

# Communication Network Analysis in Wide Area Measurement System

CS 620 Course Project

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# Outline

- Background and Motivation
- Problem statement
- Existing solutions to the problem and their drawbacks
- Proposed solution
- Deliverables with timeline
- Challenges
- Conclusion

# Motivation

- Design of the communication infrastructure affects the performance of different WAMS applications
- Each applications has different data and latency requirements
- There needs a methodology to validate if the existing design meets the needs of the applications

# Problem Statement

- To determine the latency and bandwidth of a communication infrastructure in WAMS, and study its impact analysis on power system applications

# Existing solutions to the problem and their drawbacks

- Lacks a clear methodology to determine the latency and bandwidth requirements for a given communication infrastructure

# Proposed Solution

- Build a ns2 wrapper that can generate the tcl script for given network topology of WAMS
- To Simulate a Standard IEEE 14 bus with 14 PMU at each Bus and a PDC at a fixed location
- To consider the effect of link failures and background noise on overall latency

## Timeline and Roadmap of the project

- The entire timeline is designed with 3 phases, each phase is 20 days.
- Each phases have two sub-phases with 10 days.
- The project work is planned into four levels.
  - i. NS 2 workout
  - ii. Generalized wrapper on NS 2 for WAMS
  - iii. WAMS communication workout
  - iv. Bandwidth and Latency requirements workout and prepare project report

Plan	Plan phases and implementaion	10 days	10 days	10 days	10 days	10 days	10 days
Study of NS 2 Simulator	Understanding architecutre, components, and its existing input-output interfaces	█					
	Creating sample models for dive more into NS 2		█				
	Modeling of generic communication components in the NS 2			█	█		
Creating generalize NS 2 wrapper for WAMS	Design of input configuration format where WAMS communication can be modeled without interaction with simulation software			█	█		
	Design of python scripts where it import config and exports system needed .tcl scripts			█	█	█	
	Validation and testing of the wrapper				█	█	█
Model WAMS communication scenarios through developed NS 2 wrapper	Literature survey on WAMS communciaiton systems and prepare the exhaustive list of its protocols, components, and other network elements				█	█	█
	Model IEEE 14 bus system through wrapper					█	█
	Validate and test the system						█
Observe the Bandwidth and Latency (BaL) requirements, and its analysis on few WAMS applications	Get the BaL for the designed model						█
	Analysis of the model: as varying communication parameters and traffics						█
	Document the project with all above scenarios and results						█



# Current Progress

- understanding architecture of NS 2, creation of sample models, and modeling of communication components has been completed.
- Presently, the work progress is carrying on writing python scripts, which imports input configuration (modeling of WAMS communication system) and generates .tcl scripts
- We will update for every phase completion.

# Challenges

- Identifying the different types of traffics and building the network model accordingly
- Modeling different delays in simulations