WirelessHART: Data Link Layer and MAC

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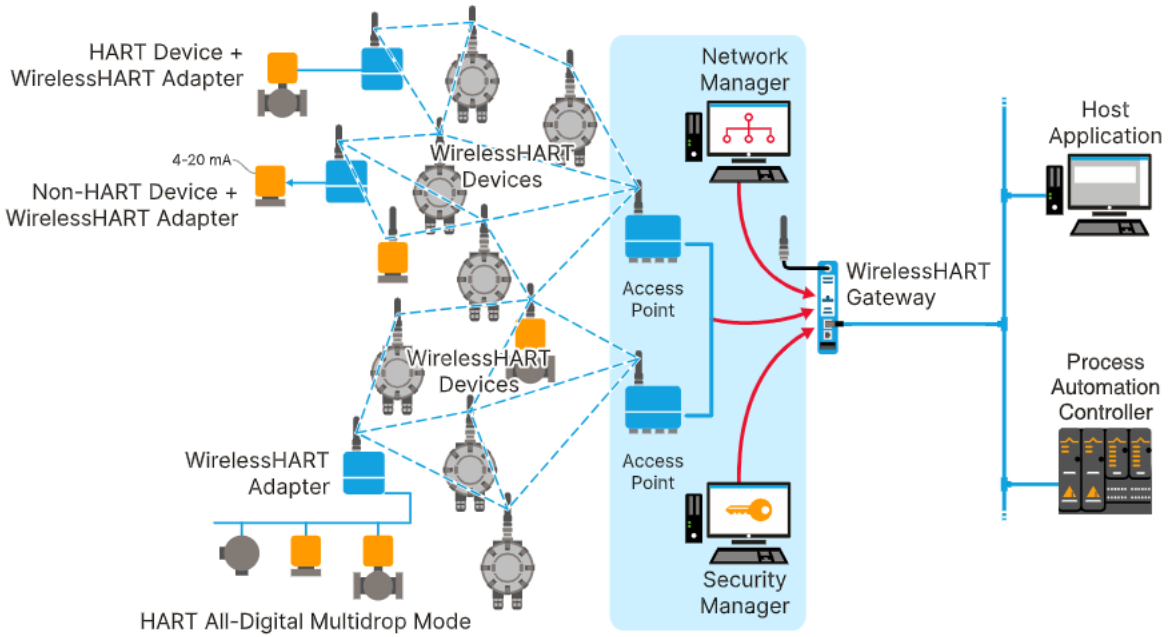
Presentation Structure

- Introduction
- Overview of WirelessHART \ WirelessHART Architecture
- Data Link Layer (DLL): Key Functions:
- Medium Access Control (MAC): Key Functions:
- Security in Data Link and MAC Layers
- Advantages of WirelessHART Data Link and MAC Layers
- Challenges and Considerations
- Conclusion

WirelessHART

Definition:

WirelessHART is a wireless communication protocol designed for industrial automation and process control Applications.



Purpose of WirelessHART

1. Reliable Wireless Communication
2. Interoperability
3. Real-time Data Collection
4. Flexibility and Scalability
5. Security
6. Energy Efficiency

Why We Use WirelessHART

1. **Reduced Installation Costs**
    1. Eliminates Wiring
    2. Simplifies Upgrades
2. **Enhanced Monitoring and Control**
    1. Remote Monitoring
    2. Real-time Data
3. **Scalability and Flexibility**
    1. Scalable Networks
    2. Flexible Deployment
4. **Energy Efficiency**
    1. Low Power Consumption
    2. Power Management

Applications of WirelessHART

Environmental Monitoring: Ensuring safe and optimal conditions.

Process Automation: Enhancing efficiency and product quality.

Asset Management: Preventing equipment failures and optimizing maintenance.

Safety Systems: Protecting workers and equipment from hazardous conditions.

Data Link Layer (DLL)

Purpose:

The Data Link Layer in WirelessHART is responsible for reliable data transfer across the physical layer. It manages communication between devices and ensures data integrity and confidentiality.

Key Functions:

Packet Framing: Encapsulates data into frames for transmission.

Error Detection and Correction: Uses cyclic redundancy check (CRC) for error detection.

Security: Implements encryption and decryption for secure data transfer.

Data Integrity: Ensures the integrity of the transmitted data.

Medium Access Control (MAC)

Purpose:

The MAC layer in WirelessHART is responsible for managing how devices access the shared communication medium (radio frequency) and coordinating the transmission of data to prevent collisions.

Key Features

- Time Division Multiple Access (TDMA)
- Frequency Hopping
- Superframes
- Slot Types
- Scheduling
- Synchronization

Security in Data Link and MAC Layers

Encryption:

Authentication:

Integrity Checks:

Advantages of WirelessHART Data Link and MAC Layers

Deterministic Communication:

Robustness:

Scalability:

Security:

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Conclusion

WirelessHART is a vital technology for industrial automation, offering reliability, scalability, and security in wireless communication. With real-time data collection, improved safety, and cost reductions, it enables higher productivity, enhanced asset management, and streamlined operations in diverse industrial settings. Adopting WirelessHART ensures efficiency and safety, even in demanding environments.

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Thank you for attention!!!

Danke!!!

Questions and Discussion