THE NORTH AMERICAN SYNCHROPHASOR INITIATIVE

# WEBINAR SERIES

## Corentin Presvôts and Thibault Prevost

## Compression of Sampled Current and Voltage Signals via a Multi-Model Coding Scheme

**Corentin Presvôts** was born in France in 1995. He entered the École Normale Supérieure (ENS) of Paris Saclay in 2016 in the field of electricity. He completed a research master's degree in Multimedia Networking at Telecom Paris in 2020. Additionally, Corentin received an engineering degree in electricity from the ENS. In 2021 he was awarded the electricity aggregation in France. Currently, he is a Ph.D. student at Réseau de Transport d'Electricité and works on the compression of sampled voltage and current signals.

**Thibault Prevost** is a System Stability expert at RTE (the French TSO). He graduated from Centrale Supelec in 2007 and has been working in the R&D department since then. He initially worked on grid connection studies for renewable and European grid code for generators. He is now working on the operation of a system with mainly power electronic interfaced generation and grid forming control.

RTE is the French Transmission System operator and has an R&D department with more than 100 researchers. Presently, there are roughly 3 types of measurements that can be collected from RTE's grid: 10 second RMS values of voltage and current, PMUs, and fault recorders. The system is undergoing two main changes. On the one side, there are more and more inverter based and distributed resources that increase the need for system observability (potentially with a dynamic that is above what PMUs can do) and on the other side there is the digitalization of the substation measurement and communication. The work that will be presented in the webinar will try to bridge these changes, having a system that can be as efficient as PMUs for the 99.99% of the time when everything is smooth, but that does not stick to phasor representation in case of a transient.

We propose, based on the literature, to improve the existing approaches for compressing raw voltage and current signals with a compression ratio similar to PMUs. The approach consists of two stages of compression. The first stage models the electrical waveform. The second stage encodes the residual signals involving a DCT or DWT. Additional models to the literature are taken into account in the first stage, notably the variational auto-encoders traditionally used in image compression. A new model of the distortion introduced by the quantization of model parameters on the reconstructed waveforms is proposed. Using this model, an optimal rate allocation between the two stages is performed by balancing the distortion introduced by the parameter quantization and the quantization of the transformed residuals. After a brief description of the state of the art, the different steps and methods will be described and illustrated during the webinar.

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**Wednesday, February 22, 2023**
**10:00 a.m. Pacific / 1:00 p.m. Eastern (1 hr.)**
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