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u okviru "IEEE Distinguished Lecturer Program"

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organizuje predavanje pod nazivom:

"Advanced demand profiling and management for efficient and secure operation of power networks"

Following the roll-out of smart meters in residential districts around the world, the end-users will gain better observability of their consumption, as well as higher potential to participate in the power network daily operation. Higher granularity of low-level consumption data in the future distribution grid will bring benefits to both consumers and the distribution system operator (DSO). On one hand, smart metering will facilitate awareness of consumers about their daily consumption and enable them to make savings by reacting to price signals or various types of incentives triggered by their electricity supplier. On the other, smart meter data will provide information to the DSO about individual load profiles, enabling more advanced profiling of consumers in different areas and at different levels of aggregation.

Load profiling has shown crucial role in the studies of direct load control, Demand Response (DR) programs, design of tariffs and involvement of local generation. An important part of load profiling is flexibility profiling, i.e. assessment of the size of controllable (shiftable) load within the total load. The assessment can be performed in two dimensions: i) Time:observing the change in the size of controllable load within the total load over a day or a season; ii) Space: observing the size of controllable load over a distribution network. In this case, different network buses will have different flexibility potential, depending on their load mix (namely residential, industrial or commercial users).

Demand side management (DSM) is the modification of demand side energy consumption patterns through various methods such as financial incentives and raising awareness of environmental sustainability. Usually, the objective of DSM is to encourage end-users to reduce demand consumption during peak times or shift the energy use to off-peak times such as night times to cater for system operational economics, network investment deferral, and system reliability enhancement. However, the advancement of electricity market liberalization, the proliferation of renewable but intermittent energy resources and cost reduction of energy storage devices has enabled a wide range of applications of DSM in electrical energy systems.

Numerous business models for DSM activities, which can generally be classified into energy efficiency and demand response, have been extensively investigated and some have already been trialed in pilot sites by industries. Energy efficiency related business models, which involve a permanent reduction of electricity demand by replacing them with new more efficiency appliances such as washing machines and florescent lights, may be investigated for bidding for energy saving performance contracts with customers and capacity resources with system operators and so on. On the other hand, demand response related business models, which are more extensively studied compared to energy efficiency, consist of interruptible/direct control loads for system reliability enhancing service, increase/decrease loads together with energy storage devices for frequency regulation, change load shapes for wholesale price reduction and compensate for the intermittent renewables with different actors of the networks including SO, TSO, DSO, consumers/prosumers, retailers, and aggregators.

All existing models focus on various promising services that DSM can provide based on its merits of flexibility or ramp provision. The DSM actions, as described above, however will have an impact on global power system operation such as voltage stability and angular stability. For example, shifting large amount of induction motors (e.g., washing machines or air conditioning) from peak time to off-peak time, the load mix at both, peak and off-peak hours will be changed and hence the load response to network disturbances locally (at buses where DSM was performed) and globally across the network. This may result in higher sensitivity of buses and the whole network to disturbances and potentially lead to unexpected network responses to disturbances and even to maloperation of protection system which would have been set based on historic network performance. Without proper analysis of the impact on power system performance, the action of DSM may endanger the system and lead to operation close to stability (voltage or angular or both) margin especially if there disturbance happens right after DSM action.

This presentation discusses advances in load modelling, demand profiling and shaping of dynamic response of demand from efficient processing of large amount of data coming from smart meters and extraction of information from existing customer data bases to forecasting demand composition, controllability and dynamic signatures of demand to the effect of DSM actions on overall network efficiency and security.

Biography of the presenter

Jovica V Milanovic received Dipl.Ing. and M.Sc. degrees from the University of Belgrade, Yugoslavia, Ph.D. degree from the University of Newcastle, Australia, and D.Sc. degree from The University of Manchester, UK. Prior to joining The University of Manchester, UK, in 1998, he worked with "Energoproject", Engineering and Consulting Co. and the University of Belgrade in Yugoslavia, and the Universities of Newcastle and Tasmania in Australia.

Currently, he is a Professor of Electrical Power Engineering, Deputy Head of School and Director of External Affairs and Business Engagement in the School of Electrical and Electronic Engineering at The University of Manchester, UK , Visiting Professor at the University of Novi Sad and the University of Belgrade, Serbia and Conjoint Professor at the University of Newcastle, Australia. He was chairman of 3 international conferences , editor or member of editorial/technical boards of 60+ international journals and conferences, research project assessor for 12 international government research funding councils, member of 8 (convenor of 2) past or current IEEE/CIGRE/CIRED WG and consultant or member of advisory boards for several international companies. Professor Milanovic published about 450 research papers and reports, gave key-note speeches at 19 international conferences and presented over 130 courses/tutorials and lectures to industry and academia around the world. Professor Milanovic is a Chartered Engineer in the UK, Foreign member of the Serbian Academy of Engineering Sciences, Fellow of the IET, Fellow of the IEEE, Distinguished IEEE PES Lecturer and currently serves on IEEE PES Governing Board as Regional Representative for Europe, Middle East and Africa and on IEEE PES Fellows Committee.

Plan aktivnosti:

10:30-11:00 ***Registracija i osveženje***
11:00-12:00 ***Predavanje***
12:00-12:30 ***Diskusija***