EOI No. 2/ISA-MDTF/2025-ISA

Expression of Interest

For

"Appointment of System Integrators (SI) for AI powered Implementation of GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration in DISCOMs (DUET initiative)"

International Solar Alliance (ISA)
Secretariat, Surya Bhawan, NISE Campus,
Gwal Pahari, Gurugram, Haryana – 122003, India
Website: www.isa.int

1. BACKGROUND

The International Solar Alliance (ISA) is an intergovernmental treaty-based organization headquartered in Gurugram, India, with over 123 member countries. It serves as a dedicated platform for collaboration among governments, multilateral institutions, the private sector, and other stakeholders to advance solar energy adoption, universal energy access, and a just energy transition.

To accelerate clean energy deployment, ISA established the Multi-Donor Trust Fund (MDTF) in October 2021. The MDTF facilitates technical assistance, capacity building, and financing mechanisms for ISA member countries, focusing on energy transition, AI, and digitalization. By reducing aid fragmentation and enhancing strategic coherence, the MDTF ensures efficient resource mobilization for scalable impact.

2. Objective of the EOI

ISA invites Expressions of Interest (EOI) from qualified organizations to support its mission of accelerating clean energy adoption in member countries. The selected agencies will implement GIS-based solutions for

- Asset management
- Network analysis
- Roster management
- Load forecasting

And offer subscription to there software for 1 year

These solutions will enable Distribution Companies (DISCOMs) to integrate more Distributed Energy Resources (DERs) in its fold, helping member countries achieve net-zero targets while ensuring energy security, sustainable economic growth, and equitable energy access.

About the DUET Initiative

The Digitalization of Utilities for Energy Transition (DUET) initiative, under ISA's MDTF, aims to:

- Develop an integrated planning blueprint to scale renewable energy deployment reducing GHG emission
- Enhance grid reliability
- Unlock strategic investments
- Foster green job creation

DUET will co-create and deploy tailored digital solutions for DISCOMs, enabling:

- AI-driven grid planning and optimization
- Improved load flow analysis and loss reduction
- Seamless integration of Distributed Renewable Energy (DRE), Battery Energy Storage Systems (BESS), and energy efficiency measures

By modernizing grid infrastructure, DUET will ensure reliable and clean electricity access, particularly in rural and underserved regions.

EOI Notice

1. International Solar Alliance (ISA) invites proposal for "Appointment of System Integrators (SI) for AI powered Implementation of GIS based Asset Management, Network Analysis, Roster Management, & Load Forecasting for DER Integration for DISCOMs" through this EOI

2. The content of this EOI enlists the requirements of the International Solar Alliance. It includes the terms which details out all that may be needed by the potential participants to understand the terms the International Solar Alliance wish to specify at this stage.

3. The Technical Bids may be submitted in a PDF format to mdtf_procurement@isa.int on or before **22.09.2025 by 1730 Hrs. (IST).** Subject line should include the **"DUET initiative"**

EOI Disclaimer

1. The information contained in this EOI or subsequently provided to Potential SI(s), whether verbally or in documentary or in any other form by or on behalf of ISA or any of its employees, Potential SIs, or associates, is provided to Potential SI(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

2. This EOI is not an agreement and is neither an offer nor invitation by ISA to the prospective Potential SIs or any other party. The purpose of this EOI is to provide interested parties with information that may be useful to making their EOI. This EOI includes statements, which reflect various assumptions and assessments arrived at by ISA in relation to the Project. Such assumptions, assessments and statements do not support to contain all the information that each Potential SI may require. This EOI may not be appropriate for all persons and it is not possible for ISA to consider the technical capabilities, investment objectives, financial situation and needs of each party who reads or uses this EOI. The assumptions, assessments, statements and information could check the accuracy, adequacy, correctness, obtained in this EOI may not be complete, accurate, adequate, or correct. Each Potential SI should, therefore, conduct its own investigations and analysis and liability and completeness of the assumptions, assessments, statements and information contained in this EOI and obtain independent advice from appropriate sources.

3. Information provided in this EOI to the Potential SI(s) is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. ISA accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

4. ISA or any of its employees, Potential SIs or associates make no representation or warranty and shall have no liability to any person including any Potential SI under any law, statute, rules or regulations, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this EOI or otherwise including the accuracy, adequacy, correctness, completeness or reliability of the EOI and any assessment, assumption, statement or information contained therein or deemed to form part of this EOI or arising in any way in this EOI stage.

5. ISA or any of its employees, Potential SIs or associates also accept no liability of any nature whether resulting from negligence or otherwise how-so-ever caused arising from reliance of any Potential SI upon the statements contained in this EOI.

6. ISA may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this EOI.

7. The issue of this EOI does not imply that ISA is bound to select a Potential SI for the Project and ISA reserves the right to reject all or any of the Potential SIs or EOIs or discontinue or cancel the EOI process without assigning any reason whatsoever.

8. The Potential SI shall bear all its costs associated with or relating to the preparation and submission of its EOI including but not limited to preparation, copying, postage, delivery fees, traveling, food, lodging, expenses associated with any demonstrations or presentations which may be required by ISA, or any other costs incurred in connection with or relating to its EOI. All

such costs and expenses will remain with the Potential SI and ISA shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Potential SI in preparation for submission of the EOI, regardless of the conduct or outcome of the EOI Process.

SUMMARY

PART I – EOI PROCEDURES AND REQUIREMENTS

Section 1: Expression of Interest (EOI) Notice

This Section includes Expression of Interest.

Section 2: Eligibility and Qualification Requirements

This Section contains information regarding specific eligibility and qualification requirements applicable for prospective Potential SIs to be considered for further evaluation of their proposal.

Section 3: Instructions to Potential SIs

This Section consists of two parts: “Instructions to Potential SIs” and “EOI Data Sheet”. “EOI Data Sheet” contains information specific to selection and corresponds to the clauses in “Instructions to Potential SIs” that call for selection-specific information. This Section provides information to help prospective Potential SIs prepare their proposals.

Section 4: EOI Forms – Technical Proposal

This Section includes the forms for Technical Proposal that are to be completed by the prospective Potential SIs and submitted.

ABBREVIATIONS

1.	**AMI**	Advanced Metering Infrastructure
2.	**AHMS**	Asset Health Monitoring System
3.	**ACL**	Access Control Lists
4.	**ACR**	Annual Confidential Report
5.	**AG**	Agricultural Feeder
6.	**AI**	Artificial Intelligence
7.	**API**	Application Programming Interface
8.	**APT**	Advanced Persistent Threat
9.	**ATS**	Annual Technical Support
10.	**BCP**	Business Continuity Plan
11.	**BG**	Bank Guarantee
12.	**BGP**	Border Gateway Protocol
13.	**BI**	Business Intelligence
14.	**BIS**	Bureau of Indian Standards
15.	**BoQ**	Bill of Quantities
16.	**BPML**	Business Process Master List
17.	**CCN**	Change Control Notice
18.	**Cert-In**	Indian Computer Emergency response team
19.	**CCB**	Control Change Board
20.	**CIS**	Consumer Information System
21.	**CMMI**	Capability Maturity Model Integration
22.	**COTS**	Commercial Off-the-Shelf
23.	**CPU**	Central Processing Unit
24.	**CRM**	Consumer Relationship Management
25.	**CV**	Curriculum Vitae
26.	**DC**	Data Center
27.	**DRC**	Disaster Recovery Centre
28.	**DBMS**	Database Management System

29.	**DUET**	Digitalization of Utilities for Energy Transition
30.	**DISCOM**	Distribution Company
31.	**DT**	Distribution Transformer
32.	**ESB**	Enterprise Service Bus
33.	**FAT**	Factory Acceptance Test
34.	**FOR**	Freight on Road
35.	**GIS**	Geographic Information System
36.	**GPU**	Graphics Processing Unit
37.	**GPS**	Global Positioning System
38.	**GST**	Goods and Services Tax
39.	**GUI**	Graphical User Interface
40.	**HES**	Head-End System
41.	**HHU**	Handheld Unit
42.	**IDS**	Intrusion Detection Systems
43.	**IEC**	International Electrotechnical Commission
44.	**IP**	Internet Protocol
45.	**IPR**	Intellectual Property Rights
46.	**IS**	Indian Standard
47.	**ISO**	International Organization for Standardization
48.	**ISP**	Internet Service Provider
49.	**IT**	Information Technology
50.	**IVRS**	Interactive Voice Response System
51.	**kVA**	kilo Volt-Ampere
52.	**kW**	kilo Watt
53.	**LAN**	Local Area Network
54.	**LCD**	Liquid Crystal Display
55.	**LED**	Light Emitting Diode
56.	**LF**	Load Forecasting
57.	**LT**	Low Tension

58.	**M&V**	Monitoring and Verification
59.	**MCB**	Miniature Circuit Breaker
60.	**MD**	Maximum Demand
61.	**MDAS**	Meter Data Acquisition System
62.	**MDM**	Meter Data Management
63.	**NAN**	Neighborhood Area Network
64.	**NIC**	Network Interface Card
65.	**NMS**	Network Management System
66.	**NOMC**	Network Operation cum Monitoring Center
67.	**NTP**	Network Time Protocol
68.	**NA**	Network Analysis Software (Power)
69.	**OEM**	Original Equipment Manufacturer
70.	**OS**	Operating System
71.	**OSF**	Open Software Foundation
72.	**P&L**	Profit & Loss
73.	**PCI**	Payment Card Industry
74.	**PO**	Purchase Order
75.	**PON**	Power Outage Notification
76.	**PRN**	Power Restoration Notification
77.	**PT**	Potential Transformer
78.	**QA**	Quality Assurance
79.	**QC**	Quality Control
80.	**QR**	Qualification Requirement
81.	**RAM**	Random Access Memory
82.	**RDBMS**	Relational Database Management System
83.	**RF**	Radio Frequency
84.	**EOI**	Expression of Interest
85.	**RPO**	Recovery Point Objective
86.	**RTC**	Real Time Clock

87.	**RTO**	Recovery Time Objective
88.	**SAN**	Storage Area Network
89.	**SAT**	Site Acceptance Test
90.	**SCADA**	Supervisory Control and Data Acquisition
91.	**SEBI**	Securities and Exchange Board of India
92.	**SI**	System Integrator OR System Integration
93.	**SLA**	Service Level Agreement
94.	**SNMP**	Simple Network Management Protocol
95.	**SOA**	Service Oriented Architecture
96.	**SQL**	Structured Queried Language
97.	**TCP**	Transmission Control Protocol
98.	**TIFF**	Tag Image File Format
99.	**TOD**	Time of Day
100.	**TOU**	Time of Use
101.	**TPAA**	Third Party Audit Agency
102.	**TRS**	Technical Requirement Specifications
103.	**TSI**	Turnkey System Integration
104.	**UAT**	User Acceptance Test
105.	**UDP**	User Datagram Protocol
106.	**UPS**	Uninterrupted Power Supply
107.	**UT**	Unit Testing
108.	**VEE**	Validation Estimation and Editing
109.	**VM**	Virtual Machine
110.	**VoIP**	Voice over Internet Protocol
111.	**WAF**	Web Application Firewall
112.	**WAN**	Wide Area Network
113.	**WO**	Work Order
114.	**WPC**	Wireless Planning & Coordination Wing
115.	**XML**	Extensible Mark-up Language

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PART I

EOI PROCEDURES AND REQUIREMENTS

Section 1 - Expression of Interest Notice

"Appointment of System Integrators (SI) for AI powered Implementation of GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration in DISCOMs ."

EOI NOTICE

(Single Stage EOI Process)

GLOBAL OPEN COMPETITIVE PROCUREMENT

Contract Title: "Appointment of System Integrator (SI) for AI powered Implementation of GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration in DISCOMs (DUET).''

Expression of Interest (EOI)/ EOI Number: EOI No. 2/ISA-MDTF/2025-ISA

1. International Solar Alliance (ISA) on behalf of selected DISCOMs invites Proposals for **"Appointment of System Integrator (SI) for AI powered Implementation of GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration in DISCOMs (DUET)."**

2. The selection of the System Integrator (SI) through RFP/tendering will be carried out at a later stage, involving parties shortlisted from this EOI.

3. The EOI Document is available online on ISA's website from **25.08.2025**. The prospective Potential SIs would be responsible for downloading the EOI Document and ensuring that any addenda/ corrigendum/ amendment/ clarification thereto available on the website is also downloaded and incorporated.

4. Organizations shortlisted after the EOI stage, will be invited to submit detailed technical/financial proposal in accordance with the terms and conditions put forward by user. Techno-commercial proposals from selected organizations will then be evaluated for award of contract. ISA is not bound to select any of the organizations submitting the proposals and reserves the right of rejection of any or all proposals without assigning any reason(s) thereof.

5. The Expression of Interest, as per the requirements detailed in later sections may be submitted in a PDF format to mdtf_procurement@isa.int before 22.09.2025, by 05:30 PM (IST) addressed to: MDTF Procurement, International Solar Alliance (ISA) at mdtf_procurement@isa.int with subject line DUET.

6. Important dates, amounts and other details pertaining to this EOI Notice including submission and opening of proposal, address for communication, etc., are given in the TABLE below.

TABLE: Important Dates, Amounts and Other Details

Dates

Sr	Particulars		Date	Remarks
a)	Commencement of downloading of this EOI	:	**22.08.2025**	ISA website
b)	i) Last date for Submission of the query through e-mail: mdtf_procurement@isa.int on EOI.	:	**02.09.2025**	By 05:00 PM IST
c)	Pre-EoI meeting	:	**10.09.2025**	Hybrid mode at **03:00 PM IST** Online link: https://teams.microsoft.com/l/meetup-join/19%3ameeting_MmE1ODY2YjUtOWZhZi00MTRiLWEyYjUtN2Q5OTY4ZWY5MjEz%40thread.v2/0?context=%7b%22Tid%22%3a%2269effc0f-57ea-42eb-b830-59baa02bbae1%22%2c%22Oid%22%3a%22af47bc8e-03da-4a5c-aa97-b88455606522%22%7d **In-person venue:** ISA, 2nd Floor, Commercial Tower, Le Meridien, Janpath, New Delhi.
d)	Last date for receipt of documents as per EOI	:	**22.09.2025**	By **05:30 PM IST** to be submitted to mdtf_procurement@isa.int

Section 2 - Eligibility and Qualification Requirements

1. Eligibility Requirements

1.1 The EOI can be submitted by a Sole Potential SI as an individual entity/consortium/Joint Venture (JV).

1.2 If at any stage of the EOI, any order/ ruling is found to have been passed in the last 1 (one) year preceding the EOI submission deadline by a competent Court of Law or any appropriate Commission or any Arbitral Tribunal against the Potential SI or its Affiliates for breach of any Contract awarded by any Government agency/department, then EOIs from such Potential SIs shall be liable to be rejected.

1.3 Technically qualified Potential SIs shall continue to maintain compliance with the Eligibility and Qualification Requirements specified herein. Failure to comply with the aforesaid requirements shall make the EOI from such Potential SIs liable for rejection at any stage of the EOI process.

1.4 The Potential SI should not be blacklisted debarred/ banned/ suspended as on date of EOI submission:

a) due to conviction of an offence
   (i) under the Prevention of Corruption Act. Or ,
   (ii) any other law for the time being in force, for causing any loss of life or property or causing threat to public health as part of execution of a public procurement contract.

b) by any Ministry/ Department/ Organization across the world.

1.5 The Potential SI shall submit the EOI as per the various terms, schedules and formats prescribed in this EOI.

The determination of the relationship of Parent(s) and/or Affiliate(s) with the Potential SI shall be on the date 7 (seven) Days prior to the EOI Submission Deadline. Documentary evidence to establish such relationship shall be furnished by the Potential SI along with the Technical EOI.

The Technically Evaluated Entity may be the Potential SI or an Affiliate or Parent of such Potential SI, as the case may be.

1.6 The Qualified Potential SI(s) will be required to continue to maintain compliance with the Qualification Requirements throughout the EOI process and till execution of the Contract. Failure to comply with the aforesaid provisions shall make the EOI liable for rejection at any stage.

2. Qualification Requirements

The technical requirements of qualification of the Potential SI are as follows:

<table>
<tr><th>Criteria</th><th>Requirements</th><th>Supporting Documents</th><th>Max Points</th></tr>
<tr><td colspan="4">Technical Requirements</td></tr>
<tr><td>Years of Operation</td><td>The SI must demonstrate prior experience in the technology or infrastructure sector. Points will be awarded based on the number of completed years of relevant operation as of the bid submission date.
<table><tr><th>Years of Operation</th><th>Marks</th></tr><tr><td>≤ 1 year</td><td>5</td></tr><tr><td>> 1 year and ≤ 5 years</td><td>10</td></tr><tr><td>> 5 years</td><td>15</td></tr></table></td><td>Certificate of Incorporation, Company Profile</td><td>15</td></tr>
<tr><td>Relevant Project Experience</td><td>The SI should have successfully implemented Eligible Projects involving Geospatial and Technical Data Collection or GIS-based web application for tracking digitised assets for any Power Distribution Company or Power Transmission Company within the last three (3) years from the date of issuance of this EOI.
Such Eligible Projects must include:
Aggregate project value across eligible engagements
<table><tr><th>Aggregate Project Value (USD, excl. taxes)</th><th>Marks</th></tr><tr><td>> $100,000 and ≤ $500,000</td><td>7</td></tr><tr><td>> $500,000 and ≤ $1,000,000</td><td>13</td></tr><tr><td>≥ $1,000,000</td><td>20</td></tr></table>Each of the projects need to have signed contracts and work orders as on date of bid submission.
The implementation should have covered Geospatial and Technical data collection of power grid assets.</td><td>References along with requisite contract/ Purchase Order (PO)/ Work Order (WO). The references should indicate client name, scope of work, Project start date.</td><td>20</td></tr>
</table>

<table>
<tr><td>Availability of GIS COTS Software Solution</td><td>1. No COTS solution. GIS-based web application to be built to requirement - 0
2. Demonstrated COTS software solution with an operational GIS-based Web Application - 10
3. Demonstrated COTS software solution with an operational GIS-based Web Application for database of digitised and geotagged power utility asset tracking, including analytics dashboards - 20</td><td>Work Order / Completion Certificate / Client Certificate and citations</td><td>20</td></tr>
<tr><td>Key Personnel</td><td>Professionals with qualifications in computer science or related fields, and experience in building software applications, project management and other relevant areas.
<table><tr><th>No. of Full-Time Professionals</th><th>Marks</th></tr><tr><td>< 5</td><td>5</td></tr><tr><td>≥ 5 and ≤ 10</td><td>10</td></tr><tr><td>> 10</td><td>15</td></tr></table></td><td>CVs of Key Personnel</td><td>15</td></tr>
<tr><td>Quality Certification</td><td>1. The SI should have ISO 9001 certificate – 10
2. Valid ISO 9001 certification, along with additional relevant ISO certifications (e.g., ISO 27001 for information security, ISO 20000 for IT service management) - 15</td><td>ISO 9001 / ISO 27001 Certificate copies to be shared</td><td>15</td></tr>
<tr><td colspan="4">Financial Requirements</td></tr>
<tr><td>Financial Capacity of the SI</td><td>The SI must demonstrate financial capacity through audited financial statements showing a minimum annual turnover in last two Financial Years
<table><tr><th>Turnover (USD)</th><th>Marks</th></tr><tr><td>> $50,000 and ≤ $100,000</td><td>5</td></tr><tr><td>≥ $100,000 and ≤ $500,000</td><td>10</td></tr><tr><td>> $500,000</td><td>15</td></tr></table>Work orders from international non-governmental non-profit organizations shall be considered valid for financial assessment.</td><td>A certificate duly certified by the statutory auditor / Chartered Account of the Agency mentioning the average annual turnover for last two audited financial years along with the audited financial statements.</td><td>15</td></tr>
<tr><td></td><td>Total</td><td></td><td>100</td></tr>
</table>

For the purposes of satisfaction of Technical Requirement, the following shall apply:

1. Eligible Projects, as referred in Technical Requirement, shall mean any project consisting of Geospatial and Technical data capture of power grid assets and a GIS-based web application to track digitised power grid assets

2. The Eligible Project(s) in the Power sector shall mean projects relating to generation or transmission or distribution of electricity.
3. The Bidder must obtain a minimum score of seventy (70) points in the Pre-Qualification (PQ) evaluation in order to be considered eligible for the second stage of bidding.

Note: To support innovation and startups, ISA will waive procurement requirements like minimum turnover, and prior experience. This inclusive approach reduces entry barriers, allowing first-time innovators and startups to participate in public projects and showcase their capabilities

Note: Power Distribution Franchisee shall be considered as ISA for the sake of assessing Potential SI experience.

