

WHAT FRAUNHOFER ESK OFFERS

Utilize our **Quality of Service (QoS) monitoring and prediction approach** to make your wirelessly connected systems predictable and dependable.

Whether you develop applications such as platooning, lane merging assistants or automated guided vehicles, our solution gives you more leeway when **implementing safety-critical, connected applications**.

WE OFFER:

- **Monitoring and prediction** of Quality of Service parameters
- **Middleware** abstracting from technology specific parameters
- Integration of **cellular and adhoc communication**
- Enabling resilient applications with **service availability indication** or **graceful degradation**
- Enabling **advanced network concept**, e.g. adaptive network selection in hybrid networks

Watch our new animation about Quality of Service monitoring and prediction on WWW.ESK.FRAUNHOFER.DE



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QUALITY OF SERVICE MONITORING AND PREDICTION



ENABLING RESILIENT V2X APPLICATIONS

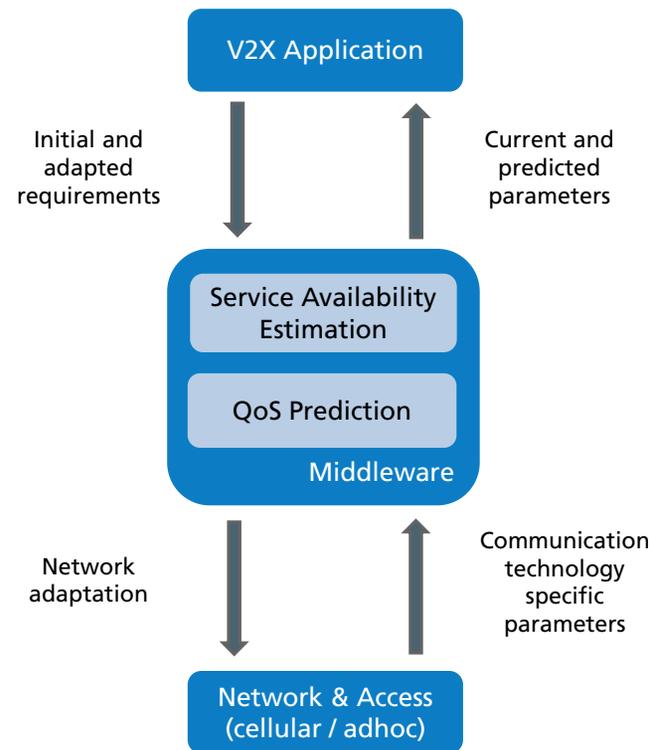
Automated and connected driving relies on **predictable communication**. However, the quality of wireless communication varies in highly dynamic environments.

The **prediction of Quality of Service (QoS) parameters** enables applications like tele-operated driving or platooning to adapt to changing network conditions in real time and even beforehand.

Fraunhofer ESK developed a solution to **monitor and predict the QoS parameters for connected vehicles**. The system continuously monitors communication between the vehicles, as well as important environmental parameters. Using this as a foundation, and with the help of **machine learning algorithms**, the solution can predict the QoS over the next few seconds and make timely adjustments to the system.

Applications that involve connected vehicles can benefit from QoS monitoring and prediction, such as lane merging assistants or when coordinating self-driving agriculture machines and automated guided vehicles.

THE MIDDLEWARE



Middleware providing QoS prediction to V2X application, abstracting from technology specific parameters

USE CASE PLATOONING

Platooning is one connected application that can benefit especially from Quality of Service monitoring and prediction. Several semi-trailer trucks follow one another in close intervals. Existing applications have to operate under the worst case scenario, assuming that the communication system could eventually be interrupted at any time. For this reason, the vehicles maintain larger and more rigid intervals.

In contrast, the solution from Fraunhofer ESK monitors the communication flow of all available technologies, such as 802.11p, LTE and 5G, and predicts how dependable they will be within the next few seconds. If the anticipated Quality of Service is insufficient, there are two options.

One option is to make **adjustments at the network level** by switching to a dependable technology, if available. The other option is to **adapt the application in the form of graceful degradation**. In the case of platooning, the second option means that the interval between the trucks is increased as a preventive measure.

The Fraunhofer ESK solution enables the use of both approaches and provides application developers extensive leeway when **implementing safety-critical, connected applications**.