Project Title: Determining EMS Software Technical Specifications and Requirements

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Project Necessity:

EMS energy management system software in power network is used to control and optimize production capacity and transmission system and have the ability to monitor, control and optimize the operation of transmission and management of assets in real-time.

Control centers have become complex and advanced control, computing and communication systems over the years. The EMS system of control centers (especially the main control centers at the level of interconnected network transmission) is one of the most critical tools for planners and users to maintain network reliability and security.

Considering the two very important issues of vitality and security of the controlled system and the benefits of passive defense, as well as the two Prospective issues of self-sufficiency and removal of barriers and limitations and knowledge overflow, local development of power grid monitoring and control software seems necessary. The EMS software requirements document must be prepared and compiled at the beginning of the design and implementation of EMS software.

Project Goals:

In Niroo Research Institute, in a project aimed at "conceptual design and development of the EMS software structure of the National Support Center for National Electricity Dispatch of Iran", a strategic document and a technology development roadmap were prepared. To implement the EMS Technology Development Strategy document and roadmap, the first step is to determine the technical specifications and requirements of the required software specification system (SRS) and the operational requirements of the EMS software.

Due to the necessity and achievement of the document objectives of this project, with the aim of preparing and compiling a document, the requirements and characteristics of the EMS software of the National Support Center for National Electricity Dispatch of Iran were defined.

Abstract:

The Software Requirements Specification (SRS) document is a document that describes the challenges, features, and requirements that need to be addressed by this software. These documents must be prepared before starting a project, in which the limitations, facilities, job descriptions of each software, time response and interactions and communications between the software are specified and the general standard governing the software suite is determined. The kernel programming language, system interface programming language, programming environment, operating system, network topology processor, database and security items are specified in detail in this section. The requirements description is prepared using the opinions of academic experts and specialists of Iran Electricity Grid Management Company (IGMC) and the documents of ABB and SNC-LAVALIN companies.
The list of EMS software whose technical specifications were developed in this project is as follows:
These applications are prioritized in 5 packages:

Pakage No.	Software		Pakage No.	Software
1	State estimator		4	Observability
	Load Flow			Network Topology Processor
	Contingency Analysis			Detecting incorrect data
2	Voltage Scheduler & Volt/VAR Control		5	PRE SWITCHING VALIDATION
	Optimal Power Flow			Short-Term Load Forecasting
	Short-Circuit Analysis			Voltage Stability Analysis
	Economic Dispatch			Transient Stability Analysis
	Security Constrained Unit Commitment			Restoration
3	Automatic Generation Control			Long-Term Load Forecasting
	Interchange Schedules			
	Reserve Monitoring			
	Load Shedding			
	Fuel Availability Management			
	Hydro Thermal Coordination			

Steps and Methodologies:

First, the status of the existing dispatching system, familiarity with the dispatching structure of regions, review of dispatching information systems (database and infrastructure) and architecture, different layers of electrical dispatching processing and SCADA and dispatching functions were discussed. Next, the reports of SNC Lavaline (a consulting company that had conducted studies for the country's dispatching company) examined the analytical performance and management functions of EMS. In the following chapters, the requirements for EMS_APPLICATION_REQUIREMENTS, including the user interface, storage and retrieval items, and the requirements of the EMS analytical functions, were extracted.
Power system network analysis including general requirements, power network modeling and general requirements, software services and operating rules and software architecture features required and non-

functional requirements were examined. Finally, the information model of the energy management system based on the IEC 61970 standard was briefly described.

Main Results (technical outputs, patents, papers, books, reports, etc.):

- SRS document including specifications, requirements and requirements for design and implementation of EMS power management system software.
- Using the existing SRS, the architecture and organization, design and analysis of native EMS software development will begin.