Section 3 - Instructions to Potential SIs

01. General Provisions

a. Definitions

i. Definitions

1. "**Affiliate**" shall mean a company that either directly or indirectly:

controls or

is controlled by or

is under common control with

a Potential SI and "control" mean either ownership by one company of 26% of the voting rights of the other company, as the case may be.

ii. **"Contractor"** shall mean the same as "SI."

iii. **Day"** means a calendar day, unless otherwise specified as **"Business Day".** A Business Day is any day that is an official working day of ISA. It excludes ISA's official public holidays.

iv. **"Financial Year" or "FY"** shall mean the period starting from 1st April of a calendar year to 31st March of the consecutive calendar year.

v. "**Month**" shall mean calendar months unless otherwise specified.

vi. "**Parent(s)"** shall mean an entity that is a Company that holds at least twenty six percent (26%) of the paid - up equity capital directly or indirectly in the Potential SI, as the case may be.

vii. **"Project"** shall mean the ISA's SI Project.

viii. **"Proposal"** shall mean the same as EOI

ix. **"Expression of Interest" or "EOI"** means this EOI of which the number, name and details have been mentioned in **EOI Data Sheet**, including all its Volumes/ Sections/ Forms/ Annexures/ Appendices etc., for Appointment of SI (including all clarification/ addendum/ amendment/ corrigendum/ etc. issued from time to time).

x. **"Service(s)" or "Related Service(s)"** shall mean any Service(s) performed or to be performed as a part of the Project by the SI.

xi. **"Sub-Contractor"** shall mean any person, natural or legal, including manufacturers, to whom execution of any part of the SI Contract, including preparation of any design or supply of the SI Project, is sub-contracted directly or indirectly by the Contractor and includes its legal successors or permitted assigns.

xii. **"Technical Proposal"** shall mean the same as Technical EOI.

	xiii. **"Technically Evaluated Entity"** shall mean the company which has been evaluated for the satisfaction of the technical requirement set forth with this document. xiv. **"ISA"** means the entity, named and as briefly described in **EOI Data Sheet**, which has issued the Request for EOIs for Appointment of System Integrator (SI). xv. **"Ultimate Parent Company"** shall mean an entity which owns at least twenty six percent (26%) equity in the Potential SI and in the Technically Evaluated Entity and/or Financially Evaluated Entity (as the case may be) and such Potential SI and the Technically Evaluated Entity and/or Financially Evaluated Entity (as the case may be) shall be under the direct control or indirectly under the common control of such entity. xvi. **"Commercial Off-the-Shelf (COTS)"** product is a packaged, ready-made software solution, available for sale, lease, or licensing to companies, by the Software Developer directly or through authorized implementation partners, which can be implemented by making certain customizations for meeting needs of the purchasing organization. xvii. **"Bespoke"** product is any software solution which is customized/ developed specifically for the purchasing organization. xviii. Capitalised terms used herein but not defined specifically shall have the meaning as ascribed to them and elsewhere in EOI Document. 1. **Singular and Plural**: Where the context so requires, words imparting the singular only also include the plural and vice versa. 2. **Headings and Marginal Notes**: Headings and marginal notes to the terms and conditions of the Contract are not deemed to form part thereof nor are to be taken into consideration in the interpretation or construction thereof or of the Contract.
b. Introduction **I. About this Expression of Interest** **II. EOI Process**	i. This Expression of Interest (EOI) is issued by the ISA for selecting the SI to implement ISA's initiative on AI and Digitalisation of DISCOMs. This EOI Document provides the overall structure of the document (as outlined in the beginning of the document in the section titled "Summary, Abbreviations & Table of Content"), requirements and general terms and conditions applicable to each Potential SI. ii. The Discom finalized for this assignment will be conveyed by ISA at the RfP stage. However, bidders may also express their preferred Discom for this assignment in the EoI. iii. EOI against the Expression of Interest shall be under Single Stage EOI Process. iv. The Potential SI's designated representative(s) is/are invited to attend a pre-EOI meeting at Potential SI's expense, which

III. Pre-EOI Meeting	shall take place at the time and venue specified in the EOI (See details in earlier sections) . v. The purpose of the meeting will be to clarify any issues regarding this EOI in general and the scope of work in particular. vi. The Potential SI may submit any question or query to ISA in writing, to reach ISA not later than one week before the meeting as per the format given in EOI. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted as indicated hereafter. vii. Non-attendance at the pre-EOI meeting will not be a cause for disqualification of a Potential SI.
c. Conflict of Interest	i. A Potential SI shall not have a conflict of interest that affects the EOI process (the "**Conflict of Interest")**. In the event a Potential SI is found to have a Conflict of Interest, the ISA may choose to reject the EOI. Any Potential SI found to have a Conflict of Interest shall be disqualified. ii. A Potential SI shall be deemed to have a Conflict of Interest affecting the EOI process, if: 1. the Potential SI or its Member (or any constituent thereof) and any other Potential SI or its Member (or any constituent thereof) have common controlling shareholders or other ownership interest. 2. Provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Potential SI or its Member (or any shareholder thereof having a shareholding of more than 15% (fifteen per cent) of the paid up and subscribed share capital of such Potential SI or its Member, as the case may be) in the other Potential SI or its Member, is less than 15% (fifteen per cent) of the subscribed and paid-up equity share capital thereof. 3. Provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in sub-section (72) of section 2 of the Companies Act, 2013. 4. For the purposes of this Clause, indirect shareholding held through one or more intermediate persons shall be computed as follows: (i) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the "Subject Person") shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and (ii) subject always to sub-clause (a) above, where a person does not exercise

	control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under sub-clause (ii) if the shareholding of such person in the intermediary is less than 26% of the subscribed and paid up equity shareholding of such intermediary; or a. a constituent of such Potential SI is also a constituent of another Potential SI; or b. such Potential SI or its Member thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Potential SI or its Member, has provided any such subsidy, grant, concessional loan or subordinated debt to any other Potential SI or its Member; or c. such Potential SI has the same legal representative for purposes of this EOI as any other Potential SI; or d. such Potential SI, has a relationship with another Potential SI, directly or through common third party/ parties, which puts either or both of them in a position to have access to each other's information about, or to influence the EOI of either or each other; or e. such Potential SI has participated as a consultant to the Authority in the preparation of any documents, design, or technical specifications of the Project.
d. Potential SIs to Inform Itself Fully	i. The Potential SI shall make independent enquiry and satisfy itself with respect to all the required information, inputs, conditions and circumstances and factors that may have any effect on its EOI. Once the Potential SI has submitted the EOI, the Potential SI shall be deemed to have examined the laws and regulations in force and fixed its price taking into account all such relevant conditions and also the risks, contingencies and other circumstances which may influence or affect the Services performed within the scope of work, as provided in this EOI. Accordingly, the Potential SI acknowledges that, on being selected, it shall not be relieved from any of its obligations under the EOI Documents nor shall be entitled to any extension of time for commencement of Services or financial compensation for any reasons whatsoever attributable to SI.

	ii. The Potential SIs should particularly acquaint themselves with the technical requirements of ISA's systems, operations, assets, equipment, statutory codes and standards. iii. The Potential SI shall familiarize itself with the procedures and time frames required to obtain all consents, clearances and permits required for implementation of the Project.
e. Fraud and Corruption	i. ISA requires compliance with the Anti-Corruption Guidelines/ Laws in force of the relevant Government/ its instrumentalities/ ISA.
f. Eligibility and Qualification Requirements	i. The eligibility and qualification requirements for submission of Proposals against the EOI are elaborated in this document. Proposals, if any, from Potential SIs not complying with the same shall be out-rightly rejected and shall not be considered for evaluation.
02. Preparation of Proposals	
a. General Considerations and Instructions	i. In preparing the Proposal, the Potential SI is expected to examine the EOI Document in detail. Material deficiencies in providing the information or documentation requested in the EOI Document may result in rejection of the Proposal. ii. All Potential SIs shall comply with the dates indicated in this EOI. iii. The Potential SIs shall comply with and agree to all the provisions of this EOI for various EOI considerations including but not limited to eligibility, information regarding ISA's systems, EOI formats, EOI submission and other considerations. iv. The Potential SIs shall be evaluated based on the requirements, criteria, norms and procedures laid out in the EOI Document. v. Potential SI's Proposal shall include sufficient information and supporting documentation in order to determine compliance without further necessity for inquiries. vi. The Potential SI's Proposal shall clearly identify all features described in the specifications along with any supporting reference material vii. An analysis of the technical specifications, functional and performance requirements of the AI powered GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration system may lead the Potential SIs to conclude that additional items are required that are not specifically mentioned in this specification. The Potential SIs shall be responsible for installing such items (at no additional cost to the ISA) such that a dependable and fully functional AI powered GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting

	for DER Integration system is implemented that meets or exceed the capacity and performance requirements. Such materials shall be deemed to be within the scope of the SI Contract. To the extent possible, the Potential SI shall identify and include all such additional items in their proposal. viii. Failure by ISA to require information from a Potential SI that has not been properly provided shall not be construed as waiver on the part of ISA of the obligation of the Potential SI to furnish the said data / information unless the waiver is in writing. ix. EOI submitted by the Potential SIs before the EOI Submission Deadline, shall become the property of the ISA and shall not be returned to the Potential SIs.
b. Cost of EOI / Preparation of Proposal	i. The Potential SI shall bear all costs associated with the preparation and submission of its Proposal, including post-EOI discussions, technical and other presentations etc., and ISA shall not be responsible or liable for those costs, regardless of the conduct or outcome of the selection process. ISA is not bound to accept any proposal and reserves the right to annul the selection process at any time prior to Contract award, without thereby incurring any liability to the Potential SI.
c. Language	i. EOI/Proposal prepared by the Potential SIs and all correspondence and documents relating to the EOI exchanged by the Potential SI and ISA and its associates shall be written in the English language.
d. Documents Comprising the Proposal and List of Forms	i. The Proposal shall comprise the documents and forms mentioned in this EOI document. A Document Checklist for the same as well as the list of forms referred to in this EOI Document is provided in **EOI**.
e. Only One Proposal	i. A Potential SI shall submit only one EOI in the same EOI process. Any Potential SI whose technical and financial capabilities are showcased for meeting the criteria shall not separately participate directly or indirectly in another EOI in the same EOI process for meeting the criteria.
f. Proposal / EOI Validity	i. The EOI submitted by the Potential SI(s) shall be valid for a period of 1 year as may be extended from time to time. ii. All such offers and terms and conditions set forth in this EOI shall be valid for the SI till the successful completion of the Project. iii. In exceptional circumstances, ISA may solicit the Potential SI's consent to an extension of the EOI validity period. The request and responses thereto shall be made in writing or by email. If a Potential SI accepts to extend the validity, A

	Potential SI granting the request will not be required or permitted to modify its EOI.
g. Extension of Proposal Validity	i. ISA will make its best effort to complete the EOI process and award the contract prior to the date of expiry of the EOI/ Proposal validity. However, should the need arise, ISA may request, in writing, all Potential SIs who submitted EOIs/Proposals prior to the EOI Submission Deadline to extend the Proposals' validity. ii. The Potential SI has the right to refuse to extend the validity of its Proposal in which case such Proposal will not be further evaluated.
h. Clarification and Amendment of EOI	i. Potential SIs may seek clarifications on this EOI in writing, through a letter or email to reach ISA no later than the period specified. ii. ISA is not under any obligation to entertain/ respond to suggestions made or to incorporate modifications sought for. iii. During the EOI process, ISA, for any reason may modify the EOI, including the timelines, by issuance of addendum / modification / errata and / or a revised document. iv. In order to provide reasonable time to the Potential SIs to take the modification into account in preparing their EOI, or for any other reasons, ISA may, at its discretion, extend the deadline/ timeline for EOI submission.
i. Preparation of EOI/ Proposal and EOI Formats	i. The Potential SI shall prepare its EOI and furnish required information and documents as per the guidelines, formats, forms, schedules and other specifications in this Section, as well as the EOI Document in general.
j. Technical EOI/ Proposal Format and Content	i. The EOI be prepared using the Forms of the EOI and shall comprise the information, details and documents listed in subsequent clauses herein The Technical EOI/ Proposal. ii. The Technical EOI shall contain a covering letter by the Potential SI duly designated. iii. The Technical EOI shall contain a signed Letter of Consent from the Potential SI that the EOI has been reviewed and each element of the EOI is agreed to by them including but not limited to any commitment in the Project. iv. The EOI shall contain all documents required to prove/substantiate the Eligibility and Qualification Requirements of the Potential SIs : 1. Company profile document with evidence of fields of competence for the Potential SI 2. Copy of Certificate of Registration/ Incorporation issued by the Registrar of Companies for the Potential SI 3. Certificate of Commencement of Business issued by the Registrar of Companies for the Potential SI clearly indicating the number of years of operation.

	Note: Submission of the EOI in a materially wrong format may lead to the Proposal being deemed non-responsive to the EOI requirements.
03.Submission, Opening and Evaluation	
a. Submission of EOIs/ Proposals	i. EoIs will be submitted digitally (to mdtf_procurement@isa.int) ii. All EOIs, as may be specified in this Section, by ISA no later than the EOI Submission Deadline indicated in BDS as may be extended from time to time by the ISA. iii. Any EOI received by ISA, after the EOI Submission Deadline prescribed by ISA will not be uploaded and accordingly be rejected. iv. ISA may, at its discretion, extend this EOI Submission Deadline by amending the EOI at any time prior to opening of the EOIs, in which case all rights and obligations of ISA and the Potential SIs shall thereafter be subject to the deadline as extended. v. Any Proposal or its modification received by ISA after the deadline through any means or medium, whatsoever, shall be declared late and rejected.
b. Confidentiality	i. Information relating to the examination, evaluation, comparison and recommendation of SI Contract award, shall not be disclosed to Potential SIs or any other persons not officially concerned with such process. ii. Any attempt by a Potential SI to influence ISA in the examination, evaluation, comparison and post qualification of the EOIs or SI Contract award decisions may result in the rejection of its EOI.
c. Opening of EOIs/ Proposals	i. ISA shall then separately evaluate the EOIs with respect to the Eligibility and Qualification Requirements, sufficiency of the submission, conformation/ compliance/ responsiveness to all the mandatory requirements, terms, conditions and specifications of the EOI Document without any deviation, reservation, or omission and other parameters outlined in this EOI.
d. EOI/ Proposals Evaluation Overview and Verification/ Clarifications	i. The evaluation assesses: (i) compliance with all mandatory requirements under applicable laws, terms, conditions and specifications of the EOI Document without material deviation, reservation, or omission; ii. (ii) achieving the Minimum Technical score in the Technical evaluation; **First Stage – Fulfillment of Eligibility and Qualification Requirements, Determination of Substantial Responsiveness to the EOI Documents**: The Technical Proposal shall be opened by the ISA and evaluated to determine: - Whether the Participating agency comply with the Eligibility Requirements and have offered eligible SI Services. - Whether the Bidders meet the Qualification Requirements.

	- Whether the Bids are substantially responsive to the EOI document. **Second Stage – Technical Evaluation of the Proposal**: The proposal found to be responsive shall be evaluated as per the criteria specified in the Bid Data Sheet.
e. Evaluation of Technical EOIs/ Proposals	i. All EOIs will first be evaluated for 'Clause by Clause' compliance to the EOI document and the SI Contract including the technical specifications and functional requirements (with amendments, if any). The Potential SIs fulfilling the Eligibility and Qualification Requirement and having submitted substantially responsive EOIs conforming to and meeting all the mandatory requirements, terms, conditions and specifications of the EOI Document without any material deviation, reservation, or omission and shall qualify for technical evaluation of the EOI. ii. In the event the Technical EOI is substantially responsive, ISA may waive any deviation, reservation, or omission in the EOI. iii. Provided that a Technical EOI is substantially responsive, ISA may request that the Potential SI submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial, nonconformities or omissions in the Technical EOI related to documentation requirements. Failure of the Potential SI to comply with the request may result in the rejection of its EOI.
f. Deviations, Reservations and Omissions	i. During the evaluation of EOIs/ Proposals, the following definitions apply: 1. "Deviation" is a departure from the requirements specified in the EOI document 2. "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the EOI document; and 3. "Omission" is the failure to submit part or all of the information or documentation required in the EOI document. ii. A substantially responsive EOI is one that meets the requirements of the EOI document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that: 1. if accepted, would: 2. affect in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or 3. limit in any substantial way, inconsistent with the EOI document, the ISA's rights, or the Potential SI's obligations under the Contract; or (a) if rectified, would unfairly affect the competitive position of other Potential SIs presenting substantially responsive EOIs.

g. Successful / Selected Potential SI	(b) The EOI process follows a Minimum Technical Score method.
04. Issuance of the Interest Letter	
a. Award Criteria	i. The ISA may consider issuing the **Interest Letter** to the Successful Potential SI/ Selected Potential SI. ii. If the letter is issued, the Successful Potential SI shall provide an undertaking that the key staff identified for the Project (as submitted in its Technical EOI) shall be available for the respective proposed work requirement, anytime during the duration of the Project, till its successful completion. iii. If for any reason the EOI of the Successful Potential SI is rejected issued to the Successful Potential SI is cancelled, ISA is empowered to take decisions for any of the following: 1. Annul the EOI process; or 2. Take any such measure as may be deemed fit in the sole discretion of ISA, as applicable.

Annexure-I

Technical Evaluation Criteria:

The SI shall have to enclose all documentary evidence in support of technical evaluation criteria:

S. No.	Requirements	Max. Marks	Supporting Documents
1.	**Mobile App Software Readiness:** Demonstration of a mature Mobile Application to digitize grid assets, as per EOI requirements. **L1 Asset Digitisation (max 10 points):** • Feeders : 3 points • Substations and Transformers: 3 points • Distributed Energy Resources: 4 points **L2 Depth of Asset Digitisation (max 10 points):** • Substation sub-assets including Circuit Breakers, CTPT sets, Power Transformers, isolators, Switches, Fuses, Busbars, Bus couplers/sectionalisers, Meters, Lightning arresters and asset connections *(5 points)* • Distribution Transformer sub-assets incl. switches, fuses, phases and meters (*3 points)* • Feeder sub-assets including meters, individual poles and connecting cables (*2 points)*	**20**	Evidence of capability (Technical Presentation / Minimum viable product demonstration)
2.	**Web Application Software maturity:** Demonstration of a mature AI-powered Web Application for tracking digitized assets, their connections and conducting load flow analysis, as per EOI requirements. **Map Visualization (5 points if all below sub-features are demonstrated):** • The SI must demonstrate a Geographic Information System (GIS)-based tool capable of visualizing grid assets and associated data with high accuracy and interactivity. • Interactive Map Rendering: Showcase zoomable maps with accurate geospatial asset placement (e.g., substations, feeders) and toggle-able layers for assets or load metrics.	**35**	Evidence of capability (Technical Presentation / Minimum viable product demonstration)

S. No.	Requirements	Max. Marks	Supporting Documents
	Load Flow Analysis (max 10 points if all below sub-features are demonstrated): • Comprehensive load flow analysis incl. accurate voltage profiles, line-wise power flow, power losses and power source-wise consumption tracking on each asset • Power Flow Metrics: Calculate and display voltage profiles, power losses and capacity loading for buses and lines, with results visualized in time-series plots. • RMS Data Overlays: Visualize RMS data (e.g., voltage) as color-coded overlays, updating dynamically with clickable asset details. **Digital SLD (max 10 points if all below sub-features are demonstrated):** • The SI must demonstrate a module for generating and editing digital single-line diagrams representing the electrical network topology. • Editable Interface: Demonstrate drag-and-drop editing of SLDs (e.g., reconfiguring connections) with real-time validation against grid rules and versioning support. **Natural Language based Querying (max 10 points if all below sub-features are demonstrated):** • The SI must demonstrate an AI-powered chat interface that can operate on databases of DISCOMs and can successfully query the data using natural language queries. • The SI must demonstrate different output formats (Tables, Bar charts, Line charts) autogenerated using the natural language queries as requested. • The interface must support follow-up queries while saving context on previous queries and data shared.		

