Nowadays, the demand of electricity goes on increasing due to the rapid growth of industrial and infra-structural facilities. To meet out this demand of electricity, a number of new private power producers are increasing. All the power producers are utilizing the common existing transmission system. Due to this, the magnitudes of the power flow in some of the transmission lines reach closer to their maximum limits. In addition, the power system engineers operate the power system network up to its maximum limits economically to improve the system efficiency.

But, voltage stability problems arise due to the maximum loadability of a transmission system. Hence, power system operators must track the system; i.e., how close the transmission system is to its maximum loadability limit. As line loading of transmission system approaches their maximum loading limit, action has to be taken to relive the critical transmission lines. Hence, the Maximum Loading Point (MLP) of the system must be determined to operate the system upto their maximum limits without losing its stability. In this situation, if it fails to maintain bus voltage within the permissible limits, then the system enters into voltage instability. This will lead to cascaded outages and power system blackout.

To meet out these new challenges, existing generation and transmission facilities must be utilized effectively or modern facilities should
be added to the existing power system. The development of the new-generation facility and the new transmission system need more investments and time. Alternatively, voltage stability, loadability of the existing system and reduction of real power loss is achieved with the help of Flexible AC Transmission System (FACTS) devices like Static Synchronous Compensator (STATCOM), Static Var Compensator (SVC), Thyristor Controlled Series Compensator (TCSC) and Unified Power Flow Controller (UPFC).

It is found from the literature that, most of the researchers are only considering the normal state of the system for placement of FACTS devices. But, the voltage instability problem usually occurs in the system under stressed conditions. Hence, the analysis of FACTS devices under heavily stressed condition is very important. Here is considered not only the normal state of the system, but also the system in a stressed condition for the placement of FACTS device and for the improvement of maximum loadability without violations in voltage.

In this work, MLP of the system is determined from the Power-Voltage (PV) curve. The PV curve is obtained by the Continuation Power Flow (CPF) method. The suitable location of FACTS device is identified by the voltage stability analysis and MLP of the system. The FACTS device can supply or absorb sufficient amounts of reactive power so that, it will improve the voltage stability of the system.
The effectiveness of the proposed work is analyzed using IEEE 14 bus and IEEE 30 bus test system. The simulation is done using MATLAB and Power System Analysis Toolbox (PSAT). The proposed method identifies suitable device and its appropriate location. The simulation result confirms the proposal.