

“Draft Central Electricity Regulatory Commission (Communication system for inter-State transmission of electricity) Regulations, 2016”

Explanatory Memorandum

Background

Communication systems are essential to facilitate secure, reliable and economic operation of the grid. It is also an important pre-requisite for the efficient monitoring, operation and control of power system. For integrated operation of all India Grid, uninterrupted availability of the real time data of various Power System elements assumes utmost importance. With the increase in the size and complexity of the grid, the communication needs of the power sector have increased drastically. Supervision and monitoring of grids call for transfer of real time operational data such as voltage, frequency, real and reactive power flow, energy, and status of circuit breaker & isolators positions, transformer taps and other parameters from their station to Data Collection Point (DCP) of CTU. The data is required to be automatically updated cyclically (typically every ten seconds) at the load dispatch center for giving up to date information about the health of power systems on round the clock basis for enabling efficient and effective monitoring, supervision and control of the power system. The telemetry system is still poor in various parts of the country's network.

2. At present, the provisions relating to communication systems for the power sector have been spelt out in the Central Electricity Regulatory Commission (Indian Electricity Grid Code), Regulations, 2010 and Central Electricity Authority (Technical Standard for connectivity to the grid) Regulation.

2.1 Regulation 4.6.2 of the Indian Electricity Grid Code (IEGC) provides as under:

"4.6.2. Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision/ control of the grid by the RLDC, under normal and abnormal conditions. All Users, STUs and CTU

shall provide Systems to telemeter power system parameter such as flow, voltage and status of switches/ transformer taps etc. in line with interface requirements and other guideline made available by RLDC. The associated communication system to facilitate data flow up to appropriate data collection point on CTU's system shall also be established by the concerned User or STU as specified by CTU in the Connection Agreement. All Users/STUs in coordination with CTU shall provide the required facilities at their respective ends as specified in the Connection Agreement."

- 2.2 Regulation 6 (3) of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations provides as under:

"The requester and user shall provide necessary facilities for voice and data communication and transfer of online operational data, such as voltage, frequency, line flows and status of breaker and isolator position and other parameters as prescribed by the appropriate load dispatch centre."

3. As per the above provisions, all requesters, users, STUs and CTU are obligated to provide Systems to telemeter power system parameters. However, many of the entities have not provided necessary facilities and in many cases the adequacy, consistency and reliability of data is far from satisfactory. The Commission has from time to time given requisite directions inter-alia seeking plan for establishment of communication system. The Commission, in its order dated 26.9.2012 in Petition No. 168/MP/2011, had observed as under:-

"45. We also observe that many State Transmission Utilities, State Power Departments/Electricity Departments have not responded to our directions to submit a clear-cut action plan for the establishment of the communication system for the existing system and the time schedule for completion including the provisioning for integration of new generating stations and the substations coming in future."

4. It is noted that the existing provision in IEGC does not dwell upon a mechanism for planning of communication systems, roles and responsibilities of various organizations and standards/protocols to be followed, which are very vital in view of the criticality of communication systems for the power sector. IEGC as well as

Tariff Regulations also do not provide norms for availability of communication system for inter-state transmission system in the country. It has, therefore, been proposed that new Regulations be framed covering the aforementioned aspects and duly taking in to consideration the new developments and emerging requirements of the grid operation and control such as Smart Grid/Smart Metering/Automatic Generation Control, PMUs, solar roof top and other RE sources for proper forecasting, scheduling, operation and control.

Task Force

5. Accordingly a Task Force was constituted by the Commission vide its order dated 22.04.2015 contemplating framing of draft Regulations on “Communication Systems in Power Sector” under Smt. Neerja Mathur, Former Chairperson, CEA and Member, JERC for State of Goa and UTs as Chairperson. The Task Force submitted its report to the Commission on 12.02.2016 which is available at CERC website (<http://www.cercind.gov.in/2016/whatsnew/RTF.pdf>). The report of the Task Force covers communication needs of power sector, planning for communication requirements of power system, smart grid, cyber security and roles & responsibilities of various organizations etc.

Planning of Communication System

6. A robust and reliable communication system for power sector involves formulation of planning criteria/guidelines and technical standards for communication systems, specifying redundancy, safety and cyber security requirements. Norms for availability of communication network also need to be specified. Task Force recommended that CEA needs to be entrusted with responsibility of formulating and notifying planning criteria/guidelines and technical standards/protocols duly considering requisite redundancy requirements as well as requirements of smart grid and cyber security for communication system for power sector in the country and grid integration with the neighbouring countries. The Task Force has also suggested a perspective communication plan to be made by CEA and the same needs to be continuously updated to take care of future requirements of power sector.

7. In view of the inherent technical advantage (availability of ROW of the transmission line) as well as the cost advantage of having a Composite Earth Wire cable (OPGW) or a separately strung fiber cable on transmission towers, communication is always aligned with the transmission lines. It is, therefore, necessary to plan and implement communication system along with the transmission network. Task Force was of the view that constitution of a Standing Committee for communication systems, on the same lines as the existing Standing Committee for Power System Planning constituted by CEA, is essential. The Standing Committee on Communication System should function in close coordination with the Standing Committee on Power System Planning. The communication requirements on inter-State transmission proposals including system strengthening schemes identified would be discussed, reviewed and finalized in the meetings of Standing Committees for Communication systems to be set up by CEA. Standing Committee would monitor and facilitate timely completion of schemes and projects for improving and augmenting the communication system along with transmission system. The mode of communication between various nodes to be decided by the Standing Committee on Communication System keeping in view the data volume and the response time requirement.

