

CONFERENCE DAY 1: 02 MARCH 2022
SPECIAL PLENARY 1
EVOLVING ARCHITECTURE OF THE 21ST CENTURY GRID WITH
TWO-WAY POWER FLOWS

Venue & Time

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| Venue | Plenary Hall |
| Time | New York 08:30 ~ 10:30 Paris 14:30 ~ 16:30 India 19:00 ~ 21:00 Tokyo 22:30 ~ 00:30 (Next Day) |

Session Background

Present architecture of the electric grids is a legacy of the 20th century based on the fundamental concepts of “one-way flow of electricity” and “electricity cannot be stored”. Today with distributed energy resources, storage, prosumers and electric vehicles connected to the distribution grid, it needs to be redesigned to support bi-directional energy flows. Both transmission and distribution grids follow the same architecture today; but in the era of distributed RE resources connected to the medium voltage and low voltage grids, the distribution grids require a different architecture. Grid reliability is threatened by increasingly erratic and severe weather events and changing customer behavior of adding renewables and other non-wire alternatives both on grid and behind-the-meter. The recent advances in operational technologies (OT) and information technologies (IT) such as advanced automation systems, smart inverters, cloud computing, mobile computing, machine learning, big data analytics have potential for efficient grid management at a lower cost.

The new Grid Architecture will include (1) different system operators controlling segments of the system; (2) different sources of active/reactive power supply ranging from transmission-located to rooftop solar-based; (3) the ability to dispatch sources of power supply versus ‘must take’ when available; (4) new cost models for this power whether tariff-based or market-based; and (5) adjusting how ancillary services are procured to ensure the grid will work reliably providing quality power to all. The new approach is to have two different architectural constructs – a **data bus** and a **control bus**. While the data bus is responsible for carrying all non-operational models of information necessary to drive utility decisions, the control bus is responsible for carrying all operational data and control actions taken at the local level, centralized level, or other levels in between where that exist. The two buses are isolated by one or more security mechanisms ensuring that information transported by either of them or their actions are not compromised.

Discussion Points:

1. Emerging Integrated Grid with DER and Two-Way Flow of Power
2. Grid-Edge and Behind-the-Meter Resources and its Management
3. Evolving Grid Architecture with Two Buses
 - a. Standardized and Open Interfaces
 - b. Standardized Tools and APIs
 - c. Standards-based and Standardized Models
 - d. Self-registration of Devices, Applications and Systems
4. Roadmap for New Architecture for the Grid

Chair and Moderator

Ravi Seethapathy, Chair, ISGF WG on RE and Microgrid; and Chairman, Biosirus, Inc

Theme Presentation

Mani Vadari, President, Modern Grid Solutions, USA

Speakers

1. **Andres Carvallo**, CMG Consulting, USA
2. **Saifur Rahman**, President, IEEE
3. **Mark McGranaghan**, EPRI Fellow and VP – Power Delivery and Utilization, EPRI
4. **Nader Farah**, President, ESTA International, USA
5. **Luciano Martini**, Chair-Executive Committee, ISGAN
6. **Andrew Dicker**, Managing Director- Utilities Strategy, Accenture, USA
7. **Anjan Bose**, Regents Professor, Washington State University
8. **Abhay Choudhary**, Director- Projects, POWERGRID Corporation of India Limited
9. **Kenneth Budka**, Senior Partner, Bell Labs Consulting, Nokia
10. **Adarsh Nagarajan**, Group Manager - Power System Design and Planning, National Renewable Energy Laboratory (NREL)

Q&A

Key Takeaways by Moderator