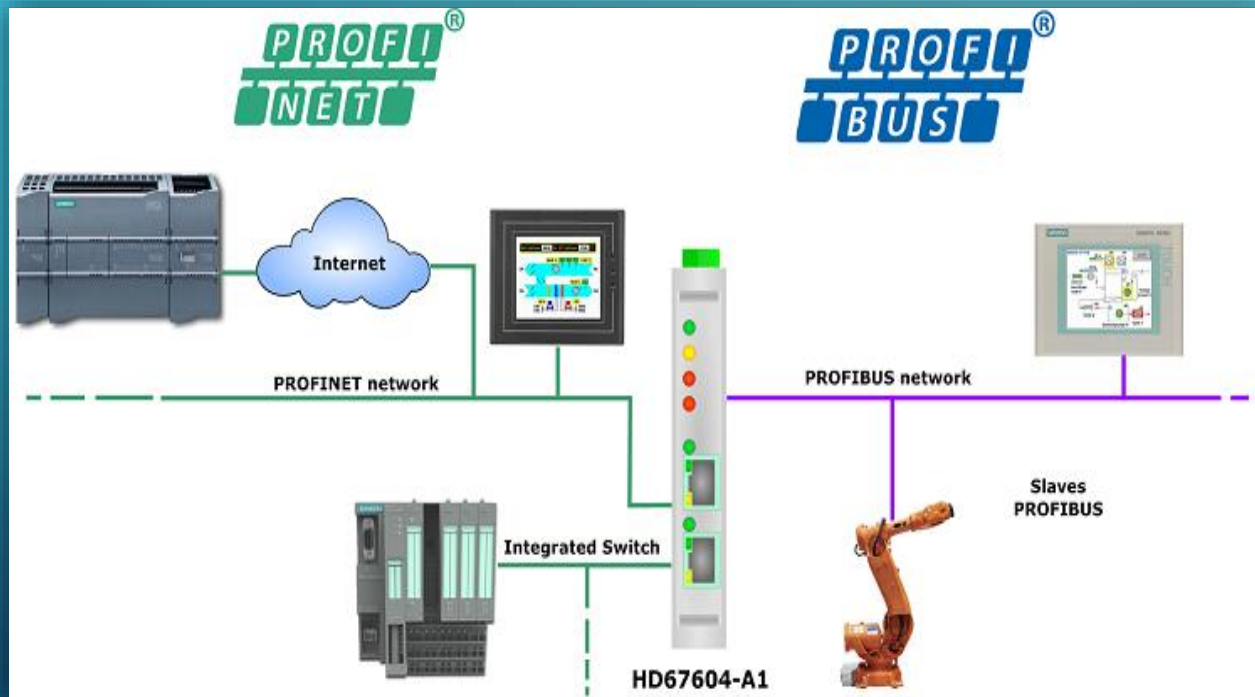


Profibus ranging from microseconds to milliseconds.

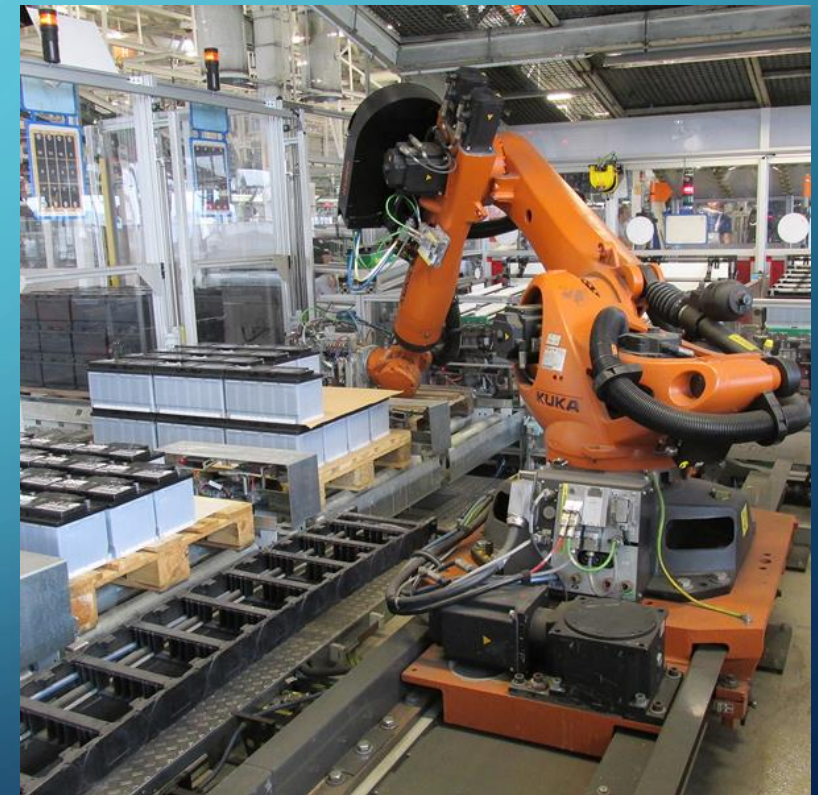
Profinet ranging from microseconds to low milliseconds.