<table>
<tr><th>S. No.</th><th>Requirements</th><th>Max. Marks</th><th>Supporting Documents</th></tr>
<tr><td>3.</td><td>On-ground Digitisation Capability: Experience in power grid digitization projects, showcased via GIS-based Web application:
<table><tr><th>Volume of Assets digitised*</th><th>Score</th></tr><tr><td>>=100,000 and <200,000</td><td>5</td></tr><tr><td>>=200,000 and <500,000</td><td>10</td></tr><tr><td>>=500,000</td><td>15</td></tr></table>*Assets are defined as unique Substations, DTs and Poles</td><td>15</td><td>Work Order / Completion Certificate / Client Certificate</td></tr>
<tr><td>4.</td><td>Proposed Solution Demonstration (30 Marks):
Understanding of the scope of work and Utility's requirements – 10 Marks
Approach & Methodology – 10 Marks
Work Plan – 10 Marks
[The SI has to score minimum 10 marks in this criterion. In case the SI is scoring less than 10 marks, the SI is liable for rejection and may be considered technically disqualified.]</td><td>30</td><td>Presentation and Solution demonstration by SIs (Approx. Time – 60 mins) - Shall be notified by the Utility</td></tr>
<tr><td colspan="2">Maximum Marks</td><td>100</td><td></td></tr>
</table>

1. Maximum 100 marks shall be awarded under Technical Evaluation and marking for the same is defined in the Technical Evaluation Criteria above.
2. The SI is supposed to give a Technical Presentation and demonstration after the opening of the Technical Proposal of their bid, which shall be carried out only for the SIs who fulfil the Eligibility Criteria.
3. The marks scored by the SI in the presentation/ demonstration shall become a part of the technical evaluation criteria of total 100 marks.
4. **Stage 2:** RFP stage, post finalisation of states for ETP: In the next stage, upon finalisation of state/s, ISA will invite detailed financial proposals from these shortlisted agencies. Final scoring will then be based on both technical and financial evaluations, as below.
    a. Rating the Technical Criteria (TC):
        i. TC Rating = (Total Score Obtained by the Offer / Max. Obtainable Score for TP) x 100
    b. Rating the Financial Proposal (FP):
        i. FP Rating = (Lowest Priced Offer / Price of the Offer Being Reviewed) x 100
    c. Final scores are awarded using a composite scoring system = 70% of TC Rating + 30% of FP Rating

d. Bidder with the highest score is to be awarded the contract for the relevant state

Note: To support innovation and start ups, ISA will waive procurement requirements like minimum turnover, prior experience etc. This inclusive approach reduces entry barriers, allowing first-time innovators and startups to participate in public projects and showcase their capabilities

Section 4 - Bidding Forms / Checklist

This form serves as a checklist for preparation of your Proposal. Please complete the EOI Submission Forms in accordance with the instructions in the forms and return them as part of your Proposal submission. No alteration to format of forms shall be permitted and no substitution shall be accepted.

Before submitting your Proposal, please ensure compliance with the Proposal Submission instructions of the EOI Data Sheets.

Technical Proposal checklist:

Have you duly completed all the Returnable Bidding Forms?	
▪ Form A: Technical Proposal Submission Form	☐
▪ Form B: Bidder Information Form	☐
▪ Form C: Joint Venture/Consortium/ Association Information Form	☐
▪ Form D: Qualification Form	☐
▪ Form E: Format of Technical Proposal (max 15 pages)	☐
▪ [Add other forms as necessary]	☐
Have you provided the required documents to establish compliance with the evaluation criteria in Section 4?	☐

Form A: Technical Proposal Submission Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
EOI reference:	[Insert EOI Reference Number]		

We, the undersigned, offer to provide the services for [Insert Title of services] in accordance with your EOI No. [Insert EOI Reference Number] and our Proposal. We are hereby submitting our Proposal.

We hereby declare that our firm, its affiliates or subsidiaries or employees, including any JV/Consortium /Association members or subcontractors or suppliers for any part of the contract:

a) is not under procurement prohibition by the United Nations, including but not limited to prohibitions derived from the Compendium of United Nations Security Council Sanctions Lists;

b) have not been suspended, debarred, sanctioned or otherwise identified as ineligible by any UN Organization or the World Bank Group or any other international Organization;

c) have no conflict of interest in accordance with Instruction to Bidders Clause 4;

d) do not employ, or anticipate employing, any person(s) who is, or has been an ISA staff member within the last year, if said ISA staff member has or had prior professional dealings with our firm in his/her capacity as ISA staff member within the last three years of service with the ISA;

e) have not declared bankruptcy, are not involved in bankruptcy or receivership proceedings and there is no judgment or pending legal action against them that could impair their operations in the foreseeable future;

f) undertake not to engage in proscribed practices, including but not limited to corruption, fraud, coercion, collusion, obstruction, or any other unethical practice, with the ISA or any other party and to conduct business in a manner that averts any financial, operational, reputational or other undue risk to the ISA and we *embrace the principles of the ISA Supplier Code of Conduct.*

We declare that all the information and statements made in this Proposal are true and we accept that any misinterpretation or misrepresentation contained in this Proposal may lead to our disqualification and/or sanctioning by the ISA.

We offer to provide services in conformity with the Bidding documents, including the ISA General Conditions of Contract and in accordance with the Terms of Reference

Our Proposal shall be valid and remain binding upon us for the period of time specified in the Bid Data Sheet.

We understand and recognize that you are not bound to accept any Proposal you receive.

I, the undersigned, certify that I am duly authorized by [Insert Name of Bidder] *to sign this Proposal and bind it should ISA accept this Proposal.*

Name: _____

Title: _____

Date: _____

Signature: _____

[*Stamp with official stamp of the Bidder*]

Form B: Bidder Information Form

Legal name of Bidder	[Complete]
Legal address	[Complete]
Year of registration	[Complete]
Bidder's Authorized Representative Information	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Are you a UNGM registered vendor?	☐ Yes ☐ No If yes, [insert UNGM vendor number]
Are you an ISA vendor?	☐ Yes ☐ No
Countries of operation	[Complete]
No. of full-time employees	[Complete]
Quality Assurance Certification (e.g. ISO 9000 or Equivalent) (*If yes, provide a Copy of the valid Certificate):*	[Complete]
Does your Company hold any accreditation such as ISO 14001 related to the environment? *(If yes, provide a Copy of the valid Certificate):*	[Complete]
Does your Company have a Written Statement of its Environmental Policy? *(If yes, provide a Copy)*	[Complete]
Contact person ISA may contact for requests for clarification during Proposal evaluation	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Please attach the following documents:	▪ Company Profile, which should not exceed fifteen (15) pages and product catalogues relevant to the goods/services being procured ▪ Certificate of Incorporation/ Business Registration ▪ Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Bidder

	is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Bidder ▪ Trade name registration papers, if applicable ▪ Local Government permit to locate and operate in assignment location, if applicable ▪ Official Letter of Appointment as local representative, if Bidder is submitting a Bid in behalf of an entity located outside the country ▪ Power of Attorney

Form C: Joint Venture/Consortium/Association Information Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
EOI reference:	[Insert EOI Reference Number]		

To be completed and returned with your Proposal if the Proposal is submitted as a Joint Venture/Consortium/Association.

No	Name of Partner and contact information *(address, telephone numbers, fax numbers, e-mail address)*	Proposed proportion of responsibilities (in %) and type of services to be performed
1	[Complete]	[Complete]
2	[Complete]	[Complete]
3	[Complete]	[Complete]

Name of leading partner (with authority to bind the JV, Consortium, Association during the EOI process and, in the event a Contract is awarded, during contract execution)	[Complete]

We have attached a copy of the below document signed by every partner, which details the likely legal structure of and the confirmation of joint and severable liability of the members of the said joint venture:

☐ Letter of intent to form a joint venture ***OR*** ☐ JV/Consortium/Association agreement

We hereby confirm that if the contract is awarded, all parties of the Joint Venture/Consortium/Association shall be jointly and severally liable to ISA `for the fulfillment of the provisions of the Contract.

Name of partner: _____

Signature: _____

Date: _____

Name of partner: _____

Signature: _____

Date: _____

Name of partner: _____

Signature: _____

Date: _____

Name of partner: _____

Signature: _____

Date: _____

Form D: Qualification Form

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
EOI reference:	[Insert EOI Reference Number]		

If JV/Consortium/Association, to be completed by each partner.

Historical Contract Non-Performance

☐ Contract non-performance did not occur for the last 3 years
☐ Contract(s) not performed for the last 3 years

Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value in US$)
		Name of Client: Address of Client: Reason(s) for non-performance:	

Litigation History (including pending litigation)

☐ No litigation history for the last 3 years
☐ Litigation History as indicated below

Year of dispute	Amount in dispute (in US$)	Contract Identification	Total Contract Amount (current value in US$)
		Name of Client: Address of Client: Matter in dispute: Party who initiated the dispute: Status of dispute: Party awarded if resolved:	

Previous Relevant Experience

Please list only previous similar assignments successfully completed in the last 3 years.
List only those assignments for which the Bidder was legally contracted or sub-contracted by the Client as a company or was one of the Consortium/JV partners. Assignments completed by the Bidder's individual experts working privately or through other firms cannot be claimed as the relevant experience of the Bidder, or that of the Bidder's partners or sub-consultants, but can be claimed by the Experts themselves in their CVs. The Bidder should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if so, requested by ISA.

Project name & Country of Assignment	Client & Reference Contact Details	Contract Value	Period of activity and status	Types of activities undertaken

Bidders may also attach their own Project Data Sheets with more details for assignments above.

☐ Attached are the Statements of Satisfactory Performance from the Top 3 (three) Clients or more.

Financial Standing

Financial Standing

Annual Turnover for the last financial year	Year USD
Latest Credit Rating (if any), indicate the source	

Financial information (in US$ equivalent)	**Historic information for the last financial year**
	Information from Balance Sheet
Total Assets (TA)	
Total Liabilities (TL)	
Current Assets (CA)	
Current Liabilities (CL)	
	Information from Income Statement
Total / Gross Revenue (TR)	
Profits Before Taxes (PBT)	
Net Profit	
Current Ratio	

☐ Attached are copies of the audited financial statements (balance sheets, including all related notes and income statements) for the years required above complying with the following condition:

a) Must reflect the financial situation of the Bidder or party to a JV and not sister or parent companies;
b) Historic financial statements must be audited by a certified public accountant;
c) Historic financial statements must correspond to accounting periods already completed and audited. No statements for partial periods shall be accepted.

Form E: Format of Technical Proposal

Please ensure that the information below is adapted in accordance with the technical evaluation criteria included in Section 4. The below sections correspond to the sample criteria included in this template EOI in Section 4]

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
EOI reference:	[Insert EOI Reference Number]		

The Bidder's proposal should be organized to follow this format of Technical Proposal. Where the bidder is presented with a requirement or asked to use a specific approach, the bidder must not only state its acceptance, but also describe how it intends to comply with the requirements. Where a descriptive response is requested, failure to provide the same will be viewed as non-responsive.

SECTION 1: Bidder's qualification, capacity and expertise

1.1 Brief description of the organization, including the year and country of incorporation and types of activities undertaken.

1.2 Specific organizational capability which is likely to affect implementation: management structure, financial stability and project financing capacity, project management controls.

1.3 Relevance of specialized knowledge and experience on similar engagements for fund-raising done in the region/country.

1.4 Quality assurance procedures and risk mitigation measures.

1.5 Organization's commitment to sustainability.

SECTION 2: Proposed Methodology, Approach and Implementation Plan

This section should demonstrate the bidder's responsiveness to the TOR by identifying the specific components proposed, addressing the requirements, providing a detailed description of the essential performance characteristics proposed and demonstrating how the proposed approach and methodology meets or exceeds the requirements. All important aspects should be addressed in sufficient detail and different components of the project should be adequately weighted relative to one another.

2.1 A detailed description of the approach and methodology for how the Bidder will achieve the Terms of Reference of the project, keeping in mind the appropriateness to local conditions and project environment. Details how the different service elements shall be organized, controlled and delivered.

2.2 The methodology shall also include details of the Bidder's internal technical and quality assurance review mechanisms.

2.3 Description of available performance monitoring and evaluation mechanisms and tools; how they shall be adopted and used for a specific requirement.

2.4 Implementation plan including a Gantt Chart or Project Schedule indicating the detailed sequence of activities that will be undertaken and their corresponding timing.

2.5 Demonstrate how you plan to integrate sustainability measures in the execution of the contract.

2.6 Any other comments or information regarding the project approach and methodology that will be adopted.

SECTION 2A: Bidder's Comments and Suggestions on the Terms of Reference

Provide comments and suggestions on the Terms of Reference, or additional services that will be rendered beyond the requirements of the TOR, if any.

SECTION 3: Management Structure and Key Personnel

3.1 Describe the overall management approach toward planning and implementing the project. Include an organization chart for the management of the project describing the relationship of key positions and designations. Provide a spreadsheet to show the activities of each personnel and the time allocated for his/her involvement.

3.2 Provide CVs for key personnel that will be provided to support the implementation of this project using the format below. CVs should demonstrate qualifications in areas relevant to the Scope of Services.

Format for CV of Proposed Key Personnel

NAME OF PERSONNEL	[INSERT]
POSITION FOR THIS ASSIGNMENT	[INSERT]
NATIONALITY	[INSERT]
LANGUAGE PROFICIENCY	[INSERT]

EDUCATION/ QUALIFICATIONS	*[SUMMARIZE COLLEGE/UNIVERSITY AND OTHER SPECIALIZED EDUCATION OF PERSONNEL MEMBER, GIVING NAMES OF SCHOOLS, DATES ATTENDED AND DEGREES/QUALIFICATIONS OBTAINED.]*
	[INSERT]
PROFESSIONAL CERTIFICATIONS	*[PROVIDE DETAILS OF PROFESSIONAL CERTIFICATIONS RELEVANT TO THE SCOPE OF SERVICES]*
	▪ NAME OF INSTITUTION: [INSERT] ▪ DATE OF CERTIFICATION: [INSERT]

EMPLOYMENT RECORD/ EXPERIENCE	*[LIST ALL POSITIONS HELD BY PERSONNEL (STARTING WITH PRESENT POSITION, LIST IN REVERSE ORDER), GIVING DATES, NAMES OF EMPLOYING ORGANIZATION, TITLE OF POSITION HELD AND LOCATION OF EMPLOYMENT. FOR EXPERIENCE IN LAST FIVE YEARS, DETAIL THE TYPE OF ACTIVITIES PERFORMED, DEGREE OF RESPONSIBILITIES, LOCATION OF ASSIGNMENTS AND ANY OTHER INFORMATION OR PROFESSIONAL EXPERIENCE CONSIDERED PERTINENT FOR THIS ASSIGNMENT.]*
	[INSERT]

REFERENCES	*[PROVIDE NAMES, ADDRESSES, PHONE AND EMAIL CONTACT INFORMATION FOR TWO (2) REFERENCES]* REFERENCE 1: [INSERT] REFERENCE 2: [INSERT]

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe my qualifications, my experiences and other relevant information about myself.

Signature of Personnel	Date (Day/Month/Year)

Section 5 - Terms of Reference

GIS, NA, PTHMS, RMLF System Requirements and Service Level Agreement

TABLE OF CONTENTS

AI powered GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration System Requirements & Service Level Agreements for 1 year Subscription

05. Introduction

ISA invites proposals from qualified System Integrators (SIs) to design, develop and deploy an AI-powered grid digitization, network modeling, load flow analysis, grid simulation and expansion planning solution. This initiative aims to support the DISCOM's energy transition toward Distributed Energy Resources (DER) such as Solar Power generators, Wind Turbines, Battery Energy Storage Systems (BESS) and Community EV charger integration. The solution will enhance grid visibility, optimize operational efficiency, enable predictive analytics and support long-term planning for a sustainable and resilient power network. The selected SI will be responsible for end-to-end implementation, one-time grid digitization, integration with existing systems, training and post-deployment support.

06. Scope of Work

The proposed solution should include the following modules and features:

Sl No.	Product Feature/Module
1.	One-Time Grid Digitization Effort
2.	AI-powered Mobile Application for Linemen
3.	AI-powered Web Application for DISCOM Officials

a. **One-Time Grid Digitization Effort**

The SI shall conduct a comprehensive one-time digitization of the DISCOM's grid assets to establish a foundational dataset for the proposed solution. This effort will involve:

i. Asset Coverage: Digitization of all grid assets, including:

1. All 66/11kV and 33/11kV Substations and sub-assets
2. 66kV and 33kV Feeders, Poles, Segments and buses
3. 11kV Feeders, Poles, Segments and buses
4. All types of Distributed Energy Resources (DER) such as Solar Power generators (SPGs), Wind Turbines, Battery Energy Storage Solutions (BESS), EV Community chargers, V2G EVs, tri-

generation units, biomass generators, gas turbines, reciprocating engines, fuel cells and Capacitor Banks attached to lines of 66kV, 33kV and 11KV lines.

ii. Validation Mechanism Requirement for One-Time Digitization Effort of Grid Assets: The DISCOM requires System Integrators (SIs) to propose a robust validation mechanism for the one-time digitization of grid assets (e.g., substations, feeders, transformers, poles, solar power generators). The mechanism must leverage Artificial Intelligence (AI) and Machine Learning (ML) to ensure data accuracy, completeness and reliability while optimizing the use of DISCOM's existing capacity and resources. Proposals must detail how the SI will meet these requirements. The SI must implement a multi-tier validation workflow that integrates field verification, automated AI/ML checks and supervisory oversight to deliver high-quality digitized data. The mechanism should minimize rework, reduce manual effort and align with DISCOM systems. Proposals must address the following tiers:

1. **Tier 1: Field-Level Validation**

   a. Requirement: The SI must capture asset data (e.g., Asset ID, geospatial coordinates, technical specifications) with real-time validation. Mandatory fields and input checks (e.g., format validation for serial numbers, range checks for voltage ratings) are required.

   i. Include anomaly detection using an ML model to flag errors in data entry (e.g., coordinates of connected assets outside possible limits, duplicate IDs, etc)

   ii. Provide AI-driven guided data entry / clean-up, suggesting plausible values based on historical patterns

   iii. DISCOM Capacity Optimization: The solution must leverage existing field staff, enhancing their efficiency with AI tools to minimize additional personnel needs.

2. **Tier 2: Automated Cross-Checking Against Existing DISCOM Records**

   a. Requirement: The SI must synchronize digitized data with a backend system and cross-check it against DISCOM databases (e.g. billing records, asset registries) provided by the DISCOM.

   i. Use ML algorithms (e.g., fuzzy matching) to identify discrepancies (e.g., mismatched pole locations, unregistered transformers).

   ii. Implement AI-based geospatial validation to detect and correct coordinate mismatches against GIS data.

   iii. Employ ML clustering to detect duplicate entries (e.g., two poles with identical coordinates).

   iv. **DISCOM Capacity Optimization**: The solution must utilize DISCOM's existing datasets as a reference, reducing manual re-verification efforts.

3. **Tier 3: Supervisory Review and AI-Enhanced Validation**

a. Requirement: The SI's Web Application must provide a dashboard for supervisors to review discrepancy reports and flagged anomalies, with options to approve, reject, or escalate issues for field re-verification.

i. Include AI-driven anomaly prioritization, ranking discrepancies by severity
ii. Use ML models trained on DISCOM data to predict errors and suggest fixes.
iii. Validate network topology (e.g., feeder-to-substation linkages) using AI to ensure physical grid rule compliance (e.g., voltage compatibility).
iv. **Capacity Optimization:** The solution must enhance existing supervisors' decision-making with AI insights, minimizing additional staffing requirements.

4. **Tier 4: Final Validation and Reporting**

a. Requirement: The SI must perform a final AI-driven consistency check on the validated dataset and generate reports for DISCOM approval.

i. Ensure data integrity across assets (e.g., pole alignment with feeder paths, transformer ratings matching feeder specs).
ii. Calculate accuracy metrics (e.g., % of assets validated without discrepancies, geospatial accuracy rate) using ML.
iii. Provide AI-generated heatmaps of validation issues (e.g., regions with frequent mismatches) for review.
iv. **DISCOM Capacity Optimization:** The solution must deliver actionable insights using DISCOM's existing reporting structures, avoiding external consultancy needs.

iii. Evaluation Criteria

1. Completeness and accuracy of digitized asset data.
2. Accuracy of AI/ML anomaly detection (e.g., >95% true positive rate).
3. Quantified reduction in manual validation effort (e.g., hours saved per 100 assets).
4. Completeness, clarity and usability of validation reports for approval.
5. Evidence of scalability and effective use of DISCOM capacity in the proposed approach.

b. **Requirements for AI-Powered Mobile Application for Linemen:**

The DISCOM requires System Integrators (SIs) to propose an AI-powered Mobile Application for linemen and field engineers to collect, validate and manage grid asset data and consumer billing information in real-time during the one-time digitization effort and ongoing operations. The application must enhance grid visibility, streamline field workflows, support consumer-to-grid mapping and facilitate the DISCOM's transition to Distributed Energy Resources (DER) such as Solar Power generators (SPGs), Wind Turbines, Battery Energy Storage Solutions (BESS) and EV Community chargers. The following detailed requirements outline the expected functionalities, incorporating advanced AI capabilities and operational integration.

