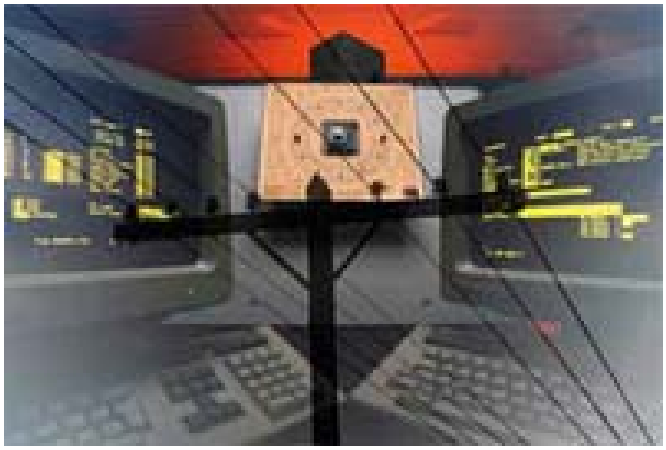
Development of an Integrated Energy and Communications Systems Architecture (IECSA)



Develop an overall integrated energy and communications system architecture that will enable the integration of a wide variety of intelligent electric power system components

Society has entered into a new era of economics and social experience driven by digitally based technologies. Our world is more interconnected than at any time in history, utterly dependent on the integrity of complex networks, including the Internet, telecommunications, and electric power systems.

In many ways, the electricity network is the foundation of this interconnection. However, the electricity system—generation, transmission, distribution, and end use—is in serious need of upgrading towards an appropriate twenty-first century architecture if the benefits of interconnection are to be fully realized at both commercial and individual consumer levels.

Lack of critical infrastructure investment and surging demand for high quality, digital-grade electricity has taxed the electrical infrastructure beyond its limit. Put simply, the current system cannot meet demand. EPRI research shows that U.S. electricity demand has exceeded transmission capacity by more than 15% for the last ten years. Most credible forecasts predict that this inequity will continue. Additionally, microprocessor-based technologies have radically altered the nature of the electrical load, resulting in electricity demand that is incompatible with a power system created to meet the needs of an analog economy. This has led to unprecedented electricity reliability problems, as well as low service quality responsible for hundreds of billions of dollars in losses to industry and society annually.

EPRI and the Electricity Innovation Institute (E2I) have formed the Consortium for Electric Infrastructure to Support a Digital Society (CEIDS) to provide the strategic framework for this serious commitment to upgrading the electric system.

The Integrated Energy and Communications System Architecture (IECSA) project will develop an open, standards-based systems architecture for the data communications and distributed computing infrastructure that will enable the integration of a wide variety of intelligent electric power system components. This infrastructure will build upon prior industry infrastructure work, leverage the newest communications and distributed computing technologies available, and provide the interoperability/interworkability foundation for system development.

OBJECTIVES IECSA will develop an overall integrated energy and communications system architecture for the intelligent equipment and data communications networks necessary to support the self-healing grid and integrated consumer communications interface by reaching the following objectives:

- Develop a complete set of systems requirements and architecture documents to support industry-wide enterprise architecture for the self-healing grid and integrated consumer communications interface.

- Contribute project results as appropriate to relevant Standards Development Organizations (SDOs) and industry consortia to effectively move the development of key open standards forward to develop a robust industry infrastructure.
- Apply systems engineering to the development of the architecture including but not limited to the elicitation and management of system requirements, analysis of requirements and development of proposed architectural designs, evaluation of architectural designs, and the use of standardized industry notation for documentation of architectural views.
- Identify the potential for infrastructure sharing and synergy between power engineering operations and other application domains.

BENEFITS This project will address looming industry issues related to the design, deployment, and management of intelligent equipment for the existing and emerging power/energy industry.The self-healing grid will not only enhance reliability, but also will enable innovative customer services, reduced O&M costs and increased throughput on existing lines via more effective power flow control. Additionally, the self-healing grid will increase grid security by hardening the system against unwanted intrusion and threat of terrorism.

Dynamic consumer interaction will be possible with the new infrastructure. This will allow incentive-based load reduction signals, the ability to influence loads through transparency in (or real-time) pricing, emergency load reduction signals, and other methods to dynamically impact the characteristics of consumer loads.

PROJECT PLAN This project will use a systems engineering approach based on the current methods for complex system designs. Each project task has specific deliverables that contribute to an emerging collection of desired system features and functions. The following tasks outline the envisioned approach for this project and will be used as a guideline only:

1. Initial Applications Scope and Stakeholder Identification
2. Existing Infrastructure and Technology Assessment
3. System Requirements Development
4. Requirements Analysis
5. Systems Architecture Definition and Associated Views
6. Technologies and Standards Assessment
7. Recommendations for Further Development of the Architecture

CONCLUSION This far-reaching project will define an overall technical framework for a robust technical architecture for data communications and equipment interoperability. It will contribute to the development of relevant open system standards and create a shared infrastructure that can enable the envisioned future. It is not just codifying the past but inventing the future by meeting the ongoing need for a stable, open systems-based shared infrastructure to enable the integration of equipment into an enterprise and industry-wide managed distributed computing system.

THE ELECTRICITY INNOVATION INSTITUTE (E2I) E2I is a recently created, non-profit, public-benefit organization designed to conduct strategic, breakthrough R&D in energy-related science and technology. It is affiliated with, and will draw upon the technical expertise of EPRI, which has 30 years of experience conducting research on the electric generation and delivery system. Through the creation of public/private partnerships (including industry, federal and state governments, and foundations), E2I in collaboration with stakeholders supports and directs science and technology innovation in electricity supply, delivery, and utilization.

CONTACT INFORMATION For more information about the E2I DR Partnership Initiative, or a copy of the prospectus on how to participate, EPRI utility members please contact your EPRI representative. Others please contact E2I:

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