APPLICATIONS

Manufacturing and Assembly Lines



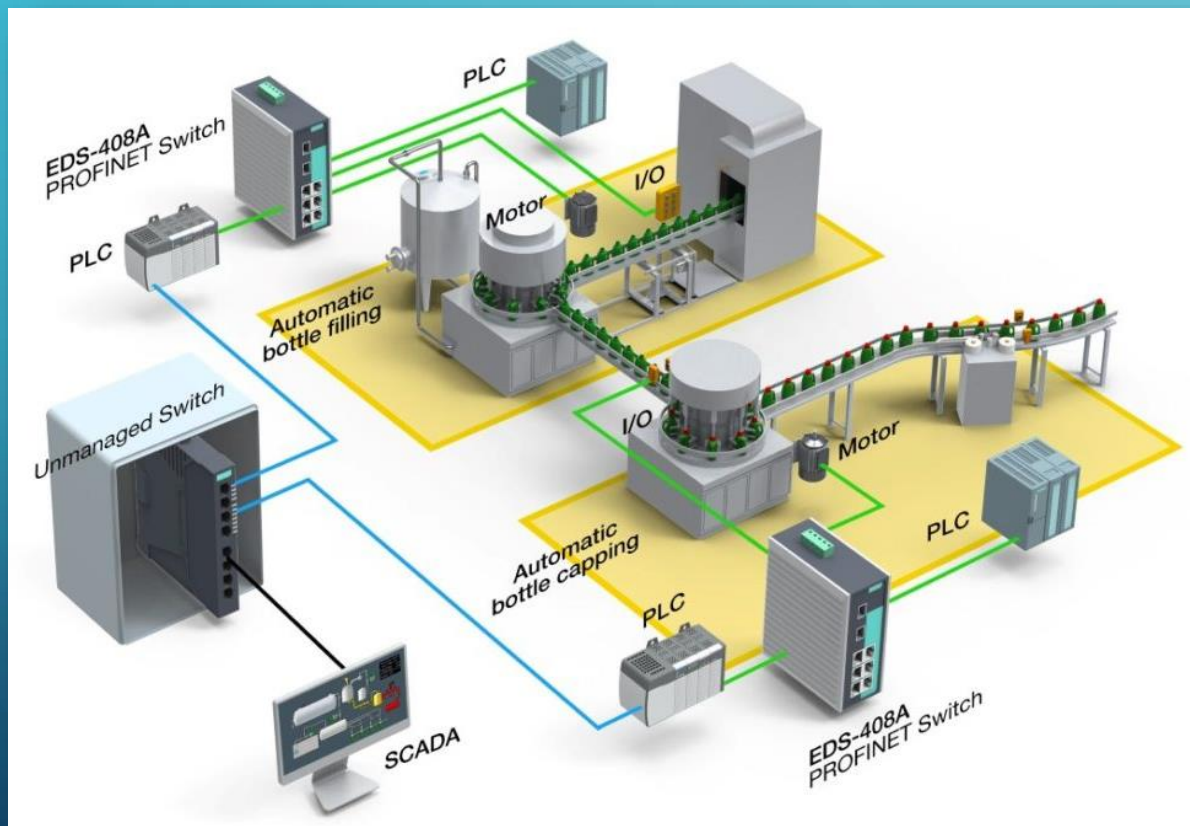
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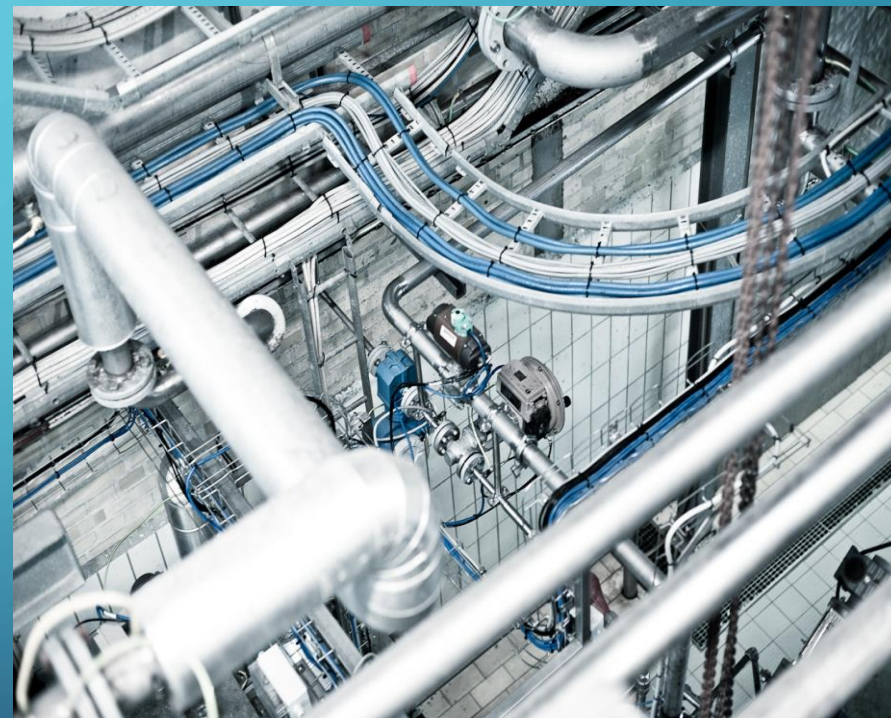
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APPLICATIONS