The proposed solution should include the following modules and features:

Sl No.	Product Feature/Module

1.	Data Capture for Nodes in the Network
2.	Data Capture for Lines in the Network
3.	Avenue to Edit Asset and Linkage Details
4.	AI-powered Validation of Digitized Assets
5.	Photo Capture and AI-Powered Asset Identification
6.	Alerts and Notifications

i. Detailed Requirements

1. Data Capture for Nodes in the Network

Description: The application must enable linemen to capture detailed data for network nodes, including 33/11kV substations, sub-assets (e.g., buses, transformers) and Distributed Energy Resources (DER) (33kV and 11KV) such as Solar Power generators (SPGs), Wind Turbines, Battery Energy Storage Solutions (BESS) and EV Community chargers.

a. Required Features:

i. Capture geospatial coordinates (latitude/longitude) with sub-meter accuracy using device GPS.

ii. Record asset specifications: Asset ID/serial number, voltage rating, capacity and technical parameters (e.g., bus type, active/inactive status).

iii. Support dropdown menus or auto-suggestions for standardized fields (e.g., voltage levels: 33kV, 11kV).

iv. For ease of data entry, every probable or default value should be entered implicitly.

b. Use ML to pre-populate fields based on historical node data patterns (e.g., typical substation capacities), reducing manual input errors.

2. Data Capture for Lines in the Network

Description: The application must facilitate comprehensive data collection for network lines, including 33kV and 11kV feeders, poles and segments.

a. Required Features:

i. Record geospatial paths (start/end coordinates and intermediate points) for feeders and segments.

ii. Capture technical specifications: conductor type, length, impedance per km, thermal/power limits and shunt admittance (optional).

iii. Include serial numbers for poles and segments, with options to link to tender records.

iv. Enable linemen to mark line conditions (e.g., “sagging,” “intact”).

b. Leverage AI to suggest conductor types or lengths based on feeder voltage and location, validated against DISCOM standards.

3. **Avenue to Edit Asset and Linkage Details**

Description: The application must allow linemen to edit asset details and network topology linkages post-capture, ensuring flexibility to correct errors or update information.

a. Required Features:

i. Provide an intuitive interface to modify asset data (e.g., update serial number, adjust coordinates) with timestamps.

ii. Enable editing of network linkages (e.g., reassign Pole from one Transformer to another) via drag-and-drop or tap-to-reconnect.

iii. Display an editable network diagram with zoom and highlight options for edited sections.

iv. Include a change log.

v. Validate edited linkages against logical rules (e.g., voltage compatibility).

vi. All cable-related functions are to be easily accessible via menus and/or toolbar icons, streamlining operations without deep menu navigation.

vii. The software should allow users to select an already laid cable by clicking on it, automatically setting it as the current type. This is useful for extending or continuing existing cable runs without manual re-entry.

viii. Functionality to be made available for integrating new connections into existing lines. Users should be able to select a network node symbol in advance and apply it during line configuration.

ix. Users should be able to add or remove cable types, adjust spacing and alignment and edit each feeder line individually through an intuitive GUI.

x. Feeder cable laying to be executed with simple icon clicks. The software should support continuation of existing multiple feeders to new locations and the connection of separate feeder paths using arcs or roundabout routing.

xi. A full suite of editing tools is available for cables and transmission lines, allowing:

1. Drawing connections by selecting end points of two feeders.
2. Extending a single cable line.
3. Unlinking or re-linking feeder poles from/to cables.
4. Moving poles using a drag-and-drop mechanism.
5. Deleting full lines or segments by selecting the start and end positions.
6. Replacing a line designation with a new one through selection.
7. Updating non-graphical attributes of cables via interactive GUI forms.
8. Displaying updated non-graphical data directly on the graphical layout.

b. Use AI to suggest corrections for edited data, flagging inconsistencies.

c. Installing new sections on single/ two phase lines: Provide proper checks for two phase / single phase lines on subsequent sections, while installing a section. Use the Network analysis module for the same.

4. **AI-Powered Validation of Digitized Assets**

Description: The application must include a robust validation framework to ensure data accuracy, leveraging AI/ML.

a. Required Features:

i. Enforce real-time input validation.
ii. Cross-check data against pre-loaded DISCOM records upon sync.
iii. Use AI-based anomaly detection to flag inconsistencies, with corrections.
iv. Generate a validation summary.

b. Train ML models on DISCOM data to predict and resolve errors.

5. **Photo Capture and AI-Powered Asset Identification**

Description: The application must enable linemen to capture and analyze visual data for asset documentation and identification.

a. Required Features:

i. Allow photo capture with automatic tagging of Asset ID and coordinates.
ii. Support annotation tools and text notes.
iii. Enable video recording for complex assets with timestamping.
iv. Validate AI results against manual entries, flagging discrepancies.

b. Use ML-models fine-tuned on DISCOM asset images for improving accuracy.

6. **Alerts and Notifications**

a. Description: The Alerts and Notifications module for the Mobile Application (Lineman App) equips on-ground linemen with real-time, actionable notifications to address grid issues, maintenance tasks and operational events efficiently. Designed for field use, this module prioritizes simplicity, delivering concise alerts with clear instructions and geospatial guidance. It integrates network modelling and AI-driven Remote Monitoring System (RMS) data analysis to generate context-aware notifications tailored to linemen's roles and assigned areas, minimizing alert fatigue and enabling rapid response.

b. Functional Requirements:

i. **Alert Generation:** The module generates alerts from network modelling and AI-driven RMS data analysis, ensuring linemen receive only relevant notifications for their geographic jurisdiction and shift. Supported alerts are optimized for field action:

1. **Fault Detection Alerts:**

a. **Description:** Triggered for faults detected via network modelling.

b. **Details:** Provides fault location with GPS coordinates and asset ID, fault type and affected area.
c. **Delivery:** Push notification with vibration and audible alert, including GIS-based navigation to the site.

2. **Load Imbalance Alerts:**
   a. **Description:** Generated when phase imbalances exceed predefined thresholds, requiring field verification.
   b. **Details:** Specifies feeder ID and imbalance details.
   c. **Delivery:** Push notification, escalated to linemen for on-site action.
3. **Voltage Violation Alerts:**
   a. **Description:** Triggered for voltage deviations beyond acceptable limits.
   b. **Details:** Specifies node, voltage level and duration.
   c. **Delivery:** Push notification for escalated field verification tasks.
4. **High Upstream DER Power Flow Alerts:**
   a. **Description:** Triggered when DER power exceeds local demand, causing upstream flow to higher voltages, impacting DISCOM finances.
   b. **Details:** Includes DER asset ID, power flow data and estimated financial impact. Provides navigation to DER site.
   c. **Delivery:** High-priority push notification with vibration.
5. **Predictive Maintenance Alerts:**
   a. **Description**: Identifies assets at risk based on network modelling and AI analysis.
   b. **Details**: Includes asset ID and stress factors.
   c. **Delivery**: Push notification with asset location and maintenance instructions.
6. **Load Trend Alerts:**
   a. **Description**: Detects abnormal load changes over a defined period.
   b. **Details**: Includes asset ID and load trend summary.
   c. **Delivery**: Push notification for verification tasks.
7. **Generation Trend Alerts:**
   a. **Description**: Identifies DER generation anomalies.
   b. **Details**: Includes DER asset ID and trend summary.
   c. **Delivery**: Push notification with navigation to DER site.
8. **Voltage Trend Alerts:**
   a. **Description**: Detects persistent voltage anomalies.
   b. **Details**: Includes node ID and trend summary.
   c. **Delivery**: Push notification for verification.

ii. **Notification Delivery and Management**

1. **Role-Based Delivery**: Alerts target linemen based on their assigned area and shift.

2. **Priority Levels**: Critical, High, Medium, Low, with distinct vibration/audible cues.
3. **Escalation Workflows:** Unacknowledged Critical/High alerts escalate to supervisors via SMS after 10 minutes.
4. **Acknowledgment Tracking:** Linemen acknowledge alerts in-app; unacknowledged alerts trigger reminders after 3 minutes.
5. **Multi-Channel Delivery:** Push notifications, SMS for low-connectivity areas.
6. **User Customization:** Configurable vibration/sound settings within admin limits.
7. **Audit Logs:** Tracks alert delivery, acknowledgment and actions for compliance

.

Alert Type	Priority Levels	Delivery Method
Fault Detection	Critical/High	Push, Vibration, Audible
Load Imbalance	Medium	Push, Informational
Voltage Violation	High/Medium	Push, Escalated
High Upstream DER Power Flow	High	Push, Vibration
Predictive Maintenance	Medium/Low	Push, Informational
Load Trend	Medium	Push, Informational
Generation Trend	Medium	Push, Informational
Voltage Trend	Medium	Push, Informational

c. **Requirements for AI-Powered Web Application for DISCOM Officials:**

The Web Application will serve as the centralized platform for DISCOM officials to manage digitized assets, perform advanced analytics, simulate grid scenarios and optimize operations. It must include the following features:

Sl No.	Feature
1	AI-driven Analytics - Dashboard, Network Analysis, Map Visualization
2	AI-powered What-If Simulations - Grid planning, DRE Integration and Agricultural Feeder Roster Manage
3	Chat-based Natural Language querying feature for data analysis and insight generation
4	Digital Single-Line Diagrams - AI-generated and editable network diagrams
5	Asset Management and Data Repository
6	Alerts and Notifications

7	Integration with Existing DISCOM IT Infrastructure
8	User Management and Security
9	Training and Knowledge Base

i. Detailed Requirements

1. AI-Driven Analytics

A robust, AI-driven module delivering real-time and historical insights into grid performance, consumer behavior, energy losses and spatial data through the integrated sub-components. This module empowers DISCOM officials with actionable intelligence for operational efficiency, loss reduction and long-term planning, leveraging data from the Mobile Application, SCADA and billing systems.

a. Dashboard

An AI-powered, customizable interface providing a holistic view of grid operations, digitization progress and consumer metrics, designed for both high-level oversight and detailed technical analysis.

i. Display AI-calculated key performance indicators (KPIs): total assets digitized, validation completion rate, outage incidents, billing compliance and load distribution.
ii. Offer AI-generated time-series charts for load profiles, fault frequency and energy consumption, with granular filters by region, feeder, substation, or date range.
iii. Provide role-based dashboards: executive summary, operational view and engineering analytics, dynamically tailored by AI based on user role, past interactions and preferences.
iv. Include AI-driven alerts for critical events with drill-down options to detailed data.
v. Support exportable AI-formatted snapshots of dashboard views for reporting purposes. Leverage ML to detect trends, predict anomalies and prioritize alerts based on severity and operational impact.

Category	Sub-Category / Data Point	Seniority Level Availability
Consumption and Supply Summary	MTD/YTD Consumption by Source (Thermal, Solar, Wind, etc.)	Executive Engineers and above
	Blended Cost of Supply (Rs./kWh)	Executive Engineers and above
	Year-over-Year Consumption and Cost Changes	Executive Engineers and above

Grid Operations	Outage Incidents (Daily/Weekly/Monthly)	All levels
	Load Distribution and Feeder Loading	All levels
	Asset Health and Critical Event Alerts	Senior Engineers and below
	Loss Metrics (Technical and Commercial)	Executive Engineers and above
Digitization Status	Total Assets Digitized and Validation Rate	Executive Engineers and above
	Task Completion Rate (Field Team Efficiency)	Executive Engineers and above
Consumer Metrics	Billing Compliance and Complaint Resolution	Executive Engineers and above
	Energy Consumption Trends	All levels
MTD Savings	Solar Integration Savings	Executive Engineers and above
	BESS Integration Savings	Executive Engineers and above
	Deviation Penalty Savings	Executive Engineers and above
Predictive Analytics	AI-Generated Demand Forecast	Executive Engineers and above
Dashboard Functionality	Customizable Views and Exportable Snapshots	All levels

b. Network Analysis

An AI-driven analytical tool for evaluating grid performance, identifying inefficiencies and predicting maintenance needs, critical for ensuring stability and optimizing energy delivery across 33kV and 11kV networks. This feature should also identify technical and commercial losses, providing detailed diagnostics and mitigation strategies to enhance revenue and grid efficiency.

i. **Required Features**:

1. Calculate AI-analyzed metrics: voltage profiles for every bus, power factor, current/power losses per line, percentage capacity loading, voltage drops and overload warnings.
2. Display AI-generated technical outputs: current angles in diagrams, power factor correction recommendations, terminal voltage drops for loads, real/reactive power losses and voltage/current unbalance factors.
3. Perform AI-enhanced fault analysis: open-phase faults, short circuit capacity, symmetrical/unsymmetrical faults and fault location estimation.
4. Provide AI-driven growth analysis: single/multi-year load growth, AC/DC load flow calculations and solar/wind yield/loss estimates.
5. Generate AI-visualized outputs: time-series plots, loss calculations and Sankey diagrams showing energy balance.
6. Enable AI-powered anomaly detection for predictive maintenance with trend analysis.
7. Train ML models on historical data, SCADA/RMS inputs and Mobile Application data to refine predictions, detect subtle issues and recommend optimizations.
8. Compare AI-analyzed energy supplied vs. billed consumption to calculate losses.
9. Flag AI-detected anomalies: potential theft, metering errors or technical losses.
10. Generate AI-compiled loss reports by feeder, substation or region, with breakdowns of data.
11. Provide AI-driven loss attribution: categorize losses by source with geospatial mapping.
12. Suggest AI-optimized mitigation
13. Use ML to pinpoint loss sources, predict loss trends and refine mitigation strategies based on historical success rates.

ii. **Additional Analysis Features for compliance:**

1. Define / evaluate annual load factor and loss load factor from the load duration details obtained from RMS data.
2. Allocate Load by Feeder Demand, DT demand, Power Factor etc from the meter database. Divide Load in proportion to kWH / connected KW.
3. kWH parameter shall be updated regularly by subdivision working. New load (consumer) added in the subdivision is automatically taken into account in load flow calculations.
4. Compare and analyze power flow study reports in a single consolidated tabular view.
5. Compare results of specific information such as the electrical load flow calculation results for buses, branches, loads, or sources.
6. Create a base line report & quickly identify deviations for all cases
7. Facility to export summary view into Microsoft® Excel for maximum data flexibility & visualization.

8. Unified Unbalanced Power Flow allows for analysis of unbalanced distribution networks due to large single phase loads. The solution ensures that distribution networks can be solved per phase.
9. Automated Protection and Coordination Evaluation capability which should provide automatic detection and evaluation of system protection and coordination / selectivity based on customized design criteria and industry guidelines.
10. Automated & intelligent detection of protection zones, Automated Overcurrent Protection & Coordination Evaluation.
11. Option to store load flow statistics with different names and reload them when required further.

Below is a list of Technical analysis that is required to be conducted:

Network Analysis Type	Input Sources	Usefulness to DISCOM
Voltage profiles for every bus	**Data from One-time Digitisation:** - Network topology data: Asset location, Bus specification (type of bus), Total number of buses - Line and cable data: impedance/km (resistance/km, inductance/km), conductor type, line length, line limit (thermal or power limit whichever is applicable)	Ensures voltage regulation and stability across the network, enabling proactive adjustments to prevent under/over-voltage conditions to enhance operational efficiency, can do "What if" or contingency analysis to improve service reliability, indicate the need of voltage compensation
Power factor, current, current-angle and power losses on every line	- SPG, BESS, Diesel generators, Shunt capacitors, voltage regulator: Bus number at which they are connected **Existing DISCOM databases and Sensor data:** - Status of the circuit breakers defining whether the bus is active or not, nominal voltage level, desired voltage limit - Load data: Balanced load, unbalanced load (phase wise load required) - Transformer data: Rating/capacity, Tap setting (if applicable), impedance, Real time Active and Reactive power output	- Identifies inefficient lines, reduces energy losses and enhances power quality - Efficiency enhancement can be done by identifying the scope of compensation (power factor correction), reducing reactive power costs, avoiding penalties by recommending corrective measures like capacitor additions. This leads to cost savings and improved grid performance - Aiding engineers in balancing loads and resolving power quality issues.
Percentage capacity loading of every asset	**Data from One-time digitisation:** - Asset specs and ratings - Network topology data **Existing DISCOM databases and Sensor data:** - historical usage data	Identifies the underutilization of an asset, Prevents asset overloading, extends equipment lifespan and supports capacity planning by highlighting assets nearing limits.

	- RMS latest load data	
Voltage drop calculations across the network	**Data from One-time digitisation:** - Network topology - line lengths & conductor impedance **Existing DISCOM databases and Sensor data:** - load data per bus (Historical and RMS latest) - voltage per bus (Historical and RMS latest)	Optimizes voltage regulation, enhanced power quality and consumer satisfaction, reduces consumer complaints about low voltage and informs infrastructure upgrades to maintain service quality.
Bus / transformer / cable overload warnings	**Data from One-time digitisation:** - Asset specs and ratings - Network topology data **Existing DISCOM databases and Sensor data:** - historical usage data - historical overload trends (if available) - RMS latest load data - Temperature data (if available)	Mitigates equipment failure risks, enhances safety and minimizes outage downtime by providing early warnings for overloaded assets, minimizes revenue loss.
Terminal voltage drops for loads	**Data from One-time Digitisation:** - Network topology: Transformer connectivity, DT load locations **Existing DISCOM databases and Sensor data:** - DT load profiles - historical voltage data - RMS latest load voltage	Enhances consumer satisfaction by ensuring adequate voltage at load points, guiding targeted interventions to address specific drop issues.
Real and reactive power losses	**Data from One-time digitisation:** - Line impedance, network topology **Existing DISCOM databases and Sensor data:** - historical load data - historical billing records - RMS latest load data	Pinpoints loss sources for mitigation, increases revenue by reducing unbilled energy and supports loss reduction strategies.
Voltage and current unbalance factors	**Data from one-time digitisation:** Bus and line connectivity, phase wise load distribution, historical unbalance data, load profiles, real-time voltage/current per phase	Detects unbalance issues to prevent equipment stress and outages, ensuring balanced operation and prolonging asset life, enhanced power quality increasing the life span of the assets and consumer's loads.
Open-phase fault calculations	**Data from One-time digitisation:** - Network topology: line/asset specs, Line	Speeds up fault identification and quick restoration by identifying open-phase

	impedance, line admittance (if applicable), impedance of each asset - System grounding, load type and configuration, sequence impedances information for each applicable asset **Existing DISCOM databases and Sensor data:** - System voltage level (nominal) - Pre-fault conditions: voltage at each bus, current in each phase, power flow in each phase, fault location, faulted phase - Digital fault recorder data(if applicable), relay settings, relay operation (if applicable)	issues, reducing downtime and improving reliability for affected consumers.
Single-year and multi-year load growth analysis	**Data from one-time digitisation:** - Asset locations **Existing DISCOM databases and Sensor data:** - historical and latest RMS load data - historical load growth trends - consumer expansion records	Supports long-term planning by forecasting demand growth, ensuring infrastructure scalability and avoiding future capacity shortages.
Solar/Wind farm annual yield and loss estimation	**Data from one-time digitisation:** - Renewable asset specs, location **Existing DISCOM databases and Sensor data:** - Weather data (solar irradiance and wind profile) - historical yield/loss records - RMS latest generation	Maximizes renewable energy utilization by estimating output and losses, aiding in investment decisions and grid integration planning, losses can be identified and minimized
Time-series plots	**Data from one-time digitisation:** - Asset and load locations **Existing DISCOM databases and Sensor data:** - Historical and latest RMS data	Tracks performance trends over time, enabling proactive maintenance and operational adjustments to address emerging issues like demand spikes or loss increases.
Loss calculations at any point in time	**Data from one-time digitisation:** - Network topology, line impedance - asset types and their impedance data **Existing DISCOM databases and Sensor data:** - historical RMS data - RMS latest power flow	Provides instant loss insights for real-time decision-making, reducing operational inefficiencies and supporting immediate corrective actions.

