The present infrastructure of energy delivery was designed over 60 years ago with the goal to be centralized. However, it is aging and is under-utilized, which will potentially limit the world's ability to achieve its energy objective. The lack of vibrant control on the grid makes it difficult to stop cascading power failure, and high penetration of renewable energy resources such as wind and solar is already creating issues of grid instability. A decentralized and distributed control mechanism should be implemented with a definite communication protocol to solve the issues mentioned above. The future electric power grid consists of a distributed generator and loads. The implementation of a distributed control will benefit utility services and will create financial advantages.

One of the best solutions is to organize these DGs in a Microgrid structure which will then connect to the main grid through the point of common coupling (PCC). A proper organization and control of the Microgrid is always a big challenge. Cooperative control makes it possible to bring together different agents in the networked systems as a group and realize the desired objective. The micro grid power objective is set by a virtual leader and transferred to the other agents in the system through a local communication channel.

A distributed cooperative control is formulated to effectively organize all the DGs in the Microgrid to produce the necessary active and reactive power to satisfy multiple objectives. It not only satisfies the active power flow from the main grid to a constant but also reduces the reactive power flow to the main grid. Moreover, the algorithm can be used to implement the demand response continuously using a combination of DGs and their local controllable loads. The approach is to use distributed inverters with the aid of multiple local communication channels for active power compensation of the micro-grid real-time in a distributed and cooperative manner.