Bottling facilities



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PROS & CONS

PROFIBUS

- **Robust and Reliable Technology.**
 - **Cost-Effective Industrial Automation Solution.**
-
- **Limited Bandwidth for Data Transmission.**
 - **Compatibility Challenges with Modern Systems.**

PROFINET

- **High-Speed Real-Time Communication.**
 - **Seamless Ethernet Integration and Interoperability.**
-
- **Complexity and Higher Setup Costs.**
 - **Vulnerability to Network Issues.**

IMPLEMENTATION(PROFIBUS)

```
import time
```

```
class PROFIBUSSlave:
    def __init__(self, address):
        self.address = address

    def process_request(self, request_data):
        if request_data == b"Hello, slave!":
            return "Hello, master {}".format(self.address).encode()
        else:
            return b"Unknown request!"
```

```
class PROFIBUSMaster:
    def __init__(self, slaves):
        self.slaves = slaves

    def send_request(self, request_data):
        responses = []
        for slave in self.slaves:
            response = slave.process_request(request_data)
            responses.append(response)
        return responses
```

IMPLEMENTATION(PROFIBUS)

```
slaves = []
for i in range(1, 6):
    slave = PROFIBUSSlave(address=i)
    slaves.append(slave)

master_device = PROFIBUSMaster(slaves=slaves)

request_data = b"Hello, slave!"
responses = master_device.send_request(request_data)

for i, response in enumerate(responses):
    print("Response from slave {}: {}".format(i + 1, response.decode()))
```

RESULTS

```
Response from slave 1: Hello, master 1!
Response from slave 2: Hello, master 2!
Response from slave 3: Hello, master 3!
Response from slave 4: Hello, master 4!
Response from slave 5: Hello, master 5!
```


THANK YOU

SOURCES:

- [1] <https://realpars.com/difference-between-profibus-and-profinet/>
- [2] <https://www.wago.com/at/io-systeme/feldbuskoppler-profinet-io/p/750-377>
- [3] <https://leunig.de/>
- [4] https://adfweb.com/home/products/PROFINET_PROFIBUS.asp?language=FIN
- [5] <https://www.automation-fair.com/2021/08/03/new-profile-for-robot-systems-working-group/>
- [6] <https://profinews.com/2017/07/profinet-switches-for-diagnostics/>
- [7] https://www.manufacturingchemist.com/news/article_page/Watson-Marlow_introduces_PROFINET_enabled_peristaltic_pumps/198866