Power and energy losses in 33kV lines and transformers	**Data from one-time digitisation:** - 33kV line/transformer specs, Network topology **Existing DISCOM databases and Sensor data:** - historical and latest RMS data	Targets loss reduction at high voltage level, improving efficiency and revenue at critical network levels (33kV and 33/11kV).
Sankey diagram showing energy balance	**Data from one-time digitisation:** - Network topology **Existing DISCOM databases and Sensor data:** - Load/consumer data - Energy supply/billing records - RMS latest power flow data	Visualizes energy flow and losses for strategic planning, identifying technical/non-technical loss areas to enhance billing accuracy and grid efficiency.
AI-powered anomaly detection for maintenance	**Data from one-time digitisation:** - Asset specs - Network topology, **Existing DISCOM databases and Sensor data:** - Historical records of maintenance, faults - Asset/device specific RMS latest and historical metrics & technical data - THD data (if available) - Asset/device specific sensor data	Predicts maintenance needs, reducing unexpected failures and downtime and optimizing maintenance budgets through early anomaly detection.
Trend analysis of voltage fluctuations, outages, losses	**Data from one-time digitisation:** - Network topology **Existing DISCOM databases and Sensor data:** - Historical voltage, outage, loss records - RMS latest load data	Identifies recurring issues for root cause analysis, improving reliability and reducing outage frequency through data-driven insights.
System's short circuit capacity estimation	**Data from one-time digitisation:** - Network topology, asset impedance, short circuit ratings **Existing DISCOM databases and Sensor data:** - Historical fault data - RMS latest current data - Impedance data of each source unit connected at a bus	Ensures system resilience by assessing fault withstand capacity, guiding upgrades to handle short circuits and maintaining stability.
Symmetrical/unsymmetrical short circuit fault	**Data from one-time digitisation:** - Line impedance - line admittance (if applicable)	- Enhances fault management by analyzing fault types, reducing restoration time and improving safety through precise

analysis and Fault location estimation	- sequence impedance data of each asset - load type and configuration - Protection system information (to assess whether the existing assets and settings are good enough or not): circuit breaker, relay, fuse,recloser, CT, PT etc each protection asset with their location, type, rating and application **Existing DISCOM databases and Sensor data:** - System voltage level (nominal) - Pre-fault conditions: voltage at each bus, current in each phase, power flow in each phase, fault location, faulted phase, system grounding - Available measurements: recorded current and voltage profiles, digital fault recorder (if available), relay settings, relay operation (if applicable)	fault understanding. - Accelerates fault repair by pinpointing locations, minimizing outage duration and improving consumer service reliability.
Feeder Protection: Over current and Earth fault relay settings of radial feeders, Relay coordination	**Data from One-time Digitization:** - Relay location, CT ratio **Existing DISCOM Databases and Sensor Data:** - Steady state, nominal/rated current - minimum and maximum fault current (historical) - neutral grounding resistance - residual current - acceptable current unbalancing - circuit breaker (CB) data (type, operating time) - recloser setting **Inputs for Scenario Building:** - Desired overloading setting/factor - Coordination time interval (CTI) required **Derived from Network Analysis:** - Fault current at each relay location (if real-time data unavailable)	- Increases revenue by minimizing feeder downtime with optimal coordination - Protects assets by reliably isolating faulted sections
Transformer Overload & Earth fault relays and	**Data from One-time Digitization:** - Transformer rating, winding connection - CT ratio	- Increases transformer lifespan by preventing maloperation of relays

coordinates them to avoid maloperation	**Existing DISCOM Databases and Sensor Data:** **-** Steady state, nominal/rated current, inrush current, minimum fault current (historical) - Neutral grounding resistance - Residual current, acceptable current unbalancing - CB data (type, operating time) - Recloser setting **Inputs for Scenario Building:** - Desired overloading setting/factor - CTI required	
Power Transformer fuse protection on HT side, Overload & Earth fault relay on LT side	**Data from One-time Digitization:** - Transformer rating, winding connection - CT ratio - Nominal voltage, rated current - Type of fuse, breaking capacity **Existing DISCOM Databases and Sensor Data:** **-** Steady state, nominal/rated current, inrush current, minimum fault current (historical) - Neutral grounding resistance - Residual current, acceptable current unbalancing **Inputs for Scenario Building:** - Desired overloading setting/factor	- Increases transformer lifespan; minimizes power downtime
Power Transformer Sequence - of - operation fault analysis	**Data from One-time Digitization:** - Transformer ratings (MVA, kV) - HT side fuses (rating, breaking capacity), CT ratios (HT and LT side) **Existing DISCOM Databases and Sensor Data:** - Transformer Percentage or pu impedance, vector group, tap changer details, rated current - Fault type, location, minimum and maximum fault current, fault recorder data - CB operating time, recloser setting - Differential protection settings (bias and operating current) - Overcurrent & earth fault relay settings	- Minimal disruption through precise fault sequence analysis

	(pickup, time dial, characteristic curve) - Restricted earth fault relay settings - Overflux protection settings **Derived from Network Analysis:** - Sequence of operations based on fault analysis	
Power Transformer Equipment damage curve plotting	**Data from One-time Digitization:** - Transformer ratings (MVA, kV), percentage or pu impedance, vector group, tap changer details, rated current **Existing DISCOM Databases and Sensor Data:** - Transformer percentage or pu impedance, vector group, tap changer details, rated current - Minimum and maximum fault current - Thermal time constant (from manufacturer datasheet) - Overload limits (continuous and short-term) - Mechanical withstand current - Thermal withstand current - Differential protection settings - Overcurrent protection settings - Earth fault protection settings - Overfluxing protection settings - Thermal overload protection settings	- Prevents transformer damage due to excessive current or prolonged overloading

c. Map Visualization

An AI-enhanced Geographic Information System (GIS)-based tool meticulously crafted to spatially visualize digitized grid asset data, sensor inputs and analytical insights, empowering DISCOM officials to monitor, analyze and strategically plan grid operations within a comprehensive geographic framework. This module seamlessly integrates multi-layered data sources—ranging from latest Sensor feeds to historical records—employing advanced visualization techniques and AI-driven insights to deliver a dynamic, interactive platform. It supports operational oversight, rapid fault detection and infrastructure optimization, enabling precise decision-making for grid management, renewable energy integration and loss reduction initiatives.

i. **Display AI-Integrated Maps with Zoomable Views and Advanced Customization:**

1. Present interactive maps with scalable granularity, accurately rendering asset locations using precise geospatial coordinates derived from high-resolution data.
2. Offer customizable layers that can be toggled via AI-driven recommendations, dynamically prioritizing layers based on user roles such as field engineers or management personnel.
3. Support intelligent layering capabilities, automatically displaying relevant layers at specific zoom scales or operational conditions, with manual override options for operators to enable or disable layers as needed.
4. Provide a user-friendly interface with drag-and-drop functionality to rearrange layer order and preview changes before finalizing map views.
5. The toolbars can be removed from the screen when not required.
6. Offer dimensioning capabilities, with measurement of length on the map views.
7. Facility to export Network directly from tree view of the network. The comments/user text to be exported along with the selected graphs and network diagrams.

ii. **Overlay AI-Analyzed Latest Sensor Data from Diverse Sources:**

1. Integrate latest Sensor data streams from SCADA systems, Remote Monitoring Systems (RMS), Load Flow Analysis (LFA) and IoT-enabled devices, visually representing critical metrics across the grid network.
2. Highlights availability of historical maintenance records and feeder configurations from DISCOM databases, integrated with geospatial asset locations.
3. Shows gaps where high-frequency SCADA/RMS data, protection devices statuses and consumer meter readings are not available or integrated.
4. Generate anomaly overlays with high temporal resolution based on the latest Sensor data, highlighting irregularities, complemented by predictive overlays that forecast potential issues based on historical patterns and AI analysis.
    a. Show overloaded equipment as blinking with overloaded color.
    b. View complaints affected nodes with a different color.
5. Enable cross-source validation by cross-referencing latest Sensor data against multiple inputs, ensuring visualized anomalies are accurate and actionable, with color-coded alerts for severity.

iii. **Provide AI-Generated Heatmaps with Multi-Dimensional Analysis:**

1. Generate detailed heatmaps illustrating congestion, technical and commercial losses and demand hotspots, employing gradient scales to reflect intensity.
2. Support layered heatmap combinations, allowing users to overlay multiple metrics with adjustable opacity for clarity and leverage AI to suggest focus areas based on operational priorities.

3. Include interactive controls to zoom into heatmap zones, revealing granular data points contributing to visualized trends.

iv. **Enable Complex Spatial Queries with AI-Filtered Results:**

1. Facilitate spatial queries using jurisdiction selections, enabling users to define custom areas and visualize assets or conditions within those boundaries.
2. Provide AI-driven query optimization, refining results to highlight the most relevant geospatial data, with options to export visualized outputs in formats suitable for reporting.
3. Support dynamic query adjustments, allowing users to refine search parameters on-the-fly and instantly update map displays.
4. Filtered search for node tracing
    a. Node searching should be provided with systematically filtered search.
    b. Node search should support global as well as Feeder ID/Feeder Name/Transformer ID/Transformer Name/ Absolute ID oriented search.
    c. Node search initiation basis consumer information i.e. Service No. / Account No. etc.
    d. Allow multiple nodes selection.
    e. Any node selected can be deselected deliberately.
5. Option to dynamically select one or more attributes of an object, to be displayed as a label or Tool Tip of the object.

v. **Offer AI-Driven Power Flow Tracing with Advanced Diagnostics:**

1. Present a tree view structure of the network- representing root at Sub-division/GSS and successive feeders/ transformers.
2. Visualize energy paths from substations to distribution transformers, displaying flow metrics from the latest Sensor data in an intuitive, color-coded format.
3. Dynamically highlight bottlenecks and fault propagation paths, with AI-driven diagnostics pinpointing root causes and suggesting mitigation strategies.
4. Include predictive tracing capabilities, simulating future flow scenarios based on load forecasts and provide optimization suggestions for infrastructure adjustments.

vi. **Include Clickable Asset Details with Comprehensive Historical and Predictive Trends:**

1. Display detailed pop-ups upon clicking assets, presenting maintenance history alongside status indicators from the latest Sensor data.
2. Provide graphical visualizations of historical trends and predictive trends, leveraging AI to extrapolate from past data.
3. Allow users to annotate pop-ups with notes or attach multimedia for enhanced documentation.

vii. **Provide Historical Map Views with AI-Processed Archived Data and Interactive Playback:**

1. Enable visualization of past grid states using a time-slider interface, allowing users to scroll through historical configurations.
2. Support animated playback with pause, rewind and fast-forward controls, marking significant events with clickable markers for detailed insights.
3. Incorporate AI-driven historical analysis, identifying trends or anomalies and offering exportable snapshots of specific timeframes for archival or presentation purposes.

viii. **Support Multi-Circuit Visualization:**

1. Display multi-circuit lines on poles / towers / underground, differentiating circuits by configuration, with clickable overlays revealing detailed specs and connectivity status.
2. Allow toggling between simplified and detailed views to balance clarity and information density based on user needs.

ix. **Enable Land Base Representation with Interactive Elements:**

1. Present an intelligent land base layer integrating topographic and administrative data, with clickable entities displaying geospatial attributes such as name and address.
2. Support topology visualization, superimposing the electrical network onto land base maps to illustrate connectivity and spatial relationships.
3. Provide zoomable overlays of land features to contextualize grid assets within their physical environment.
4. Enable the system to import satellite imagery in formats like GeoTIFF and JPEG, enhancing land base visuals with high-resolution data for improved situational awareness.

x. **Provide Advanced Navigation and Interaction Tools:**

1. Equip the interface with intuitive GUI tools for zooming, panning and highlighting network features, ensuring rapid navigation across large-scale maps.
2. Include locator tools to instantly zoom to specific entities using coordinates, asset codes, or location names, with dynamic mode-switching between views.
3. Support pan-and-scan functionality to smoothly traverse the map display, enhancing usability for detailed inspections.
4. Option to traverse the network by keyboard from the selected node in upward and downward directions.

xi. **Offer Customizable Symbology and Scaling:**

1. Enable customization of symbols for network elements, with options to adjust color, shape and size based on attributes.
2. Support automatic scaling of symbols to maintain consistent visibility across zoom levels, ensuring readability without manual adjustments, with user-defined defaults for standardization.

3. Allow symbology updates based on the latest Sensor data to reflect changing conditions dynamically.
4. Provide different shapes for different types of sections like - Cut-Point, Double-Pole structure, Composite line, Composite double circuit, Double Supply, Four Pole Structure, Six-pole structure.
5. Labels loaded on the network to be made invisible if required

xii. **Power Transformer Protection Zone Selection & Viewer:**

1. Enable DISCOM officials to define, visualize and manage protection zones spatially across the grid, enhancing fault management by identifying areas covered by protective devices and their coordination logic. This feature maps fault boundaries and operational statuses to minimize downtime and improve reliability.
2. Visualization: Display protection zones as color-coded overlays on the GIS map, with boundaries dynamically adjusted based on latest available fault data and protection settings, highlighting overlaps or gaps in coverage across all digitised power transformers.
3. Interactive Viewer: Allow users to select a zone to view associated protective devices, their settings and fault history, with AI-driven suggestions for optimizing coordination to reduce outage duration.
4. Fault Management: Integrate fault location estimates (from Network Analysis) to visually flag affected zones, enabling rapid isolation and restoration strategies, supported by real-time CB/recloser status updates.

xiii. **Enable Versioning for Map Data:**

1. Implement versioning capabilities to track and manage changes in map visualizations, preserving historical states for reference or rollback purposes.
2. Support version management with timestamps for each update, allowing users to compare different iterations of the grid map via side-by-side displays or overlays.
3. Ensure version tracking integrates with playback features, enabling animated transitions between versions to visualize network evolution over time.

xiv. **Support Data Editing for Visualization Accuracy:**

1. Enable dynamic editing of network entity relationships, such as reassigning hierarchical connections, with validation based on the latest Sensor data to ensure compatibility and logical consistency.
2. Provide an intuitive graphical and textual editing interface, allowing authorized users to modify asset positions, connectivity, or attributes directly on the map, with security controls to restrict access based on user roles.
3. Include tools for annotating edits and visualizing updates instantly, ensuring the map reflects the most current grid configuration for operational use.

Feature Category	Detailed Requirements

AI-Integrated Maps with Zoomable Views	- Interactive maps with scalable granularity showing asset locations via precise coordinates. - Customizable layers toggled via AI recommendations with role-based prioritization. - Intelligent layering for scale-specific visibility and manual control, with drag-and-drop layer management.
Latest Sensor Data Overlay	- Integrate SCADA, RMS, LFA and IoT data with color-coded visuals. - Anomaly overlay with high-frequency updates and predictive overlays based on AI forecasts. - Cross-source data validation with severity alerts.
AI-Generated Heatmaps	- Heatmaps for congestion, losses and demand with gradient scales and interactive zoom. - Layered combinations with adjustable opacity and AI-suggested focus areas.
Spatial Queries	- Spatial queries with polygon selections and buffer zones for custom area analysis. - AI-optimized visualized results with export options. - Dynamic query refinement with instant map updates.
AI-Driven Power Flow Tracing	- Visualize energy paths with flow metrics from latest Sensor data in color-coded format. - Highlight bottlenecks and fault propagation with AI diagnostics. - Predictive tracing with optimization suggestions for infrastructure adjustments.
Clickable Asset Details	- Pop-ups with maintenance history and status indicators from the latest Sensor data. - Historical and predictive trends visualized graphically, with annotation options.
Historical Map Views with Playback	- Display past states with time-slider and version comparison. - Animated playback with controls, event markers and AI insights. - Exportable snapshots of specific historical views.
Multi-Circuit and Multi-Cable Visualization	- Display multi-circuit lines with clickable configuration details. - Visualize multi-cable layouts with trench cross-sections and toggling options.
Land Base Representation	- Intelligent land base with clickable entities and topology overlay. - Zoomable topographic/administrative overlays for context. - Import satellite imagery in formats like GeoTIFF and JPEG for enhanced visuals.

Navigation and Interaction Tools	- GUI-based zooming, panning and highlighting with toolbar icons. - Locator tools for entity-specific zooming and mode switching. - Pan-and-scan for smooth map traversal.
Customizable Symbology and Scaling	- Attribute-based symbol customization for elements. - Automatic symbol scaling across zoom levels with user-defined defaults. - Symbology updates based on the latest Sensor data for dynamic conditions.
Versioning for Map Data	- Track visualization changes with versioning and timestamps. - Manage versions for historical comparison and animated transitions. - Preserve baseline maps with update logs.
Data Editing for Visualization Accuracy	- Edit network relationships with compatibility validation using the latest Sensor data. - GUI-based graphical/textual editing with security controls and instant visualization. - Annotate edits for traceability and operational accuracy.

2. **What-If Simulations**

Description: An AI-powered module for modeling grid scenarios, planning expansions, integrating Distributed Energy Resources (DER) and optimizing agricultural feeder rosters, enabling DISCOM officials to test, refine and validate infrastructure strategies with predictive insights. This module leverages advanced machine learning to simulate operational changes, assess long-term impacts and recommend optimal configurations, supporting DISCOM's goals of reliability, sustainability and scalability.

a. Actual Mode & Analysis Mode

There should be separate modes to maintain precious data - Actual Mode or Real Mode and Analysis mode for any study.

i. In "actual mode" the network must be connected with actual network data and updated regularly with the associated module. Any changes made to the system are recorded and can be further traced. Since its information is precious to the organization and must be updated through proper channels.

ii. In "actual mode" Cut, Paste, Save and Consumer shifting should be allowed but with proper check on user authenticity.

iii. An analysis mode of the network will be such that whatever ad-hoc changes made to the network for analysis will not affect the actual "network/subdivision data", which represents actual network propriety of the organization.

iv. In “Analysis mode” Cut, Paste and all editing options shall be allowed so that users can analyze the network with different configurations and modifications.

v. Automatic vanishing of new nodes added at the time of new proposals/augmentation, on closing of the network.

vi. Nodes added at the time of scenario building should be mapped with dash or different line color/ node-id to distinguish them from persistent nodes.

b. General Simulations

Simulate grid planning scenarios with AI optimization to evaluate infrastructure changes and operational adjustments, providing a foundational framework for testing network modifications and their short- and long-term effects. This section includes advanced optimization techniques to enhance voltage profiles, reduce technical losses and improve reliability, while addressing evolving load dynamics through concepts like Equivalent Load for short-term planning.

i. Model AI-optimized scenarios: load increase/decrease, new loads with line sections, conductor size changes, topology reconfiguration and new substations/distribution transformers (DTs).
ii. Include AI-enhanced integrations: shunt capacitors, regulators and Distributed Energy Resources (DER).
iii. Forecast AI-driven demand: short-term and long-term with recommended parameters.
iv. Provide AI-visualized results: impact analysis, load flow changes and cost estimates.
v. Use machine learning (ML) to suggest optimal parameters and predict outcomes based on historical load data, weather patterns and asset performance metrics.
vi. Simulate network optimization using Equivalent Load: calculate a fictitious load for short-term planning that balances energy losses against year-wise load growth and discount rates.
vii. Optimize switching operations: determine optimal configurations for existing switches and suggest new tie points to minimize losses and balance feeder loads.
viii. Strategically place shunt capacitors: identify optimal locations and bank sizes for voltage support and power factor correction, minimizing costs and releasing branch capacity.
ix. Perform Volt/VAR Optimization (VVO): manage voltage levels and reactive power flow to reduce losses and peak demand using Conservation Voltage Reduction (CVR).
x. Support Fault Management and Service Restoration (FMSR): isolate faults, restore service and minimize affected customers by integrating with SCADA and AMI systems.

xi. Recommend economically viable options: suggest network expansion, restructuring, or deconstruction based on technical and financial analyses.

xii. Integrate Distributed Energy Resources (DER) with power flow analysis for optimal placement.

xiii. Provide for at least one slack bus for simulations.

xiv. Facility to merge two studies in order to work in a distributed environment.

xv. Export whole or part of a network to a new study via selecting transformers and feeders.

