Motivation:
- Microgrid
  - Small-scale, low-voltage power network;
  - Emerging & promising paradigm for improving resilience of electric infrastructure;
  - Enhance power supply quality.
- Communication infrastructure
  - Critical for microgrid with smaller inertia renewable energy sources;
  - Challenges: low latency for time stringent packet (e.g. 4ms), resilience to communication network failures, diverse QoS requirement.
- Software Defined Network
  - Ultra-fast programmable network;
  - Flexible, dynamic network monitor and management;
  - Diverse QoS support.

SDN-based communication architecture

Technical Approach
- SDN Controller actively monitor link delay in real time;
- Dynamically change path based on latency requirement;
- Divert traffic if no path satisfy guaranteed delay;
- Passively monitor port status and dynamically reconfigure route if link fails;
- Packet Prioritization with meter and queue.

SDN-enabled Microgrid Communication

Experimental Results
- GENI infrastructure;
- Open vSwitch and hardware OpenFlow switch.
- Path Selection for latency guarantee (OVS)
- Divert Traffic for latency guarantee (OVS)
- QoS with queue (OVS)
- QoS with meter (hardware switch)

Conclusion and Future Work
- Innovative SDN-based communication architecture for microgrid;
- Latency-guaranteed communication, failover recovery delay analysis and packet prioritization;
- Evaluation and demonstration using GENI infrastructure.
- Future work:
  - Improve monitoring accuracy, robustness of route reconfiguration;
  - Extension to various microgrid packets.