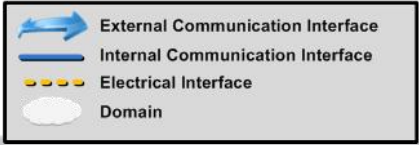
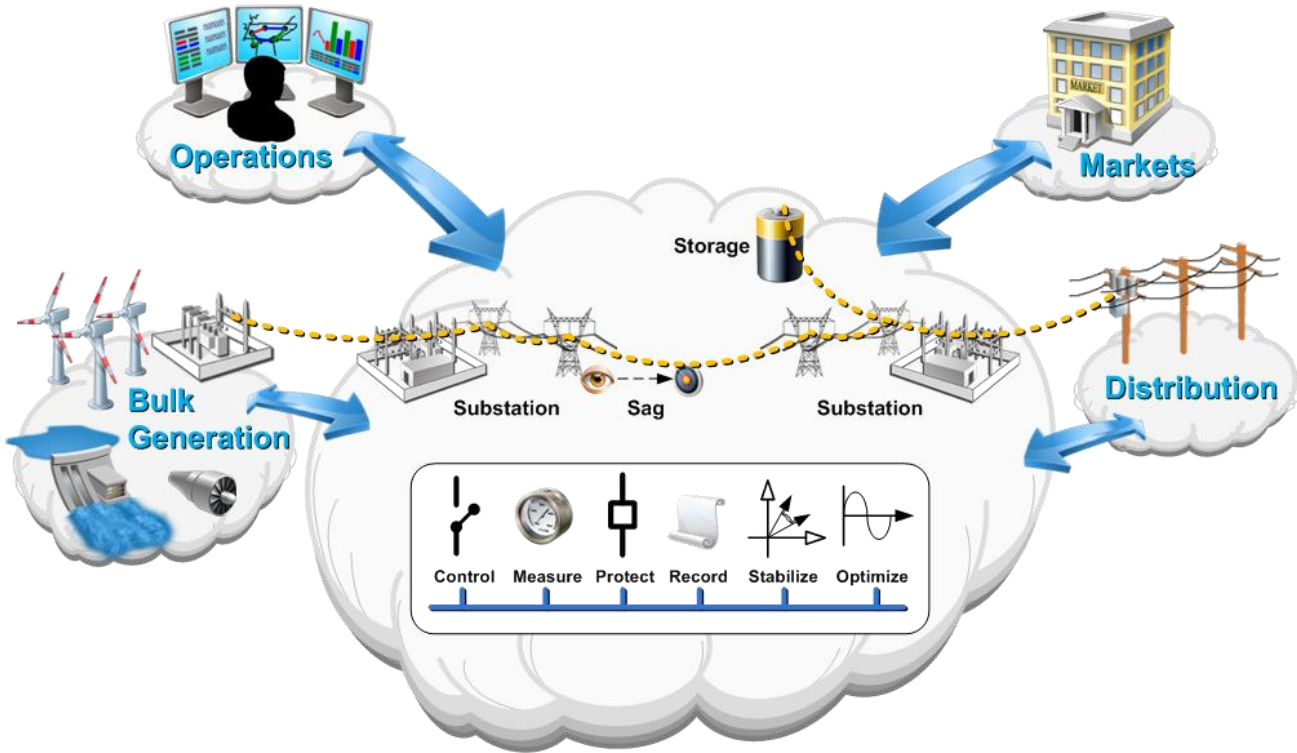


Transmission Working Group (ref: NIST-EPRI Smart Grid Interoperability)

Transmission



Scope of Document

- Smart grid definitions
- Topologies
- Interoperability
- End-use
- Interfaces
- Integration
- Functional attributes
- Performance attributes
- Test and verification methods

Towers

- Foundation and structure designed for increased capabilities to withstand environmental stresses (fire, wind, seismic event)
- Foundation and structure designed for increased physical security against manmade threats
- Ability to support future installations/retrofit of new conductor types
- Capacity for future installations of new circuits or conductors on existing circuits
- Provision for fiber optic link along circuit
- Provision for power flow control equipment on tower or near structure on conductors
- Provision for installation of remote transmission units (RTU) for data networking on tower
- Easy access to tower and related structure by line crews for maintenance, upgrade and installation
- Tower structure support onboard or integrated structural diagnostics (corrosion detection, mechanical failure, wind or ice loading, etc.)

Conductors

- Initial in-service rating no more than 50% of maximum to provide for future load growth
- Conductor spans optimized for vibration dampening
- Conductor mechanical strength sufficient to support dampeners and on-line flow control equipment
- Conductor drop controlled for maximum wind on maximum hot day with maximum load
- Conductors should support dynamic line rating protocols
- Capacity for adding additional conductors to bundles/groups for circuit available transmission capacity expansion

Connectors

- Connector suitability to planned and future load growth parameters.
- C119.4, C119.7(proposed) requirements.
- Standardized methods of connecting future DER proximity sites (Wind Solar, geothermal, Super Con, etc to existing lines.
- Means and methods of measurement of power contribution.
- Structural impact analysis
- Pre-existing connector terminal lugs to accept DER grid tie point.

Vibration Mitigation

- Parameters collected
- Format of data collected.
- Insulators
- Parameters Collected
- Format of Data collected and transmitted
- Environmental, stress and corona Degradation

OPGW

- Parameters collected
 - Vibration
 - Transient activity
 - Relative ground integrity
 - Communication interfaces
- Format of Data collected and transmitted

FACTS

- Work Underway

VAR Control

- Work Underway

Dynamic Thermal Line Rating

- Work Underway

Synchrophasors

- Work Underway

Protection

- Over-current and ground-fault protection
- Under-voltage and over-voltage protection
- Under-frequency and over-frequency protection
- Thermal overload protection
- Negative phase sequence over-current and over-voltage protection
- Provision for fault current limiter installation at terminations
- Installation of new circuits must not exceed fault current ratings of downstream components, circuits and systems
- Retrofit of existing circuits must not exceed fault current ratings of downstream components, circuits and systems
- Maximum provision for local connection of distributed generation resources

Communications

- Overall transmission system should support wide area situational awareness (WASA)
- Provide transmission line/circuit data for reliability and efficiency monitoring
- Provide transmission line/circuit data for congestion relief
- Provide transmission line/circuit data for optimal utilization of assets and power flow control
- Provision for weather stations on towers/lines?
- Provision for GPS locations and unique identifiers on towers/lines?
- Coordination between phasor data (electrical events, frequency, phase angle, phase load balance, voltage and stability) and real-time circuit physical/mechanical status (temperature, sag/droop, clearance to ground or neighboring conductors/structure, true available transmission capacity)
- Tension-based real-time monitoring of conductors?
- Temperature-based real-time monitoring of conductors?
- Data over power line?
- Data over license-free radio spectrum (Wi-Fi, Wi-Max, GSM, 900 MHz/433 MHz RTP, 3G)?
- Distributed Network Protocol (DNP 3.0)?
- IEEE 1379-2000?
- IEC 62351-5?
- MODBUS?
- IPv4/IPv6?
- IEC 61850/IEC 61968?
- IEC 1547.3?
- Latency requirements – desired and allowable maximum