Simulation Scenario	Inputs Required	Utility to DISCOM
Increase/decrease load levels of a feeder/network (single multiplier)	**Data from One-time digitisation:** - Feeder/network topology (line segments, buses, switches) **Existing DISCOM databases and Sensor data:** - Base load data (historical or RMS latest kW/kVA values per node) - Transformer/line thermal ratings **Inputs for Scenario building:** - Multiplier range - Voltage limits	- Assess overloading risks - Plan capacity upgrades - Optimize load shedding strategies
Increase/decrease load at a selected bus	**Data from One-time digitisation:** - Bus ID and location in the network - Upstream/downstream network impedance **Existing DISCOM databases and Sensor data:** - Existing load profile (kW, kVAR, power factor) - Existing transformer tap setting - Circuit breaker, recloser and protection device settings **Input for Scenario building:** - New load value (absolute or percentage change in kW, kVAR)	- Identify voltage violations - Optimize transformer tap settings - Assess suitability of existing protection assets

Add new loads with additional line sections	**Data from One-time digitisation:** - Existing network model (with adjacent feeder capacity and utilization factor) **Input for Scenario building:** - New load locations (GPS coordinates or nearest bus) - Load characteristics (type, phasing) - Line parameters (resistance, reactance, length) - Desired nominal voltage at load end	- Plan cost-effective network extensions - Minimize losses
Increase/decrease conductor size for all/part of a feeder	**Data from One-time Digitisation:** - Current conductor specs (type, ampacity, R/X values) **Existing DISCOM databases and Sensor data:** - Load profiles - Thermal limits (ambient temperature, derating factors) - Cost data (material + labor) **Input for Scenario building:** - Proposed conductor specs	- Reduce technical losses - Defer costly infrastructure upgrades
Reconfigure network topology or reroute feeders	**Data from One-time digitisation:** - Feeder connectivity map **Existing DISCOM databases and Sensor data:** - Switch/breaker/bus coupler status (open/closed) - Load distribution (balanced/unbalanced phases) - Regulatory constraints **Derived from Network analysis:** - Fault current contributions	- Minimize outage times - Improve reliability (SAIDI/SAIFI reduction)

Add new substations/injection points & reconfigure	**Data from one-time digitisation:** - Upstream transmission capacity **Existing DISCOM databases and Sensor data:** - Land acquisition costs **Input for scenario building:** - Load growth projections **Derived from Network analysis:** - Substation capacity (MVA rating, voltage levels) - Location coordinates (via load density)	- Reduce line losses - Balance load distribution
Add new distribution transformers (DTs) and reconfigure	**Data from one-time digitisation:** - DT ratings **Existing DISCOM databases and Sensor data:** - Load clustering data (peak demand per cluster) - Historical DT utilization factor - Failure rate history	- Prevent DT overloading - Optimize service area boundaries
Integrate shunt capacitors, regulators, or BESS	**Existing DISCOM databases and Sensor data:** - Renewable generation patterns - Tariff structures **Derived from Network analysis:** - Device specifications (capacitor bank size/MVAR, BESS kWh/kW) - Voltage profiles - Desired voltage profile/power factor - Control strategies	- Improve voltage regulation - Reduce peak demand charges
Forecast electricity demand using historical trends & DRE data	**Existing DISCOM databases and Sensor data:** - Historical load data (hourly/daily/monthly) - DRE penetration (solar rooftop capacity, feed-in patterns) - Population/economic growth rates	- Accurate capacity planning - Dynamic tariff design

	- Event calendars	
Simulate grid expansion (Solar, BESS, new infrastructure)	**Existing DISCOM databases and Sensor data:** - Solar irradiance/Wind speed data - Land use/zoning regulations - Cost parameters (capex/opex) - Regulatory targets **Derived from Network analysis:** - BESS specs (cycle life, efficiency)	- Prioritize cost-effective investments - Maximize renewable hosting capacity
Optimize network with Equivalent Load	**Existing DISCOM databases and Sensor data:** - Current ampere loading - Year-wise load growth rates - Discount rate of money **Derived from Network analysis:** - Energy loss calculations	- Improve short-term planning - Balance investment utilization
Switching optimization	**Data from One-time digitisation:** - Existing switch locations and status **Existing DISCOM databases and Sensor data:** - Load profiles - Voltage conditions **Derived from Network analysis:** - Feeder load balance data	- Minimize kW losses - Reduce voltage violations - Balance feeder loads
Volt/VAR Optimization (VVO)	**Existing DISCOM databases and Sensor data:** - Load profiles - Generator/inverter setpoints - Voltage limits - Transformer tap positions **Derived from Network analysis:**	- Reduce system losses - Lower peak demand via CVR

	- Capacitor bank/SVC settings	
Fault Management and Service Restoration (FMSR)	**Existing DISCOM databases and Sensor data:** - SCADA/AMI event/fault data - Feeder connectivity status **Derived from Network analysis:** - Fault isolation plans - Restoration options	- Minimize customer outages - Optimize restoration speed
Economically viable network options	**Existing DISCOM databases and Sensor data:** - Technical constraints - Cost models **Derived from Network analysis:** - Expansion/restructuring scenarios	- Justify network investments - Optimize HT/LT configurations
Distributed Energy Resources (DER) integration	**Existing DISCOM databases and Sensor data:** - Solar/wind generation patterns - Load flow data **Input for Scenario building:** - DER specs (solar, wind, BESS) **Derived from Network analysis:** - Harmonic/time-series analysis	- Optimize DER placement - Enhance grid stability

c. Grid Expansion

Plan and simulate large-scale grid expansion scenarios within the simulation framework to accommodate growing demand, new geographic coverage and infrastructure upgrades, ensuring scalability and reliability while optimizing investment decisions.

i. Simulate AI-predicted grid expansion impacts: model the addition of new feeders, substations and transformers, with load redistribution effect.

ii. Assess AI-analyzed expansion requirements: calculate capacity needs, line lengths and asset specifications based on population growth, industrial development and electrification forecasts.
iii. Provide AI-driven optimization: recommend expansion layouts, phasing strategies and cost-effective configurations.
iv. Generate AI-visualized expansion outcomes: display new network topology, load flow impacts, loss estimates and financial projections.
v. Integrate with external data sources: incorporate AI-processed demographic data, land use plans and regulatory constraints for realistic simulations.
vi. Monitor AI-analyzed expansion metrics: post-expansion reliability, capacity utilization and consumer coverage.
vii. Train ML models on historical expansion data, current grid performance and external factors to predict expansion needs, optimize site selection and refine cost-benefit analyses.

d. DRE and BESS Integration Planning

Plan renewable energy and Battery Energy Storage System (BESS) integration within simulations to align with DISCOM's sustainability goals, ensuring efficient utilization of renewables and grid stability.

i. Simulate AI-predicted DRE impacts with suggested connection points.
ii. Track AI-analyzed renewable performance with annual estimates.
iii. Provide AI-driven optimization with load balancing projections.
iv. Use ML to optimize DRE placement and capacity based on load patterns and solar irradiance.

e. AI-Powered Agricultural Feeder Roster Management

Optimize agricultural feeder operations within simulation scenarios to ensure equitable supply distribution, enhance reliability and meet seasonal demand variations effectively. This module addresses the unique challenges of managing dedicated AG feeders, which predominantly serve subsidized agricultural consumers billed by pump capacity and designated supply hours, by providing advanced tools for roster management and precise load forecasting. It accounts for substation capacity limitations, seasonal supply directives and load growth trends, enabling DISCOM officials to balance operational constraints with consumer equity and infrastructure reliability.

i. **Generate AI-Optimized Block Supply Schedules Based on Substation Feasibility:**
   1. Develop detailed block supply schedules tailored to the operational capacity of 33/11 kV substations, factoring in power transformer loading limits and seasonal directives from the Government of target state on block hours.

2. Analyze feeder-specific constraints to ensure schedules align with available substation capacity, preventing overloads during peak agricultural demand periods like sowing or harvesting seasons.
3. Incorporate historical supply patterns to prioritize feeders for scheduling, ensuring equitable distribution of limited supply hours across all AG consumers connected to a substation.

ii. **Rotate AI-Suggested Schedules at Flexible Intervals:**

1. Facilitate automatic rotation of supply schedules on weekly, fortnightly, or monthly cycles to maintain fairness among consumer groups, adjusting for variations in demand or operational needs.
2. Enable authorized users to modify schedules multiple times as required, with an intuitive interface that tracks all versions and highlights the active schedule for operational clarity.
3. Simulate the impact of rotation adjustments within the module, providing previews of load distribution and energy availability to optimize fairness and reliability across feeders.

iii. **Assess AI-Calculated Energy Requirements with Multi-Horizon Forecasts:**

1. Calculate energy needs for AG feeders across short-term (day-ahead), medium-term (monthly to quarterly) and long-term (annual to multi-year) horizons, using AI to integrate historical consumption trends and planned load increases from new agricultural connections.
2. Provide granular forecasts at 15-minute intervals, scalable from individual feeder levels to broader divisions, circles, zones, or the entire DISCOM, supporting detailed planning at every operational tier.
3. Enhance forecasting accuracy by incorporating seasonal weather impacts, irrigation patterns and consumer growth data, with self-correcting models targeting 95% accuracy at commissioning and 99.5% within two years.

iv. **Provide AI-Generated Alerts with Escalations:**

1. Monitor feeder operations continuously, generating alerts for abnormal conditions such as unplanned tripping, overloading beyond prescribed limits, or voltage variations outside acceptable thresholds.
2. Escalate alerts via SMS or email to relevant personnel based on severity, with a ticketing system to track resolution of issues like equipment failures or schedule violations.
3. Include predictive alerts based on forecasted demand spikes or transformer stress, enabling proactive measures to mitigate risks and maintain supply reliability.

v. **Monitor AI-Analyzed Parameters:**

1. Track critical operational parameters including breaker ON/OFF status, cumulative active and reactive energy, peak demand, block hours delivered and fault/trip records for each AG feeder.

2. Analyze power transformer loading and ampere loading per feeder, integrating data from tagged transformers to assess block-wise energy consumption and identify capacity bottlenecks..

vi. **Integrate with Existing DISCOM Systems:**

1. Seamlessly connect with SCADA, Remote Monitoring Systems (RMS), feeder metering, billing and power transformer monitoring systems to capture a comprehensive set of electrical parameters and operational data.
2. Leverage integration to acquire data such as active/reactive energy, power factor, frequency and outage/downtime records, enabling energy balancing across blocks and substations.
3. Interface with legacy systems like RAPDRP billing modules or load shedding systems to enrich forecasting and rostering with consumer indexing and historical usage insights, enhancing overall system coherence.

vii. **Optimize with AI Recommendations and Impact Previews:**

1. Deliver actionable recommendations for schedule adjustments, feeder load balancing and capacity augmentation, previewing impacts on energy distribution, loss reduction and consumer service levels.
2. Optimize block arrangements by analyzing tripping incidents, power ON/OFF hours and demand patterns, ensuring supply aligns with substation feasibility and agricultural needs.
3. Support decision-making with simulations of proposed changes, such as feeder separation or transformer upgrades, to address forecasted overloading or reliability issues.

viii. **Support Block Arrangement Features:**

1. Enable detailed tracking of block-wise supply arrangements, including power ON/OFF hours, number of tripping incidents and interruptions per feeder, substation, or broader operational unit.
2. Compare normative load and consumption against actual values to identify deviations, generating exception reports for block violations or unscheduled supply extensions.
3. Facilitate energy assessments at feeder, substation and EHV levels, aiding in load quota fixing and augmentation planning for transformers or feeders over short, mid and long terms.

ix. **Enhance Operational Visibility and Control:**

1. Provide engineers with mobile and web-based access to monitor AG feeder status, including breaker conditions (based on sensors available from DISCOM), energy consumption and fault logs, supporting field-level decision-making.
2. Automatically adjust block hours based on predefined rules, with manual override options for flexibility during exceptional demand periods.
3. Generate daily, weekly, or monthly reports on feeder performance, including load curves, demand trends and outage durations, to assist engineers at all levels from feeder in-charge to chief engineer.

x. **Train ML Models for Continuous Improvement:**

1. Utilize machine learning to refine schedules and forecasts by training models on agricultural load data, weather forecasts and SCADA/RMS inputs over time.
2. Incorporate multi-year consumption history to predict demand spikes, seasonal peaks and long-term growth, improving accuracy with each iteration.
3. Enable models to adapt to operational feedback, such as tripping patterns or consumer complaints, ensuring rostering and forecasting evolve with changing field conditions and agricultural practices.

f. Cost Estimation

Provide detailed financial analysis and cost estimation within simulation scenarios to evaluate the economic feasibility of infrastructure changes, expansions and integrations, enabling DISCOM officials to optimize budgets, prioritize investments and maximize return on investment (ROI).

i. **Required Features:**

1. Simulate AI-predicted cost impacts: calculate capital expenditure (CAPEX) for new assets, operational expenditure (OPEX) and lifecycle costs.
2. Assess AI-analyzed cost drivers: break down expenses by category, timeframes and scenarios.
3. Determine economic and break-even loading limits of conductors and cables.
4. Provide AI-driven cost optimization: recommend cost-saving alternatives, phasing options and financing strategies.
5. Generate AI-visualized cost outcomes: display cost breakdowns, cash flow projections, ROI estimates and sensitivity analyses.
6. Integrate with external financial data: incorporate vendor quotes, market trends and DISCOM budget constraints for accurate estimations.
7. Monitor AI-analyzed cost metrics: track budget adherence, cost-benefit ratios and savings from optimizations.
8. Train ML models on historical project costs, current asset data and external economic indicators to predict costs, optimize spending and refine ROI projections.

ii. **Additional Features, for compliance:**

1. The module should be capable of preparing cost estimates of lines, substations etc. based on the cost data.
2. Provision for users to input customized costs for special structures like river crossings, railway crossings.

3. Provision to input the cost data of storing the material and associated equipment, erection charges, other standard and non-standard estimate components.
4. Preparing project estimates consisting of several lines and substations.
5. Facility to store the cost data of several areas and more than one version of the project report.
6. Capture the works proposed under various studies and create the estimates of the studies performed by transferring the initial works proposed in the studies without again entering those details.
7. Automatically create cost estimates for study picked up, by selecting the complete details of the lines and equipment proposed.
8. Cost / value estimation of any proposal should also include the depreciation of "Item recovered".
9. Provide the commercial feasibility of any technical modification proposed, using cost benefit analysis of any network under various proposed alternatives.
10. Calculate the financial parameters such as internal rate of return, pay back period, sensitivity analysis etc. so as to optimize the investment for an electrical distribution system.
11. Provide the optimal solution for any given network and shall have provisions for minimization of losses so as to maximize the net benefit.

3. **Chat-based Natural language querying module**

Description : This module is a custom natural language based querying feature designed to empower DISCOM officials with advanced analytics and data retrieval capabilities without requiring specialized MIS expertise. It provides a conversational interface that enables users to query databases, analyze operational metrics and extract actionable insights in real time. This self-service model enhances decision-making, reduces dependency on technical teams and ensures faster access to critical grid and consumer data.

a. Natural Language Query Processing with Instant AI Responses

i. Supports human-like, intuitive interactions, allowing users to query structured and unstructured datasets using plain language (e.g., "Show me transformer failure rates by region over the last six months").

ii. Parses complex multi-layered queries, understanding context, intent and entity relationships for accurate results.

iii. Provides real-time response generation, reducing the time required for manual data extraction and analysis.

b. AI-Driven Insights via Interactive Data formats

i. Converts query outputs into intuitive, interactive visualizations, allowing users to explore and interpret data seamlessly.

ii. Supports multiple data representations, including:

1. Tables for structured datasets like failure reports, AT&C loss percentages and outage logs.

2. Map views for geospatial asset tracking, network visualization and location-based analytics.
3. Line graphs for trend analysis on power demand, revenue collection and performance KPIs.
4. Filtered lists to quickly retrieve asset, consumer and operational records based on dynamic parameters.

c. AI-Visualized Outputs for Complex Queries

i. Translates multi-variable, time-series and geospatial queries into AI-generated, easy-to-read visual reports.

ii. Automates the generation of heat maps, bar charts, correlation matrices and predictive trend graphs based on query complexity.

iii. Ensures seamless drill-down analysis, allowing officials to zoom into specific data points, filter datasets and cross-reference information without manual intervention.

1. Substation: Substation design print schematic, Substation inventory summary, Subdivision level consumers report
2. Feeders: Individual, Summary & Detailed feeder parameters, Circuit parameters Graph, Distance V/s Pole, Current V/s Load, Power losses, Consumers reports, Consumer service lines losses detailed
3. Transformers: Transformer parameters individual Static, Transformer parameters individual (dynamic), Consumers reports

d. AI-Suggested Follow-Up Questions for Contextual Exploration

i. Uses ML-driven query expansion to suggest intelligent follow-up questions, guiding users toward deeper insights.

ii. **Example: If a user queries "**What is the energy consumed in Ajmer district in the last 30 days with a time granularity of 1 hour? Show it as a table**?", the AI might suggest:**

1. "Would you like to compare this with the previous 30 days?"
2. "Do you want to view consumption trends by consumer category (residential, industrial, commercial)?"
3. "Would you like an anomaly detection report to flag irregular consumption patterns?"
4. "Do you want a heatmap visualization of energy consumption across different feeders?"
5. "Would you like to overlay this data with temperature and weather patterns?"

e. AI-Driven Data Export & Report Generation

i. Provides AI-assisted data extraction for officials to export query results in structured formats (CSV, Excel, JSON, PDF).

ii. Enables custom report generation, allowing users to define parameters, add visual elements and apply filters dynamically.

iii. Automates email-based reporting, sending periodic summary insights, alerts and performance updates to stakeholders.

f. AI-Model Trained on DISCOM-Specific Data

i. Uses a fine-tuned GPT model trained on DISCOM's historical and real-time data, ensuring context-aware, precise responses.

ii. Incorporates DISCOM's operational policies, performance metrics, consumer behavior patterns and historical maintenance logs into its learning model.

iii. Provides DISCOM-specific terminologies and process-based reasoning, improving accuracy over generic AI tools.

g. Machine Learning-Based Query Refinement & User Adaptation

i. Leverages ML algorithms to refine suggestions based on:

ii. User behavior patterns (e.g., frequently accessed data, preferred report formats).

iii. Query history analysis, learning from previous interactions to anticipate information needs.

iv. Feedback mechanisms, where users can rate AI responses, improving the system's relevance and accuracy over time.

v. Ensures continuous learning, adapting responses based on evolving operational data and user inputs.

Feature	Detailed Aspect	Description
Natural Language Query Processing		
Instant AI Responses	Human-Like Interactions	Supports intuitive conversational queries in plain language
	Context & Intent Recognition	Understands query structure user intent and entity relationships for precise responses
	Real-Time Response Generation	Reduces manual effort by instantly retrieving and presenting requested data
	Multi-Turn Dialogues	Supports context retention across multiple interactions enabling users to refine and modify queries dynamically
	Multi-Language Support	Provides multilingual querying capabilities allowing officials to interact in their preferred language
Contextual Understanding	DISCOM-Specific Terminologies	Recognizes operational jargon synonyms and abbreviations relevant to DISCOM workflows
	Multi-Layered Query Processing	Handles complex queries including comparisons aggregations and conditional logic
	Data Source Integration	Connects with multiple databases MIS systems and real-time IoT sensor feeds for holistic data

		access
Conversation History & Context Retention	Persistent Memory	Enables AI to remember user interactions ensuring context-aware responses over time
	Session-Based Context Retention	Maintains query history within a session to support follow-up questions and refinements
	Cross-Session Memory	Preserves historical queries and responses allowing users to pick up where they left off
AI-Driven Insights via Interactive Widgets		
Multi-Format Data Representation	Tables	Displays structured data including failure reports AT&C loss and outage logs
	Map Views	Provides geospatial visualization of network assets outages and distribution trends
	Line Graphs	Represents trends such as power demand revenue collection and KPI performance over time
	Filtered Lists	Enables dynamic filtering to retrieve specific assets consumer data or operational records
	Hierarchical Data Views	Allows users to drill down from high-level KPIs to individual consumer transactions meter readings and asset health data
Drill-Down Capabilities	Interactive Data Exploration	Allows users to zoom in on specific data points for deeper analysis
	Cross-Referencing Information	Supports multi-dimensional analysis across different datasets without manual intervention
	AI-Generated Summaries	Provides concise AI-generated summaries of long datasets for quick insights
AI-Visualized Outputs for Complex Queries		
Automated Report Generation	Heat Maps	Visualizes geospatial patterns in power demand outage density and AT&C losses
	Bar Charts & Correlation Matrices	Provides comparative and statistical insights for operational metrics
	Predictive Trend Graphs	Uses AI to forecast demand failure rates and revenue fluctuations
	Scenario-Based Simulations	Enables users to input hypothetical conditions and observe projected impacts on network stability and revenue

