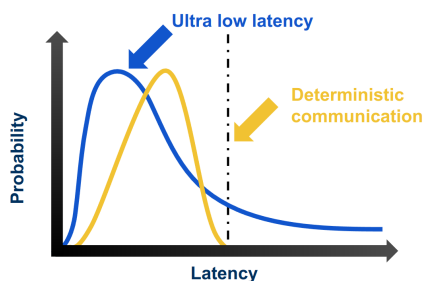
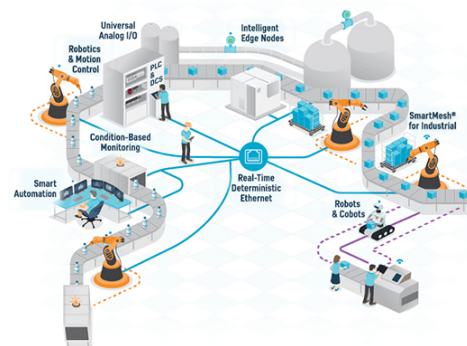


Comparative Analysis of Deterministic Communication Protocols

Topic for Project Work (Oberseminar, PBL, Wissenschaftliche Arbeitsmethodik)



Source: ComNets TSN groupLink



Source: motioncontroltipsLink

Description

This task revolves around addressing the growing demands of emerging industrial applications, which increasingly require deterministic communication protocols to ensure guaranteed performance levels. Industries often encounter situations where different deterministic communication techniques are needed, each suited for specific scenarios. The primary objective of this work is to conduct a detailed comparative analysis of various deterministic communication protocols, with a focus on answering critical questions related to their characteristics and capabilities:

- **Compatibility and Complementarity:** Explore whether these deterministic protocols can be used together and whether they complement each other in specific applications.
- **Use Cases:** Identify and define the different use cases for each deterministic communication protocol, highlighting where they excel.
- **Scenario-Based Usage:** Determine the circumstances and scenarios in which each protocol should be strategically deployed to maximize effectiveness.
- **Interoperability:** Evaluate which of these deterministic protocols exhibits superior interoperability, considering their ability to work seamlessly together or with other communication technologies.



Tasks

To successfully complete this task, the student is expected to:

- Protocol Overview: Provide a comprehensive overview of deterministic communication protocols, emphasizing their core principles and salient features.
- Categorization: Organize and categorize these protocols based on their applicability and compatibility across various industrial scenarios.
- Specific Protocols: Delve into the detailed examination of the following deterministic communication protocols:
 - EtherCAT
 - DetNet
 - PROFINET
 - Profibus
 - Ethernet Powerlink
- Comparative Analysis: Analyze and compare these protocols in terms of their suitability for distinct use cases, taking into account factors like latency, reliability, and real-time communication requirements.
- Recommendations: Offer insights into the specific circumstances and environments where each protocol shines, providing practical recommendations for optimal utilization.

The ultimate goal of this work is to equip stakeholders in emerging industrial applications with a comprehensive understanding of deterministic communication protocols, enabling them to make informed decisions regarding protocol selection, deployment, and integration for diverse scenarios.

Keywords

Time-Sensitive Networking, 5G System, Programming, Networking, Performance Evaluation

Resources and Material

You can access additional information through the provided resources to learn more about the topic.

- General information of Time-Sensitive Networking and DetNet
 - [Wikipedia](#)^{Link}



- A. Nasrallah et al.: *"Ultra-Low Latency (ULL) Networks: The IEEE TSN and IETF DetNet Standards and Related 5G ULL Research"*^{Link}

Contact

Depending on the project topic and student preferences, certain members of the TSN group will be responsible for supervising this project.

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- Start: Flexible