

Topic for a Specialization Module / Bachelor's / Master's Thesis

Simulation of Time-sensitive Networking for Active Noise Control in Ports

Noise emissions play an important role in inland and seaports as well as logistics facilities, as they are often located near residential areas. This leads to conflicts regarding operational times and process flows in the ports and industrial areas. These conflicts are addressed in the European research project I²PANEMA. In order to reduce noise emissions from several noise sources in ports, an active noise control (ANC) system has been developed, which consists of several components that communicate with each other.

With regard to high requirements of the ANC system, the use of Time-sensitive Networking (TSN) seems to be one of the most appropriate for communication between the individual components. As shown in Figure 1, a TSN-capable switch is required as the central element, which supports mechanisms such as time synchronization (IEEE 802.1ASrev) and the time-aware shaper (802.1Qbv).

Within the scope of this work, a concept shall be developed on the basis of existing requirements for the ANC system that confirms the applicability of TSN in this scenario. Subsequently, the concept will be verified by using a TSN simulation environment. The extent to which TSN can meet the requirements should be demonstrated using TSN simulators, i.e. NeSTiNg. NeSTiNg is a simulation model for TSN using the OMNeT++ discrete event simulation framework.

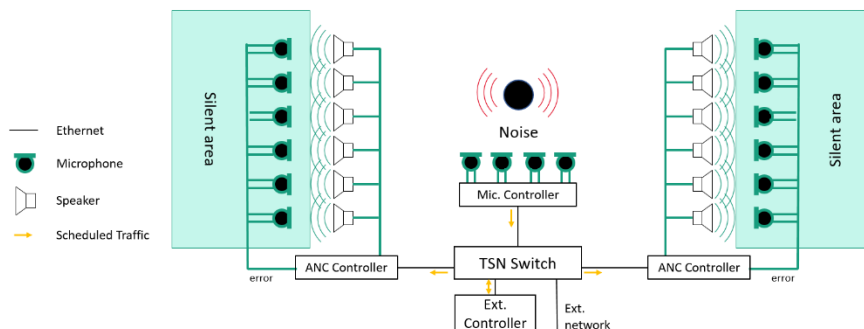


Figure 1: TSN communication approach for the ANC system

Requirements:

- Advanced C++ programming skills
- Basic knowledge in networking (802.1 Ethernet)

In summary, the following tasks need to be solved:

- Literature research of TSN family of standards
- Investigation of NeSTiNg - Network Simulator for TSN
- Development of a concept for the given scenario
- Simulation of the ANC scenario
- Elaborate documentation of all working steps

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Start Date: SS 2021