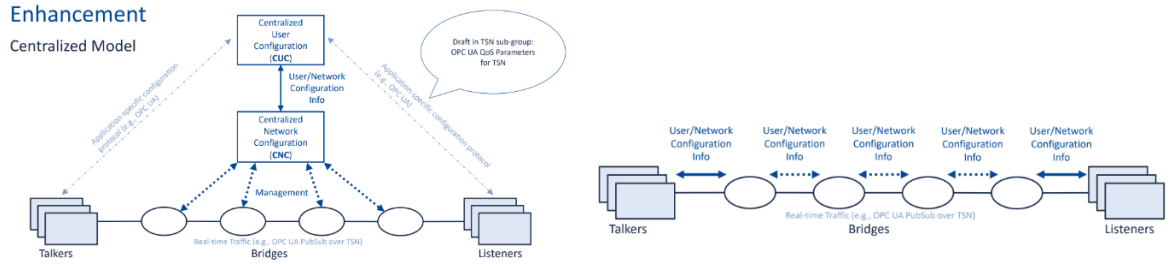
TECHNISCHE UNIVERSITÄT DRESDEN

ComNets
Deutsche Telekom Chair of Communication Networks

Faculty of Electrical and Computer Engineering Institute of Communication Technology

The Evaluation of Determinism in Different TSN Configuration Models

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



Source: IEEE P802.1Qcc

Task Description

TSN, a set of standards designed to ensure deterministic communication over Ethernet cables and wired connections, is particularly valuable for applications with strict deadlines and the need for guaranteed performance. The objective of this task is to conduct a comprehensive investigation into the impact of configuration models on the determinism of Time-Sensitive Networking (TSN). TSN offers various configuration models to achieve determinism over wired links. This task comprises two main steps:

- **Comparative Analysis of TSN Configuration Models:** The first step involves an in-depth exploration of the distinct TSN configuration models specified by IEEE standards. The student will highlight and examine the significant differences between these models.
- **Evaluation of Determinism Levels:** In the second step, the student will assess the degree of determinism provided by each TSN configuration model. This assessment will be conducted using the OMNeT++ simulator, allowing for a quantitative analysis of determinism levels.

The student is expected to engage in detailed discussions for each configuration model, outlining their specific features and attributes. Additionally, the student will provide step-by-step procedural guidelines for implementing each TSN configuration model, emphasizing key considerations and necessary settings.

Furthermore, the task includes an evaluation of the success or effectiveness achieved by each configuration model in delivering deterministic communication. Factors such as latency, reliability, and real-time communication requirements will be considered in this assessment.

By successfully completing this task, the student will contribute valuable insights into the influence of TSN configuration models on network determinism, enhancing our understanding of

their practical applicability in various networking scenarios.

Keywords

Time-Sensitive Networking, OMNeT++, INET, 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 the 802.1Qcc configuration model.
  - TSN Wikipedia[Link]
  - A. Nasrallah et al.: "*Ultra-Low Latency (ULL) Networks: The IEEE TSN and IETF DetNet Standards and Related 5G ULL Research*"[Link]
  - INET TSN features[Link]

Contact

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

- TSN group of ComNets: Stefan Senk, Hosein K. Nazari, How-Hang Liu, Tobias Scheinert
- Language: German or English
- Start: Flexible