Y9.ET1.1 Interface between The FREEDM System and Power Simulation's Software

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Project Objectives

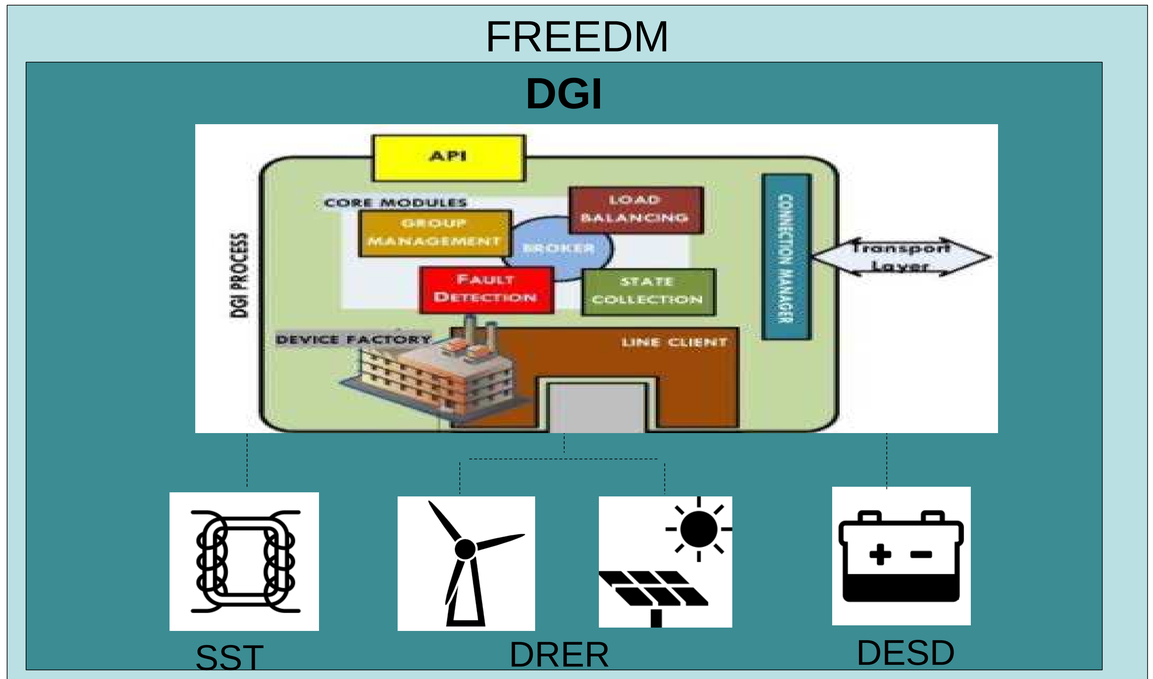
- To design an interface between power simulation software (OPENDSS) and the FREEDM system
- The new interface will help us to perform large scale simulation tests with the FREEDM system coupled with DGI.

Background

- The FREEDM System is moving towards maturity which gives rise to the requirement of testing the system on large scales
- OpenDSS is a power simulation software which allows simulation of large scale industrial power systems

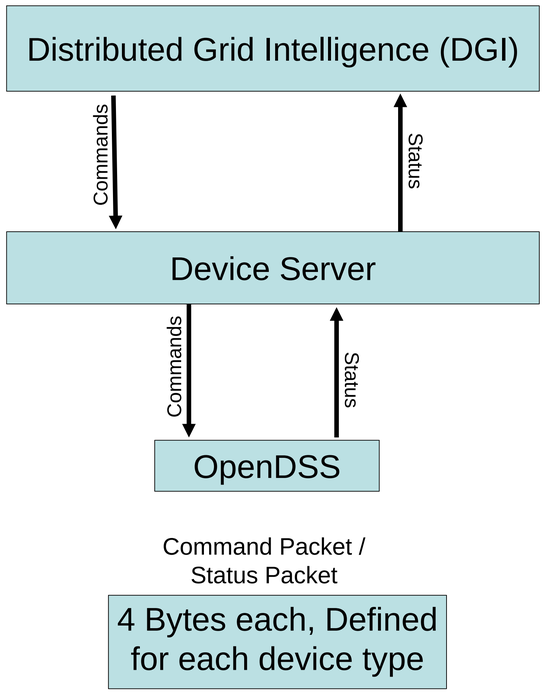
Approach / Implementation

- Insights from another power simulations software PSCAD (integrated with FREEDM system)
- Create external stubs that intercept the openDSS and DGI outputs
- The DGI then processes these values to understand the state of system and produce outputs for another openDSS simulation.




```
DeviceServer start()
{
  Create Socket();     //wait connection
}
DGI Start()
{
  Load OpenDSS Adapter();
  Load Devices();
  Initiate connection();
}
```

```
OpenDSS Start()
{
   Call OutputParser()
}
OutputParser()
{
   Parse CSV;
   Load Values to Device server;
}
```



Command Packet / Status Packet

4 Bytes each, Defined for each device type

Conclusion

- The implementation will allow us to enhance the existing FREEDM system integration to power systems simulators and enable large scale testing.

Future Work

- Enable DGI to send commands to OpenDSS
- Deployment as operational LSSS testbed
- Security analysis/threat mitigation on the FREEDM smart grid

References

- http://freedm.readthedocs.io/en/2.0.1/
- http://smartgrid.epri.com/doc/OpenDSS%20Level%201%20Training.pdf

Partners