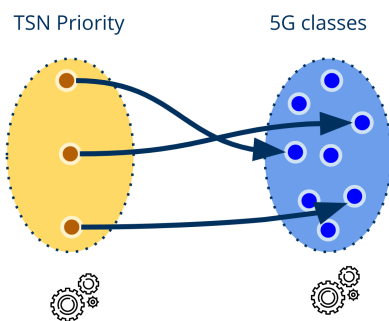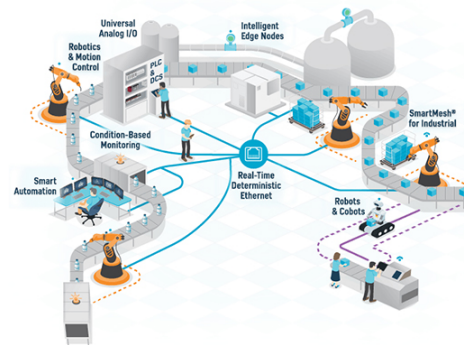# Quality of Service Mapping for 5G-TSN Integration

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

Source: ComNets TSN group[Link]

Source: motioncontroltips[Link]

Description

Time-Sensitive Networking (TSN) is a set of IEEE standards to achieve deterministic[Link] communication over Ethernet networks. This is especially relevant for industrial domains, such as medical, banking, avionics, or automotive. The communication is characterized by strict requirements on delay, packet delay variations, and packet loss. In order to achieve certain guarantees, the TSN standards provide different algorithms, metrics and tools.

On the other hand, the 5G System (5GS) is itself very complex. With enhancements for Ultra-Reliable Low-Latency Communication (URLLC) in Release 15 (R15), the 5GS paved the path for latency-aware communication. The 5GS already provides possibilities to treat packets similarly to in TSN.

The integration of 5G and Time-Sensitive Networking (TSN) is a prominent and evolving area of research, facilitating deterministic communication and extending it over the air. One critical aspect of this integration is the translation of TSN traffic priorities into 5G's Quality of Service Indicator (5QI) framework. This task aims to create a QoS mapping table for seamless translation of QoS between TSN and 5G, focusing on industrial automation.

Tasks

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

- QoS Understanding: Provide a comprehensive understanding of Quality of Service (QoS) mechanisms in the 5G context, including how 5G systems manage and maintain QoS.

- TSN Priority Consideration: Explore the different priority levels within TSN and how they are currently defined.

- Mapping Table Creation: Develop a mapping table that correlates TSN priority levels with corresponding 5QIs in the 5G system, ensuring a smooth transition of QoS parameters.

- Performance Levels: Offer reasoning and insights into when default 5QI values suffice for desired performance levels and when dynamic 5QI values should be designed for tailored QoS.

- Use Case Evaluation: Discuss and identify specific industrial automation use cases that stand to benefit from this QoS mapping, emphasizing the advantages and scenarios where the priority translation is particularly advantageous.

By accomplishing this task, the student will contribute to the understanding of QoS mapping between TSN and 5G, providing a valuable resource for seamless integration and improved deterministic communication in industrial automation applications.

Keywords

Time-Sensitive Networking, 5G System, 5G-TSN integration, Deterministic wireless communication, QoS mapping

Resources and Material

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

- Wikipedia[Link]

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

- Zenepe Satka et al.: *"QoS-MAN: A Novel QoS Mapping Algorithm for TSN-5G Flows"*[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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- Language: German or English

- Start: Flexible