

VeN²uS

Low latency, reliable, secure
communication for energy grid
operation systems



IETF Introduction

Scope

- Introduction to technical details of our research project VeN²uS
- Goal to find out which IETF solutions might be considerable for contribution by the project

Speakers

- Carl-Heinz Genzel, IT-Consultant/Software Developer at amperias GmbH in Germany
- Markus Dahlmanns, IT-Security Researcher at Chair of Communication and Distributed Systems at RWTH Aachen in Germany

Agenda

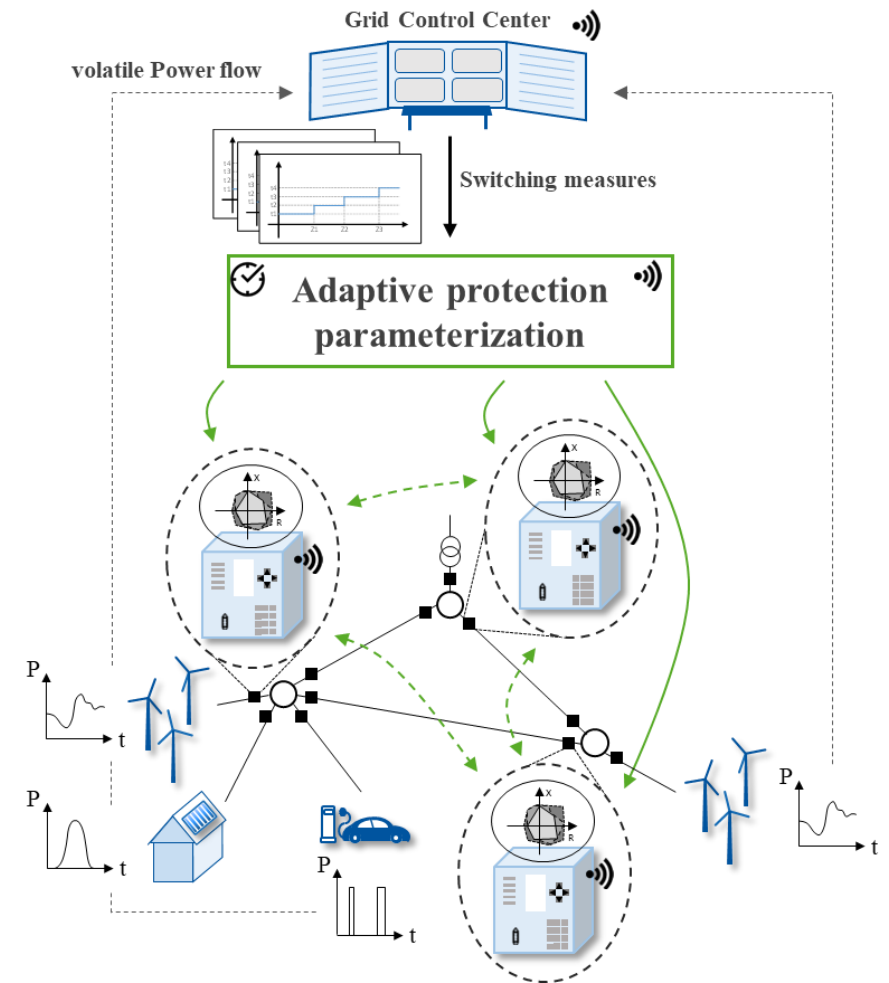
1. Motivation
2. Project introduction
3. Architecture brief
4. Open questions

Motivation

- Distribution grid is changing, driven by measures to meet climate goals
- Recent events intensify the need to be independent from fossil energy sources
- Conventional, centralized power plants are replaced by decentralized generation systems with volatile power supply
 - Power flow changes from unidirectional (high voltage to low voltage level) to multidirectional
- Traditional (static) distribution grid protection cannot cope with multidirectional flows
 - For example, changes in power flows can be misidentified as short circuit
- Uncontrollable conditions for the protection technology often result in false curtailment or partial shutdown