AI-Suggested Follow-Up Questions		
ML-Driven Query Expansion	ML-Driven Query Expansion	Uses NLP and machine learning to predict and suggest contextually relevant follow-up questions based on the user's current query. Enhances user engagement and helps officials explore data more efficiently.
	Context-Aware Follow-Ups	Dynamically adjusts follow-up suggestions based on conversation history and user role (e.g., field engineer vs. management). Example: After querying outage data, suggests "Compare outage frequency by region."
	Use-Case Examples	Predefined prompts for common DISCOM tasks (e.g., "Compare current month's energy consumption to last month" or "Show a heatmap of high-loss areas"). Reduces training time for new users.
	Historical Data Comparisons	Enables side-by-side analysis of current and past performance (e.g., demand patterns, outage rates). Supports trend identification and decision-making.
AI-Driven Data Export & Report Generation		
Structured Data Extraction	Structured Data Extraction	Extracts and formats data from chatbot interactions for further analysis. Supports multi-format exports (CSV, Excel, JSON, PDF) for integration with other tools.
	Custom Export Formats	Allows users to define export templates (e.g., preformatted regulatory compliance reports). Ensures compatibility with DISCOM's existing reporting systems.
	User-Defined Parameters	Enables filtering and subsetting data before export (e.g., "Export only high-priority outages from the last quarter"). Supports dynamic field selection for tailored reports.
Automated Email-Based Reporting	Automated Email-Based Reporting	Scheduled Reports: Sends periodic summaries (daily/weekly/monthly) to stakeholders via email. Configurable for metrics like energy loss, billing efficiency, or outage frequency.
	Anomaly Alerts & Notifications	Triggers automated alerts when KPIs deviate from thresholds (e.g., sudden voltage fluctuations or

		unexplained energy losses). Integrates with DISCOM's alerting systems (SMS/email).
DISCOM-Specific AI Model		
Fine-Tuned GPT Model	Fine-Tuned GPT Model	Custom LLM trained on DISCOM's historical data, regulatory documents and operational logs. Ensures responses align with organizational policies and technical jargon.
	Context-Aware Responses	Leverages real-time grid data (e.g., SCADA inputs) and past incidents for accurate, situational answers. Example: "Transformer X failed twice in the last 6 months; recommend preventive maintenance."
Domain-Specific Reasoning	Regulatory Compliance	Hardcodes regional regulations (e.g., tariff rules, safety standards) into response logic. Flags non-compliant actions suggested by users.
	Domain-Specific Reasoning	Operational Process Knowledge: Understands workflows like outage management, load forecasting and maintenance scheduling. Incident Response Insights: Recommends actions based on past resolutions (e.g., "Follow Protocol B for substation fires").
Machine Learning-Based Query Refinement & Adaptation		
User Behavior Learning	Personalized Suggestions	Adapts responses based on user interaction history and frequently accessed data
	Preferred Report Formats	Learns from user preferences for visual and tabular outputs
	Adaptive Question Refinement	Guides users towards more precise queries by rephrasing unclear or ambiguous inputs
Query History Analysis	Pattern Recognition	Analyzes past queries to anticipate future data needs
	Enhanced Accuracy Over Time	Improves response relevance through continuous learning
Feedback-Based System Improvement	User Ratings & Corrections	Allows users to rate AI-generated responses to refine accuracy
	Iterative Model Enhancement	Continuously updates models based on real-time operational feedback
	Usage Analytics &	Admin Insights

	Dashboard	
	Customizable KPI Tracking	Allows management to define monitor and adjust AI performance benchmarks
User Engagement Enhancements		
Quick Replies & Buttons	Pre-Configured Responses	Enables quick action buttons for frequently asked queries reducing typing effort
	Interactive Buttons	Provides UI elements like filters navigation shortcuts and query refinements for ease of use
	Rich Media Support	Allows responses to include images charts videos and other multimedia formats to improve user understanding
	Adaptive UI Elements	Adjusts UI elements based on user behavior device type and query complexity for an optimized experience

4. **Digital Single-Line Diagrams**

Description: An AI-supported module designed to generate and maintain accurate, editable single-line diagrams (SLDs) representing the electrical network topology of the DISCOMs. Leveraging data from the one-time digitization effort, SCADA, RMS and Mobile Application inputs, this feature provides a dynamic, user-friendly interface for visualizing grid connectivity, asset relationships and operational statuses. The module enables engineers to edit network configurations, simulate changes and ensure alignment with physical grid updates, supporting fault analysis, planning and operational decision-making.

a. Automated SLD Generation:

i. Automatically construct SLDs using digitized asset data and network topology from the one-time digitization effort, depicting buses, transformers, feeders and protective devices.

ii. Integrate real-time SCADA/RMS data to reflect current grid states.

iii. Employ AI to validate topology accuracy against physical grid rules, flagging inconsistencies for correction.

b. Editable Diagram Interface:

i. Provide an intuitive drag-and-drop interface for engineers to modify SLDs, adding or reconfiguring assets or updating connections.

ii. Support versioning and audit trails for changes, syncing edits with the Asset Management module and field updates from the Mobile Application.

iii. Enable export of SLDs in standard formats for reporting and collaboration with executive engineers and above.

iv. Option to move/shift a complete circuit downward by moving source equipment with proper validations.
v. Option to insert a node between two already existing nodes irrespective of their order.
vi. Facility to rotate asymmetric equipment like transformers.
vii. The record history (undo record) should persist even after closing a session.
viii. Option to rotate circuit from its source with any degree of rotation.

c. Flashing Protective Device via the One-Line Diagram:

i. Enhance operational visibility by integrating an AI-driven feature that highlights the latest available status of protective devices on the single-line diagram basis Sensor data (if available), using dynamic indicators to signal operational states. This aids rapid identification and response to grid events across the DISCOMs' networks.
ii. Display protective devices on the SLD with dynamic indicators, updating based on Sensor data if provided by DISCOM.
iii. Enable users to click on a flashing device to access detailed data and trigger alerts.

d. Visually Showcasing Availability of Integrated DISCOM Data and Sensors

i. Illustrates static network topology data combined with high-frequency SCADA/RMS inputs for 33kV and 11kV networks.
ii. Displays historical power transformer records and line data from DISCOM databases, integrated into editable SLD layouts.
iii. Highlights gaps in availability / integration of high-frequency data from SCADA/RMS and protection system sensors.

e. Integration with Analytics and Simulations:

i. Link SLDs to Network Analysis outputs, overlaying AI-calculated metrics on the diagram.
ii. Support "what-if" simulations by allowing temporary SLD edits, visualizing impacts on load flow and protective device statuses.
iii. Use AI to suggest optimal device placements or settings adjustments based on historical fault data and load growth trends.

f. Performance Specifications:

i. Ensure SLD rendering completes within 4 seconds, including flashing device indicators, with updates syncing based on SCADA/RMS data refresh rates.
ii. Support complex queries with results displayed on the SLD within 30 seconds, leveraging AI caching for efficiency.
iii. Maintain compatibility with GIS-based Map Visualization, allowing seamless toggling between spatial and schematic views.

5. **Asset Management and Data Repository**

Description: A centralized, AI-enhanced repository for storing, retrieving and proactively managing digitized grid asset and consumer data collected via the Mobile Application and field operations. This module serves as the backbone for asset lifecycle management, consumer billing (based on existing DISCOM data systems), grid connectivity tracking, maintenance planning and regulatory compliance, integrating both physical infrastructure and consumer-related datasets into a unified system.

a. Required Features:

i. Store AI-validated asset details: Asset ID, geospatial coordinates, technical specifications, tender details and maintenance logs
ii. Enable AI-powered search and filtering: by asset type, location, status or custom criteria.
iii. Support bulk data operations: upload/download in formats like CSV, Excel, or JSON, with AI-driven validation and standardization.
iv. Track asset edits with version control: log changes, maintain historical versions and enable rollback.
v. Present one-time digitized data and historical maintenance records from DISCOM databases for substations, transformers and feeders.
vi. Reflect partial SCADA/RMS integration with latest breaker status updates alongside static feeder and busbar connectivity data.
vii. Indicate absence of sensors, integration or data source for high-frequency data from SCADA/RMS, protection device settings, capacitor bank status, etc.
viii. Provide asset health dashboards: status overview, condition ratings and lifecycle tracking.
ix. Integrate with GIS for geospatial queries and SCADA/RMS for high-frequency updates.
x. Store consumer data: Consumer ID, name, address, meter number, billing status and load category.
xi. Display consumer-to-transformer connections with editing capabilities, including geospatial validation.
xii. Track billing history: monthly readings, payment status and consumption trends.
xiii. Flag AI-detected discrepancies: unbilled usage, meter tampering or load mismatches.
xiv. Sync with Unified Billing System via APIs: real-time updates, with error handling and two-way reconciliation.
xv. Provide AI-generated consumer profiles: usage patterns, payment reliability and load forecasts.
xvi. Create asset-consumer relationships with cross-referenced data.
xvii. Offer data integrity checks with automated correction suggestions.
xviii. Generate reports with export options.

xix. Use ML to predict asset degradation based on load history, environmental factors and maintenance records.

xx. Leverage AI to recommend maintenance schedules with cost estimates.

xxi. Employ ML to identify consumer anomalies with peer benchmarking.

xxii. Integrate NLP for unified queries with natural language processing of asset and consumer datasets.

b. Additional features for compliance:

i. Provide facilities for expanding the standard library and also creating user specific libraries of symbols, design data, equipment data, operating limits and standards, cost data for equipment / material, cost data for power and energy losses and necessary data for carrying out economic analysis for the operating lifetime of the system.

ii. Update actual networks basis job order processes meant to update changes to the network.

iii. Feature to tag/identify/code the equipment / network component as existing, new, proposed etc

6. **Alerts and Notifications**

a. Description: The Alerts and Notifications module for the AI-Native Web Application (Control Centre App) enables engineering staff, from operators to senior management, to monitor and manage grid operations strategically. It delivers real-time and predictive alerts derived from network modelling and AI-driven Remote Monitoring System (RMS) data analysis, providing detailed analytics, visualizations and decision-support tools. Alerts are tailored to user roles within the DISCOM hierarchy, supporting proactive grid management and financial optimization.

b. Functional Requirements

i. **Alert Generation:** The module generates alerts from network modelling and AI-driven RMS data analysis, offering comprehensive insights for control room operations. Alerts are designed for strategic oversight and include:

1. **Fault Detection Alerts:**
    a. **Description:** Triggered for faults detected via network modelling.
    b. **Details:** Includes fault location with GPS and asset ID, type, affected area, consumer impact and optimized restoration strategies with simulations.
    c. **Delivery:** High-priority pop-up visualized on GIS dashboard and single-line diagrams.
2. **Load Imbalance Alerts:**
    a. **Description:** Generated for phase imbalances exceeding predefined thresholds.
    b. **Details:** Provides feeder ID, load data, trend analysis and mitigation options.

c. **Delivery:** Dashboard notification with interactive load flow analysis.

3. **Voltage Violation Alerts:**
    a. **Description:** Triggered for voltage deviations beyond acceptable limits.
    b. **Details:** Includes node, voltage data, duration and mitigation options.
    c. **Delivery:** Pop-up with visualization and simulation-based recommendations.
4. **High Upstream DER Power Flow Alerts:**
    a. **Description:** Triggered when DER power exceeds local demand, causing upstream flow and financial impact.
    b. **Details:** Includes DER asset ID, power flow analytics, financial impact estimate and control options. Offers simulation results.
    c. **Delivery:** High-priority pop-up with financial impact dashboard and control analytics.
5. **Predictive Maintenance Alerts:**
    a. **Description:** Predicts asset stress based on modelling and AI.
    b. **Details:** Includes asset ID, stress metrics, failure timeline and prioritized maintenance schedules.
    c. **Delivery:** Dashboard alert integrated with roster management.
6. **Load Trend Alerts:**
    a. **Description:** Detects abnormal load changes over a defined period.
    b. **Details:** Includes asset ID, trend graph, anomaly score and root cause analysis.
    c. **Delivery:** Dashboard alert with interactive trend visualization.
7. **Generation Trend Alerts:**
    a. **Description:** Identifies DER generation anomalies.
    b. **Details:** Includes DER asset ID, trend data, confidence score and control adjustments.
    c. **Delivery:** Dashboard alert with updated forecasts.
8. **Voltage Trend Alerts:**
    a. **Description:** Detects persistent voltage anomalies.
    b. **Details:** Includes node ID, trend chart, severity score and mitigation options.
    c. **Delivery:** Dashboard alert with trend analysis and simulation tools.

ii. **Notification Delivery and Management**

1. **Role-Based Delivery:** Alerts target engineers/supervisors based on hierarchy and responsibility.
2. **Priority Levels:** Critical, High, Medium, Low, with distinct visual cues.
3. **Escalation Workflows:** Unacknowledged Critical/High alerts escalate to senior management via email/SMS after 15 minutes.

4. **Acknowledgment Tracking:** Engineers acknowledge alerts in-app; unacknowledged alerts trigger reminders after 5 minutes.
5. **Multi-Channel Delivery:** Pop-ups, email, SMS for critical alerts during outages.
6. **User Customization:** Configurable notification settings within admin constraints.
7. **Audit Logs:** Tracks alert delivery, acknowledgment and actions for compliance.

c. Service Levels:

i. Delivery of alerts and associated insights within 2 minutes of issue identification
   1. Predictive Maintenance alerts to be generated daily

ii. Accuracy to meet operational standards.

d. Integration Requirements:

i. Real-time RMS and Relay sensor API data feeds with low latency.

ii. AI model retraining with historical/real-time data.

iii. SCADA/DMS: Validates alerts with telemetry.

e. Deliverables

i. **Alerts Module:** Analytics-driven module with dashboards and simulations.

ii. **Configuration Interface:** Admin portal for alert thresholds/rules.

iii. **Documentation:** Manuals, API specs, alert workflow diagrams.

iv. **Training Materials:** Tutorials/videos for engineering staff.

v. **Test Reports:** Validates alert accuracy, latency and reliability.

Alert Type	Priority Levels	Delivery Method
Fault Detection	Critical/High	Pop-up, GIS/SLD
Load Imbalance	Medium	Dashboard, Load Flow Analysis
Voltage Violation	High/Medium	Pop-up, Visualization
High Upstream DER Power Flow	High	Pop-up, Financial Dashboard
Predictive Maintenance	Medium/Low	Dashboard, Roster Integration
Load Trend	Medium	Dashboard, Trend Visualization
Generation Trend	Medium	Dashboard, Forecast Update
Voltage Trend	Medium	Dashboard, Trend Analysis

7. **Integration with Existing Systems**

Description: An AI-enhanced module ensuring seamless connectivity and data harmonization with DISCOM's IT infrastructure, maximizing the utility of existing investments while enabling advanced functionalities.

a. Feeder Monitoring System (FMS)

i. **Live Feeder Performance Dashboard:** GIS overlays real-time feeder metrics such as voltage, interruptions, AT&C loss and load factor. Each feeder is color-coded by performance.

ii. **Event-Based Fault Tracking:** When FMS detects a voltage anomaly or feeder tripping, the system maps it to the corresponding network topology, suggesting probable failure points or theft-prone areas.

iii. **Feeder Reconfiguration Support:** During feeder splitting/merging, GIS updates consumer re-tagging and communicates new feeder topology to RMS, MDMS and CCC in real-time.

b. SCADA/RMS Integration

i. **Outage Management:**
   1. Correlates SCADA alerts (e.g., voltage dips) with GIS to pinpoint faults (e.g., transformer failure at DT-X).
   2. Auto-triggers CRM tickets with probable causes (e.g., "Feeder-12 fault: suspected bird flash").

ii. **Load Forecasting Sync:**
   1. Trains AI models on SCADA historical load data to predict demand (accounting for target state's agricultural cycles).
   2. Pushes forecasts to SCADA for proactive grid adjustments (e.g., capacitor bank switching).

c. Energy Accounting / Energy Audit

i. **Energy Balance:** Integrates SCADA, MDMS and RMS data to compute energy inflow vs. billed consumption across feeders, DTs and consumer groups.

ii. **Audit Trail Generation:** Automatically creates monthly audit reports with loss breakdown (technical, commercial) and compliance status for regulatory reporting.

iii. **Loss Cluster Identification:** GIS-based heatmaps highlight loss-prone pockets (urban slums, high-theft zones), helping target enforcement and infrastructure investments.

8. **User Management and Security**

Description - The User Management and Security module is a comprehensive access control and data protection system designed to safeguard grid infrastructure, consumer data and DISCOM's critical operational information. This module ensures that only authorized personnel can access specific datasets and functionalities, mitigating security threats, unauthorized access and compliance risks. By

incorporating advanced authentication mechanisms, encryption protocols and real-time monitoring, it fortifies grid and consumer data against cyber threats while maintaining regulatory compliance with cybersecurity frameworks.

a. Role-Based Access Control (RBAC) with Dynamic Permissions

i. Implements granular access control mechanisms, assigning permissions based on user roles, hierarchy and function-specific needs.

ii. Enables custom role definitions (e.g., System Admin, Field Engineer, Grid Operator, Billing Manager) with restricted access to specific modules, datasets and operational functions.

iii. Supports dynamic permission updates, allowing administrators to modify access rights in real time as organizational roles evolve.

iv. Provides context-aware access policies, ensuring users can only interact with data relevant to their designated responsibilities.

v. Includes temporary access mechanisms, enabling secure, time-limited access for third-party vendors, consultants, or auditors without permanent privileges.

b. Multi-Factor Authentication (MFA) and Session Security

i. Enforces multi-layered authentication, combining passwords, biometric verification (fingerprint/face ID), OTP-based login and hardware token authentication.

ii. Uses adaptive authentication, increasing security measures based on risk factors (e.g., login from a new device or unusual location).

iii. Implements session timeout policies, automatically logging out idle users to prevent unauthorized access due to unattended terminals.

iv. Supports single sign-on (SSO) integration, allowing secure authentication across multiple DISCOM platforms without redundant logins.

c. End-to-End Encryption for Data Protection

i. Encrypts sensitive operational and consumer data both at rest (stored data) and in transit (during transmission) using AES-256 and TLS 1.3 standards.

ii. Ensures secure communication channels, preventing man-in-the-middle attacks and unauthorized data interception.

iii. Implements hashed and salted credential storage, preventing password leaks and brute-force attacks.

iv. Supports public-key infrastructure (PKI) for certificate-based authentication and digital signatures on critical transactions.

d. Comprehensive Audit Trails with Detailed Logs

i. Maintains tamper-proof logs of user activities, system modifications, access attempts and security events.

ii. Tracks who accessed what data, when, from where and any modifications made, ensuring full traceability.

iii. Generates real-time log reports, enabling security teams to monitor and review system usage for compliance verification.

iv. Integrates with Security Information and Event Management (SIEM) systems for proactive threat detection and forensic analysis.
v. Security Dashboards for Real-Time Monitoring
vi. Provides interactive security dashboards, visualizing:
vii. User activity metrics (e.g., active sessions, login frequency, system usage patterns).
viii. Unauthorized access attempts, highlighting potential security breaches.
ix. Compliance status indicators, ensuring adherence to ISO 27001, NERC CIP and government-mandated cybersecurity policies.
x. System vulnerabilities and patching status, helping DISCOM IT teams address security gaps proactively.
xi. Supports custom security alerts and analytics, enabling incident response teams to react swiftly to security threats.

e. Real-Time Anomaly Detection & Auto-Lockout Mechanism

i. Utilizes AI-driven behavior analysis to detect suspicious login patterns, unauthorized access attempts and data extraction anomalies.
ii. Automatically flags high-risk activities, such as:
iii. Multiple failed login attempts from different locations within a short period.
iv. Unusual data export requests that exceed normal operational behavior.
v. Access to restricted modules by unauthorized personnel.
vi. Implements auto-lockout policies, temporarily disabling accounts showing suspicious activity, preventing insider threats and external breaches.
vii. Notifies system administrators and cybersecurity teams in real time, ensuring immediate investigation and mitigation.

S. No	IDAM Specifications	Description
A	**User ID Management**	
A.1	User ID Creation/Modification/Deletion	Enables creation, modification and deletion of user identities either manually, automatically, or event-driven (e.g., joining, transfer, exit) using predefined workflows, APIs, or scripts. Includes onboarding and offboarding integration with HRMS or ERP systems.
A.2	User ID Lock/Unlock	Provides functionality to lock or unlock user accounts individually or in bulk, either manually or automatically based on events (e.g., failed login attempts, policy violations) or workflows. Includes temporary lockouts and scheduled unlock mechanisms.
A.3	Functional/Support ID	Functional or support IDs (shared, system-level, or batch-processing users) can be created manually or automatically based on business rules, workflows, or system scripts. Permissions and expiry policies can be configured separately for these IDs.
A.4	De-Duplication of User IDs	Ensures uniqueness of user IDs across the system. Validates incoming user creation requests to prevent creation of duplicate identities based on attributes such as employee ID, Aadhaar, email ID, or mobile number.
A.5	User ID Merging	Supports merging of multiple user identities belonging to the same individual, including consolidating roles, entitlements and historical audit logs while preserving integrity and traceability.
A.6	Delegated User Administration	Allows identity lifecycle tasks (e.g., create, modify, disable) to be performed by authorized non-admin users (e.g., department managers or HR) with scoped permissions. Enables tiered, granular control based on roles or business units.
A.7	Delegation of Authority	Permits users to assign delegates for acting on their behalf (e.g., during leave). Includes temporary delegation with time-bound validity, visibility of delegated actions and automatic revocation post-delegation period.