Cost Sharing

8. The principles for cost sharing of communication system for power sector and its operation and maintenance charges are notified by the Central Commission under the CERC Tariff Regulations from time to time. However, there are no norms for target availability of communication systems in CERC Tariff Regulations. Uninterrupted availability of the real-time data of various power system elements is essential for the reliable and secure operation of the grid. In view of critical importance of communication system for ensuring reliability and security in operation of the grid and optimum utilization of transmission system, there is a need for all owners to establish very high availability of communication systems so

that power system operation may be most reliable and optimum. Therefore, it has been proposed in draft Regulations that owner of communication system shall maintain the channel availability up to 99.9%.

Up-gradation

9. In so far as the up-gradation of communication facilities is concerned, the same may be addressed by the Standing Committee on Communication System duly keeping in view the technological advancements, requirements of power sector as well as the performance of existing communication facilities.

Roles and Responsibilities

10. The Electricity Act, 2003 recognizes that transmission planning process is a coordinated activity in which CTU and STU need to coordinate among themselves in addition to coordination with Authority, Government, Licensees and Generating companies. CTU and STUs are obligated to discharge all functions of planning and co-ordination relating to inter-State transmission system and intra-State transmission system respectively. Task Force also recommended that CTU shall plan, coordinate and develop communication systems as per the requirement of major inter-State transmission system including inter-regional schemes considering perspective plan/planning criteria and guidelines issued by the CEA, operational feedback from NLDC/RLDCs/SLDCs and Renewable capacity addition plan issued by Ministry of New and Renewable Energy Sources (MNRES), Govt. of India. CTU should be the nodal agency for planning, coordination and development of communication system for ISTS. All STUs and users will supply the desired data to CTU from time to time to enable formulation of communication plan.

11. Further based on Plans prepared by the CTU, STUs are to plan their intra-State communication systems appropriately and adequately for further exchange of information to/ from the communication system for ISTS and to optimize the use of integrated communication network. STUs are to plan, coordinate and develop

reliable communication systems for data communication within a State among SLDC, DISCOM control centers, Substations of STU, State Generating Stations, IPPs and Renewable Energy Generators within State system. STU should be the nodal agency for planning, coordination and development of communication system for Intra-State transmission system. STUs should provide access to their wideband network for grid management by all users.

12. The Electricity Act, 2003 prescribes following functions for RLDCs as given under:

“(3) The Regional Load Despatch Centre shall –

(b) monitor grid operations;

(d) exercise supervision and control over the inter-State transmission system; and

(e) be responsible for carrying out real time operations for grid control and despatch of electricity within the region through secure and economic operation of the regional grid in accordance with the Grid Standards and the Grid Code.”

13. Similar functions are also prescribed for SLDCs for intra-State transmission system in the Electricity Act. Task Force is of the view that nodal agency for integration of communication system with SCADA, WAMS, VCS, AMR, EPABX, Tele-protection system is to be respective RLDC for ISTS and SLDCs for intra-State system. Further the NLDC should prepare and issue guidelines on the interfacing requirements in respect of terminal equipment, RTUs, SCADA, PMUs, Automatic Generation Control (AGC), AMI, etc. and for data communication from the User's point to the respective control centre(s) based on technical standards framed by CEA from time to time. Till the time technical standards are framed by CEA, NLDC shall adopt necessary standards. The NLDC should be responsible for integration of the Communication system at NLDC end for monitoring, supervision & control of Power System and adequate data availability in real-time. NLDC is to submit Guidelines for Interfacing Requirement, calculation of availability of the Communications-systems etc. to the Commission for approval within 60 days of notification of these Regulations.

Broad Features of Communication System

14. The broadband ISTS Communication system shall cover the following nodes:

- (i) NLDC
- (ii) RLDCs
- (iii) SLDCs
- (iv) 132 kV/110 kV Substations and 132kV/110kV overhead transmission Lines connected to ISTS
- (v) All ISGS and Generating Stations connected to ISTS as well as Solar generating plants/ solar parks and wind generation pooling stations connected to ISTS and HVDC stations as required

15. Safety of equipment as well as cyber security is an inherent feature of the planning and implementation of communication systems. Planning and development of the communication systems should be therefore made in due consideration of smart grid requirements and technologies. The wideband communication systems should be planned prospectively considering the expected nodes to ensure comprehensive planning for the communication system by the respective agencies. All Grid stations including pooling stations should be considered for Broad Band Communication system in consultation with Standing Committee to be constituted by CEA. Also redundant paths and back up communication system during disaster should be invariably considered during the planning process. NLDC shall monitor case of cyber security-incidences and discuss them at RPC level and take necessary action as deemed fit.

Route Diversion

16. In case of outage of telemetered data, or communication failure, respective RLDC and/or SLDC are required to inform the respective user for the fault so that the user can lodge complaints for failure of the communication to the communication system owner for quick restoration. The communication provider shall explore the

possibility for route diversion on the existing facility in case restoration of fault is likely to be prolonged. No separate charges shall be paid for such route diversion or channel re-allocation. However such rerouting shall be discontinued once the original channel is restored.

Testing of Communication System

17. Periodic testing of the communication system is important to ascertain high availability (low intermittency) of communication system. It has been proposed that all users that have provided the communication systems are to facilitate for periodic testing of the communication system as per the standards and guidelines issued under Communication Regulations. Testing process for communication network security should also be included even for third party system, if it exists.

Draft Regulations

18. Draft regulations have been framed in the light of above discussions.