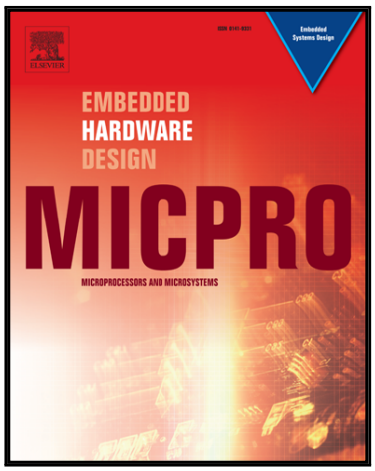

System of connections and transport of data registered from lightning discharges

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System of connections and transport of data registered from lightning discharges

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Abstract - **This paper is dedicated to connection links and data transportation methods of monitoring system in real time for measurement of direct lightning currents. There are a few different ways to record and locate lightning flashes. To confirm recorded events, different independent systems were used on Broadcasting Center of Montenegro (RDC). Four sensors are embedded and integrated in one system: current transformer, IP camera, electric field sensor and transient recorders. Software platform is developed for lightning activity monitoring system (LAMS) and it provides services for collection, transportation and processing of measured data. Additionally, lightning activity monitoring system is connected with an international lightning location system (LINET). A great number of data were collected, analyzed and compared.**

Keywords: **lightning activity monitoring, telecommunication systems, power systems, data analysis, data correlation**

I. INTRODUCTION

In the field of lightning research for engineering applications, the most important data are obtained by analysis of directly measured lightning current waveform. Any subsequent analysis of direct and indirect effects of lightning on power system relies on accurately determined lightning current waveform parameters. These parameters are essential to experimental correlations with corresponding generated electric and magnetic fields, evaluation and development of lightning return stroke models. Relevant lightning current waveform parameters are necessary for the construction of protection systems for power lines, telecommunication networks and for evaluation and calibration of the lightning detection systems. For example, any new equipment that needs to be installed into a power system is usually subjected to standard lightning impulse tests in order to be certain about its reliability and energy capability when exposed to lightning surge. Lightning natural characteristics are entirely different from testing procedures which focus on impulse with specified impulse wave shape (see IEC standards).

In order to select the appropriate lightning protection system, it is necessary to identify the parameters of lightning flash: shape of the lightning current (peak value, front time, tail time and duration), polarity and multiplicity – number of components in a flash. Front time and tail time can be determined only from direct measurements (if lightning current shape is recorded) [1].

During 1950s and 1960s, extensive experimental data recorded by professor Berger and his team on the top of two instrumented towers in Monte San Salvatore (Switzerland) resulted in a complete statistical characterization of lightning current parameters, which are still considered to be the reference in lightning protection standards. However, the results obtained by professor Berger and his team suffered from technological limitations of the instruments; in particular, from insufficient frequency bandwidth of a few hundred kHz, despite the fact that the spectrum of lightning current exhibits significant frequencies up to a few MHz [2-3].

Thanks to advances in development of measurement, information and communication technologies, today it is possible to develop a very powerful system for monitoring parameters of lightning current. Such monitoring system is installed on the mountain Lovćen in Montenegro and it is in operation since 2016 [4]. Mountain Lovćen is a region with a very high lightning activity. Therefore, measurement equipment was installed on the RDC tower of the mountain Lovćen, located at an altitude of 1749 meters above sea level. The monitoring station consists of a computer-communication infrastructure and supporting 4 measuring sensors: current transformer, IP camera, electric field sensor and transient recorders. A great number of collected data are analyzed, explained and compared. Data analyses showed that mountain Lovćen has the highest number of registered lightning strokes in the whole area. System of connections and links for transport of recorded data on lightning discharges is very important part of real-time lightning activity monitoring system. Therefore, this paper considers system of connections and transport of data registered from lightning discharges. Additionally, recorded data are shown and analyzed, as well as compared with data recorded by lightning location system LINET.