

UDC: 621.316.012

Dušan Vukotić^{1*}, Božidar Ćirić¹, Stojan Šiškoski¹

Evolution of the Concept of Automation of Underground Medium Voltage Electric Distribution Networks

¹„Elektrodistribucija Srbije“ Ltd. Belgrade, Serbia

Professional article

Highlights

- Automation of the MV electric distribution network is the backbone of "Smart Grids".
- The need to significantly improve the previously applied concept of automation of the MV electric distribution network.
- The improved concept of automation of the MV electric distribution network enables efficient restoration of power supply to end users after a fault occurs.

Abstract

More than two decades ago, the concept of automation of the MV electricity distribution network was adopted for the electric distribution area of the city of Belgrade, which was the initial basis for further intensive automation of the MV electric distribution network. The concept of the MV electric distribution network was primarily based on a decentralized concept, where a large number of elements were planned for integration into the SCADA system, with the possibility of activating standard predefined local automation functions. As there has been a significant functional improvement of the equipment for automation of the MV electric distribution network during the last decade due to intensive digitalization, further directions in terms of improving the existing automation concept, where a large number of automated points within the MV electric distribution network would need to be redefined. Additionally, the requirements regarding the increasing reliability of the MV electric distribution network have led to a situation where it is necessary to increase the degree of automation of the MV electric distribution network, but also to ensure a much higher degree of coordination between the embedded equipment for the automation of the MV electric distribution network. For the above reasons, it was necessary to start implementing new modern concepts of advanced automation of the MV electric distribution network, which were supported by the latest generation of equipment and solutions from the world's largest equipment manufacturers. One solution included the implementation of a semi-decentralized concept with network controllers, while the other solution included the implementation of a solution without a network controller with a predefined application algorithm within the embedded and integrated equipment for the automation of the MV power distribution network.

Keywords

Advanced Automation, Smart Grids, MV Network

Notes:

The full text of this article is available only in the Serbian language. In the English version, only its Abstract (above) is available.

This article represents an expanded, improved and additionally peer-reviewed version of the paper "Comparative Analysis of the Implementation of Advanced MV Electric Distribution Network Automation Solutions", awarded by Expert Committee EC-3 Protection and Control in Distribution Networks at the 14th CIRED Serbia Conference, Kopaonik, September 16-20, 2024

Received: February 24th, 2025Reviewed: June 3rd, 2025Modified: July 9th, 2025Accepted: July 18th, 2025

* Corresponding author: Dušan Vukotić, +381 64 834 2210

E - mail: dusan.vukotic@es.rs