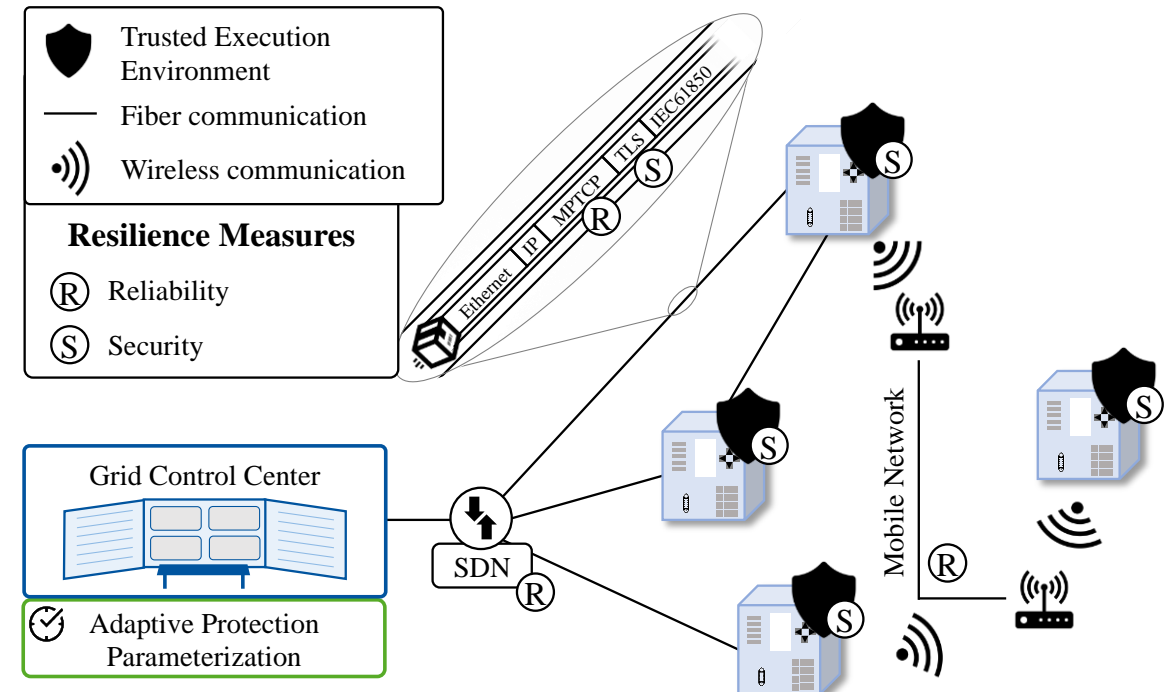
Project introduction: VeN²uS

- Protection technology must be prepared to cope with new challenges in the grid
- An adaptive and interconnected grid protection system with real-time and secure communication is needed
- The grid protection system should carry out the automatic modification of protection parameters depending on the grid status
- Low latency, reliable, and secure communication concepts and secure systems are a key factor



Communication architecture brief

- Low latency: Change detection and reaction on network faults via SDN with multiple simultaneous connection via MPTCP
- Reliability: A dual-communication network based on a fiber optic cable network and a radio network as well as transport layer reliability with (Multi-path) TCP/QUIC
- Security: Established trust relationships between the grid control center and stations as well as between the stations combined with code isolation based on TEE with TEEP, SUIT and RATS



Open questions

We like to ...

- ... apply and test solutions found in the IETF (e.g., MPTCP, QUIC or TEEP, SUIT, RATS)
 - Can you think of things that we should look at?
- ... contribute results to IETF workgroups.
 - Which workgroups could be interested in results/could be relevant?
 - What information would the IETF workgroups be interested in?

Credits

- The information provided is part of a larger project introduction under submission at CIRED 2022:

Lorenz et al., „Interconnected network protection systems -the basis for the reliable and safe operation of distribution grids with a high penetration of renewable energies and electric vehicles”