INDUSTRIAL CASE STUDIES

KOTA MATSUO
HD-PLC ALLIANCE

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Agenda

1. Industry Market

2. Comparison of Network Standards (HD-PLC Features)

3. Industrial Case Studies of HD-PLC
Industry 4.0 Market

CAGR 16.9 %
From 2019 to 2024

https://www.marketsandmarkets.com/Market-Reports/industry-4-market-102536746.html
Industry Network Market Share

Comparison of Network Standards

- **Ethernet**
  - Speed: High
  - Stability: Medium
  - Real-time: High
  - Installation cost: Low
  - Portability: Low

- **Wireless**
  - Speed: Medium
  - Stability: High
  - Real-time: Low
  - Installation cost: Medium
  - Portability: High

- **Fieldbus**
  - Speed: Low
  - Stability: High
  - Real-time: Medium
  - Installation cost: Medium
  - Portability: Medium
Comparison of Network Standards

- **Ethernet**
- **Wireless**
- **HD-PLC**
- **Fieldbus**

Graph showing comparisons on:
- Speed
- Stability
- Real-time
- Installation cost
- Portability
An Important Piece that Fills Customer Network Needs

Cost? Stability? Portability?

Industrial Ethernet
Wi-Fi/Bluetooth/5G
Fieldbus etc…

+ HD-PLC
Industrial Case Studies of HD-PLC
Data Acquisition at the Factory

- **Customer needs**: Temperature and humidity data of measuring instruments are stored on servers in the factory. Access server data from office PCs. Speed requirement: 1Mbps
- **Reasons for HD-PLC adoption**: Network construction cost and workability design: 1 person-day, installation: 2 person-days

(Source: Specified customer)
Inspection of Underground Equipment in the Sewage Plant

- Customer needs: Build a network for inspecting underground equipment with a wearable camera.
  Rate requirement: 1 Mbps per IP camera.

- Reasons for HD-PLC adoption: Low-cost network construction in an environment where wireless is difficult to reach.
  Design: 1 person-day, installation: 3 person-days.

(Source: Specified customer)
IP Camera Usage at the Warehouse

- **Customer needs:**
  - Use: Video recording analysis of picking site
  - Rate requirements: 2 Mbps/IP camera per 1 unit x 16 units
  - Units/Configuration of IP camera: 16 units, 10 fps, Fine quality
  - No need for drilling holes in walls or ceilings, wiring work in the ceiling, work at high places, etc., and no electrical work

- **Reasons for HD-PLC adoption:** Low-cost network construction design: 1 person-day, installation: 1 person-day
  - There was no need to perform construction work for a building by using existing lines.
Condition Monitoring of Boiler Feedwater Pumps

(Source: HD-PLC Alliance Member companies)
Boiler Monitoring with Extension Cord Reel

Streamlined inspection of underground boilers, Use of power line HD-PLC for real-time Data transfer

Enables real-time image confirmation even at remote headquarters

Source: HD-PLC Alliance Member companies

Multi hop HD-PLC adapter

Inspection in the boiler
Temperature sensor
Wearable IP Camera

(Sources: HD-PLC Alliance Member companies)
Tunnel Construction

Customer needs:
To be able to contact the work sites in the tunnel and outside the tunnel. There is a problem that radio waves do not reach. With a total length of 7,460 meters, the cost of construction is large for laying ethernet cables.

Reasons for HD-PLC adoption:
Low-cost network construction

Total length of tunnel 7,460m
Coverage 4,000m

- Power lines
- Single-phase three-wire

On-site office
Optical cable
On-site office

Can communicate with the outside within a range of about 4 km from the entrance!

(Source: HD-PLC Alliance Member companies)

https://www2.panasonic.biz/ls/works/building/detail/id/541410000/?building-filter=product-series&codes[]=plc-adaptor#region=541450000

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Various Uses of HD-PLC in Wireless Dead Areas

- Used for human sensor/IP camera communication for environmental monitoring in the factory
- Use surveillance IP camera and Wi-Fi-AP communication for power management board of substation
- Installed communication cable, power wiring, and Wi-Fi-AP, which are under verification, for maintenance and inspection of underground tunnels (assuming use of three-phase power line)

- Maintenance inspection of the management, underpass in the dam, Wi-Fi-AP installation communication use
- Use for confirming flow lines and safety management of workers
- Used for remote work instructions to maintenance/inspection workers and communication with IP cameras that capture analog control instruments

- Use underground single-phase/three-phase electric lighting line with PLC. Used for ground communication by inspectors.
- Utilize underground single-phase and three-phase lighting lines to communicate between the ground and inspectors with PLC.

(Source: HD-PLC Alliance Member companies)
Challenge:
Chronic labor shortages in the construction industry
It is necessary to make construction sites IoT.
At construction sites, there are many places where radio waves can not reach, such as tunnels and underground.

IoT platform TSUNAGATE

A platform that can build a communication network using "temporary electrical wiring" used in construction work by utilizing PLC technology that can communicate using power lines.

https://www.takenaka.co.jp/solution/topics6/
Conclusion

• HD-PLC is an important piece that fills customers’ network needs!

• Useful for industrial customers
  • Network construction at low cost
  • Complements an environment where wireless is difficult to reach

Contribute to industrial digital transformation!
THANK YOU!

info@hd-plc.org

@hdplc_alliance

Hakataku Minoshima4-1-62, Fukuoka, Japan