A.8	Single User ID Repository	Centralized identity store that maintains all user accounts, access permissions, group memberships and role assignments across the organization. Eliminates fragmented ID management across applications by integrating via directory services or federated access.
A.9	User ID Provisioning/De-Provisioning (Event-based)	Automatically provisions or revokes access across connected systems based on predefined business events (e.g., onboarding, transfer, exit, promotion) or approval workflows. Ensures timely and accurate access assignment or revocation across systems.
A.10	Group Management	Enables creation, modification and deletion of user groups. Supports static and rule-based group membership. Allows assigning access permissions or roles to entire groups, simplifying user administration.
A.11	Delegated Group Management	Permits designated non-admin users (e.g., department heads) to manage group memberships and configurations with limited administrative privileges, reducing load on central IT teams while maintaining control.
A.12	Dynamic Groups	Supports rule-based group memberships where users are added or removed from groups automatically based on defined criteria (e.g., department, job title, location), facilitating scalable access governance.
B	**Password Management**	
B.1	Password Policy & Account Lockout	Enforces password complexity and lifecycle rules, including minimum length, special character requirements, expiry duration, reuse history and account lockout thresholds after failed login attempts. Supports configurable lockout duration and account unlock options.
B.2	Self-Service Password Reset	Enables users to reset their passwords without IT intervention using multi-factor authentication (MFA), challenge-response questions, or OTP verification. Enhances user experience and reduces helpdesk dependency.
B.3	Password Synchronization	Ensures automatic synchronization of passwords across multiple integrated systems (e.g., Windows AD, email, ERP) to provide a unified credential experience and reduce password fatigue.

B.4	Administrative Password Resets	Allows authorized administrators or helpdesk agents to securely reset user passwords. Includes options to notify the user and enforce password change at next login.
C	**Authentication**	
C.1	Password Authentication	Supports basic password-based authentication using LDAP/AD integrations. Includes brute-force protection, session timeouts and security alerts for failed login attempts.
C.2	Risk-Based Authentication	Incorporates contextual risk signals (device fingerprinting, IP reputation, time-of-day patterns, geo-location anomalies) to dynamically evaluate login risk and enforce additional authentication or restrictions accordingly.
C.3	Token/Biometric/OTP Authentication	Enables multifactor authentication (MFA) using time-based OTP (TOTP), biometric authentication (e.g., fingerprint, facial recognition) and token-based methods (hardware, software, or SMS/email OTPs). Configurable per user, role, or system sensitivity.
C.4	Role Lifecycle Management (Approval-based)	Supports role-based access control (RBAC) with full lifecycle management — including role creation, modification, deletion, assignment and de-assignment based on user requests, approvals, or events (e.g., role expiry or department change). Includes role recertification and SoD policies.
D	**Audit & Compliance**	
D.1	Sign-On/Sign-Off Logging	Captures all login and logout events with timestamps, user IDs, IP addresses, device types and session durations for audit purposes.
D.2	Account Lifecycle Audit	Logs all user account changes (creation, updates, deletion, disabling) with initiator details, timestamps and justification (workflow traceability).
D.3	Role Lifecycle Audit	Records all role changes (create, assign, remove) and tracks who approved, modified, or revoked role access.
D.4	Password Change & Challenge-Response Audit	Maintains logs of all password-related activities, including password changes, resets, failed attempts and challenge-response question updates.

D.5	Synchronization Events Logging	Logs all synchronization events across systems with status (success/failure), timestamps and system-specific traceability for troubleshooting.
D.6	User Log Activity Monitoring	Tracks all user interactions with the IAM system, including login success/failure, access requests, self-service actions and policy violations. Provides dashboard-based analytics for administrators and auditors.
E	**Other Features**	
E.1	Reporting	Provides built-in and customizable reports on user access, role usage, policy violations, inactive accounts, password expiry, failed login attempts and audit logs. Supports scheduling and export in multiple formats (PDF, XLSX, CSV).
E.2	High Availability	Designed for 99.9% uptime with support for load balancing, failover clusters, redundant components and disaster recovery. Ensures business continuity even during node or service failures.
E.3	Backup and Restore	Supports automated and on-demand data backups with full system and configuration restore capabilities. Includes encryption, retention policies and cross-site replication options.
E.4	Encryption	Supports encryption of sensitive identity attributes and credentials at rest and in transit. Compliant with AES-256, TLS 1.3 and other industry-grade encryption standards. Allows selective attribute-level encryption based on data classification policies.

9. **Training and Knowledge Base**

Description - The primary objective of the training is to achieve 100% user adoption through both technical and behavioral competencies, ensuring all end users are proficient in the system functionalities. The training will be provided in both English and the local language, with a focus on field staff who predominantly use the local language.

a. Training Types and Scope

i. **Professional Training (Implementation Team)**

1. This training is for the core implementation team of the Utility, consisting of IT professionals and technical staff. Each member will be trained in their respective modules to ensure seamless operations.
2. Approximate number of trainees: 90-100 personnel per Discom.

3. The training will cover software and hardware solutions and network configurations, preferably conducted by the OEM partner or OEM-certified training partner.

ii. **End-User Training**

1. End-user training focuses on operational staff handling day-to-day system tasks. It ensures that employees can efficiently use the deployed system and its features.
2. Approximate number of trainees: 750 personnel per Discom.
3. The SI must ensure that all users are adequately trained in their relevant system modules.

iii. **Train-the-Trainer Approach**

1. Upon instruction and approval from the Nodal Officer, the SI will adopt a train-the-trainer model, where select personnel from the Utility will receive advanced training to further train other employees.
2. Certified functional, technical, system administration and database management training for the core team should be arranged by the SI directly from OEM/OEM-certified trainers.
3. The training will be mapped with the Software Products for a comprehensive learning experience.

b. Training Needs Analysis

i. **Description -** Before execution, a Training Needs Analysis (TNA) will be conducted to determine role-based training requirements. The SI and OEM consultants will collaborate with key business users to create a Training and Development Plan, which includes:

1. Identifying training needs for each user group.
2. Recommending the most effective delivery methods and channels.
3. Establishing criteria for training success.
4. Developing training materials including guides, videos and FAQs.
5. Creating a knowledge-sharing strategy to enable internal capability-building.

c. Content Development

i. **Description -** Training materials will be customized based on user roles and business processes, developed collaboratively by the OEM, SI and Utility Core Team. The materials will include:

1. Instructor-led training guides with exercises based on ‘Day in the Life’ scenarios.
2. Media-based training simulations for interactive learning.
3. Context-sensitive online help and self-paced modules
4. All training materials, including manuals, FAQs and videos, will be uploaded to the system for easy reference.

d. Train-the-Trainer Program

i. Training core team members on customized system functionalities.

ii. Knowledge-sharing on best practices and process improvements.

iii. Instruction on classroom management, communication techniques and engagement strategies.

iv. Practical guidance on non-verbal communication, questioning techniques and presentation skills.

e. Training for Higher Management of Utility

i. **Description -** Targeted training sessions designed specifically for the higher management of the Utility will be conducted, ensuring they are well-informed and empowered to oversee and support the implementation and operation of the deployed systems.

ii. **Sensitization Workshop**

1. **Description -** A structured sensitization workshop exclusively for the senior leadership of the Utility will be conducted. This session will provide a high-level overview of the functionalities, strategic value and expected outcomes of the proposed systems. This workshop will also address:
    a. The rationale and need for system integration
    b. Key performance indicators and system outputs
    c. Governance expectations from senior stakeholders

f. Training Locations and Infrastructure

i. The training sessions for higher management will be conducted at the Utility's Corporate Office and relevant Site Offices, as designated.

ii. The Utility will provide the necessary training spaces, including seating and furniture.

g. Ongoing Training and Capacity Building

i. Conduct refresher training and re-trainings for identified groups

ii. Provide training staff at Utility offices as needed.

iii. Ensure access to OEM training platforms and data repositories.

iv. Implement a staged training approach (before, during and post-implementation).

v. Facilitate competence development and internal capacity building.

h. Comprehensive Tutorial Library: Video Modules, Step-by-Step Guides and FAQs

i. **Interactive Learning Materials:**

1. High-quality video tutorials with voiceovers, animations and real-world case demonstrations.
2. Hands-on, scenario-based learning modules for practical skill application.
3. Offer varied range of tool tip help, with important parameters/ attributes can be seen with balloon help.

ii. **Step-by-Step Walkthroughs for Critical Workflows:**

1. **Grid Asset Digitization and Updates:** Training on survey methods, GIS data integration and real-time updates.
2. **Field Data Validation and Integration:** Guidelines for verifying, correcting and syncing data from mobile applications.
3. **Consumer Data Linkage and Billing Insights:** Procedures for integrating consumer records with the grid for accurate billing.
4. **Incident Reporting and Resolution Tracking:** Instructions for logging and resolving technical and operational issues.

iii. **Contextual FAQs:**

1. Intelligent, keyword-driven FAQs providing instant solutions to common queries.
2. Embedded links to in-depth training materials and troubleshooting guides.

iv. **Downloadable Reference Materials:**

1. Quick-start guides, workflow diagrams and best practices for offline access.
2. Printable checklists for field personnel operating in low-connectivity environments.

i. Searchable Knowledge Base with Contextual Relevance

i. **Centralized Documentation Repository:**

1. A structured digital library containing all technical documentation, troubleshooting guides and compliance best practices.

ii. **Search Engine for Instant Access to Information:**

1. Context-aware search results based on keywords, role-based queries and issue types.
2. Adaptive indexing that prioritizes frequently accessed topics and recently updated materials.

iii. **Recommendation Engine:**

1. Suggestions for related topics based on user search behavior.
2. Personalized learning pathways guiding users through progressive training levels.

iv. **Version Control and Update Tracking:**

1. Automated version tracking, ensuring users access the latest materials aligned with software updates and policy changes.
2. Change logs documenting modifications in training content to maintain transparency.

v. By integrating structured tutorials, search capabilities and interactive learning materials, the Training and Knowledge Base module will empower DISCOM personnel with the knowledge and resources needed to optimize grid management operations effectively.

10. **Change Management**

Description - The successful transition of the digital utility platform from the System Integrator (SI) to the DISCOM for full operational ownership

necessitates a robust, structured and institutionally anchored Change Management (CM) framework. The digital ecosystem—comprising GIS, Network Analysis, Load Forecasting, Roster Management and associated analytics—introduces significant shifts in technology usage, business processes and workforce roles. To ensure these changes are internalized across all levels of the organization, a proactive and comprehensive CM strategy must be embedded into the handover roadmap.

The handover shall include detailed requirements for managing the people-side of change, addressing capability development, process adaptation, organizational readiness and cultural alignment, ultimately enabling DISCOM to sustainably operate and continuously improve the new systems.

Given the scale of this transformation, a structured and proactive Change Management (CM) strategy is essential to ensure:

i. Smooth Transition: Minimizing disruptions to daily operations.
ii. User Adoption: Ensuring employees at all levels understand and embrace new systems.
iii. Sustainability: Building long-term competency to maximize ROI.
iv. Stakeholder Alignment: Securing buy-in from leadership, field staff and external partners.
v. Ensure Business Continuity: Minimize operational disruption during and after transition.
vi. Enable Capability Absorption: Equip DISCOM staff to independently operate, manage and scale the platform.
vii. Embed Long-Term Ownership: Institutionalize governance and continuous improvement mechanisms within DISCOM.
viii. Align Stakeholders: Facilitate buy-in and accountability across departments and management layers.

b. A phased approach to Change Management, covering HR readiness, operational adjustments, communication strategies and continuous improvement mechanisms will be followed to achieve this.

c. Responsibilities of the Change Management Teams

i. The Change Management initiative will be jointly owned by the SI and DISCOM leadership. Key responsibilities include:
   1. Conducting a capability gap assessment to evaluate readiness.
   2. Developing staff capability to effectively implement and manage the new systems.
   3. Preparing departmental heads and their teams for new operational and reporting responsibilities.
   4. Implementing tailored training programs for varied user groups.

5. Ensuring every employee understands their role in the new ecosystem.
6. Providing ongoing support to users transitioning into updated or redefined job functions.

d. Human Resources (HR) Plan

i. **Capacity Building and Training Segmentation:** All employees will be categorized based on their current roles, competencies and familiarity with digital systems. Customized training modules will be developed for each group – from operational staff to senior management.

ii. **Orientation Workshops:** Introductory workshops will familiarize employees with the objectives and benefits of the new systems. These will cover how business processes are transforming and what new responsibilities individuals will undertake.

iii. **Skill Appraisal Workshops:** Diagnostic sessions will assess the current understanding of field and office staff regarding system workflows and data flows. These will inform refinements in the training approach.

iv. **Mentorship Programs:** Each trainee will be paired with a mentor (senior trainer or internal champion). Through the shadow and reverse-shadow method, users will observe mentors using the systems, followed by hands-on practice while being observed and guided.

v. **Training Evaluations:** Post-training quizzes and feedback forms will be administered to measure knowledge transfer and retention. Evaluation results will inform targeted refresher sessions.

vi. **Feedback Mechanism:** Anonymized, structured questionnaires will help gather user feedback on the training experience, pain points during adoption and readiness gaps. These will feed into the continuous improvement of the change strategy.

e. Operational Plan

i. **Team Formation:** Identify and designate trained Process Leaders and System Leaders from among Utility staff to act as internal change lead.

ii. **Phased Implementation:**

1. **Phase I:** Develop training content, communication material and identify the Change Team.
2. **Phase II:** Release official communications, commence structured training and facilitate exposure visits.
3. **Phase III:** Monitor implementation, conduct appraisal workshops and organize feedback sessions.

iii. **Functional, operational and maintenance support**

1. Functional enhancements, defect resolution and configuration changes.
2. Management of user roles, access controls and support for technical and procedural queries.

3. Administrative services for user lifecycle, password resets and authorization controls.
4. Performance tuning of application, middleware and database layers.
5. Redeployment and migration support during system upgrades or hardware transitions.
6. Detailed tracking and documentation of all configuration changes and enhancements.

f. Communication Plan

i. Weekly Project Status Meetings: Track milestones, risks and action items.

ii. Internal Project Meetings: Resolve ongoing issues and escalate bottlenecks.

iii. Change Control Board (CCB) Meetings: Evaluate and approve scope-related changes.

iv. Communication material includes newsletters, infographics, FAQs and process briefings.

g. Feedback, Data Collection and Continuous Improvement

i. Change adoption will be tracked using a data-driven approach. Regular feedback will be collected through:
   1. Training effectiveness evaluations
   2. Post-implementation usage audits
   3. Help desk logs and issue patterns
   4. Periodic surveys on user confidence and challenges
   5. Based on this feedback, iterative improvements in training, processes and communication will be rolled out to address bottlenecks and support smoother transitions.

h. Help Desk

i. **Centralized Support Hub:** Acts as the single point of contact for GIS, Network Analysis, Roster Management and Load Forecasting systems. Includes phone, email and call-tracking mechanisms.

ii. **Issue Management:** Supports queries on software, network, configuration, connectivity and security. Tickets are tracked, classified, escalated and resolved per SLA priorities.

iii. **Problem Classification:** Issues prioritized based on impact and affected users; Utility can modify priority levels.

iv. **ITIL Compliant Operations:** Implements incident, problem, change management processes; integrates with EMS/NMS systems.

v. **Solution Database:** Maintains searchable knowledge base with cause, symptom and resolution details; supports updates and user access for self-resolution.

vi. **Level One Support:** Logs incidents, dispatches support personnel, sends system status updates, initiates PMRs and monitors issue resolution.

vii. **Operational Management:** Ensures end-to-end resolution, tracks performance (call volumes, resolution time, trends) and provides MIS to Utility.

viii. **User Services:** Supports user requests (ID creation, password changes, address updates), MAC requests and offers advisory for data backups.

ix. **Vendor Management:** Manages vendor coordination, tracks SLAs, maintains vendor databases and provides performance MIS and renewal alerts.

x. **Anti-Virus & Security:** Handles virus detection, eradication and synchronization across servers, maintaining required security levels.

xi. **SD-WAN Monitoring:** Provides continuous network availability monitoring, SLA performance reporting, outage escalation, latency tracking, configuration logs and SLA violation alerts.

11. **Facility Management Service**

Description - Facility Management Services shall be provided for the GIS, Network Analysis, Roster Management and Load Forecasting systems deployed across the Utility. These services are to ensure maximum availability and performance of the systems, aligned with Utility's business objectives.

a. Patch Management and Configuration

i. Timely application of patches and updates to system software, applications and firmware.

ii. Maintenance of configuration baselines and rollback points for critical components.

iii. Documentation and impact analysis of all patch cycles.

iv. Automated patch compliance monitoring as per defined policies.

b. Performance Management

i. Continuous system monitoring to assess uptime, response time and throughput.

ii. Generation of reports and dashboards to evaluate KPIs and SLA compliance.

iii. Performance tuning recommendations based on telemetry and usage data.

iv. Root cause analysis and preventive action planning for recurring issues.

v. **Support for Third-Party Audits:** To facilitate third-party audits mandated by Utility or any designated authority, the following shall be ensured:

1. Comprehensive system logs across all infrastructure layers (network, server, storage, database, applications) shall be

enabled, securely stored and made accessible in accordance with the defined audit policies.

2. Detailed reports, including but not limited to incident logs, performance reports, backup status and configuration changes, shall be generated and shared in formats prescribed by the auditing body.
3. All relevant documentation, including standard operating procedures (SOPs), compliance records, access logs and configuration baselines, shall be made available to support compliance verification.
4. Adequate support shall be extended to audit teams during audit planning, execution, validation and post-audit follow-ups, including the facilitation of interviews, system access, walkthroughs and verification of controls.
5. Remediation activities based on audit observations shall be tracked and documented, with status reports submitted periodically as per Utility's governance requirements.

vi. **Incident Management**

1. Creation of incident records to document deviations from expected standards of operation shall be supported.
2. Capability shall exist to generate other tickets (such as service requests, problems, or work orders) from an incident, if such actions are required for resolution.
3. Incidents shall be auto-generated from integrated sources such as email and system-monitoring tools.
4. Use of ticket templates containing pre-defined data shall be supported, enabling agents to insert standard information into high-volume records efficiently. Templates shall include, but not be limited to, details such as Owner, Service Group, Service, Classification, Internal Priority, Activities, Labor Requirements and Activity Owners.
5. Templates shall support modifiable information fields, including:
    a. **Ticket-level fields**: Priority, Owner or Owner Group, Service Group or Service, Classification
    b. **Activity-level fields**: Activity, Sequence, Job Order, Site, Organization, Description, Owner or Owner Group, Priority, Vendor, Classification
6. Assignment of ownership of an incident shall be possible to either an individual or a group responsible for managing the associated work.
7. Ownership assignment shall also be executable via workflow or escalation mechanisms.

8. Assets shall be associable with incident records where the issue pertains to a specific asset.
9. A global view shall be provided to display a list of related records and their respective work and communication logs within a single interface.
10. Creation of a service request from an incident shall be supported, with relationships between the two records maintained.
11. Functionality shall exist to initiate a problem record from the incident application, to log an unidentified underlying cause affecting one or more incidents.
12. Release records shall be creatable from the incident application when the resolution involves deployment of bundled changes to users.
13. Relationships between multiple incidents shall be definable to maintain reference and traceability.
14. Identification and designation of a global incident (root cause or widespread issue) shall be supported.
15. SLA(s) shall be automatically assigned based on workflow or escalation logic defined by SLA criteria.
16. Incident templates shall include predefined activities that are editable post-application.
17. Capability shall exist to attach existing solution records containing resolution guidance to an incident record.
18. Solution records capturing the Symptom, Cause and Resolution shall be creatable directly within the incident application.
19. Draft solutions may be submitted from the incident application, which can later be reviewed and approved for broader reuse.
20. Communication logs shall maintain a record of all inbound and outbound communications and attachments exchanged between users and agents.
21. Communication entries associated with a record shall be viewable directly from the record.
22. Communication templates shall be usable to populate default message content during communication exchanges.

vii. **Ticketing Management :** A robust Ticketing Management system shall be provisioned with the following capabilities:

1. Ownership details, including Owner, Owner Group, Service Group, or Service, shall be assignable for each ticket.
2. Classification of tickets shall be supported to enable appropriate routing and prioritization.
3. Provision shall exist to specify both Reported Priority (as per user input) and Internal Priority (as per internal operational assessment).

4. Related assets shall be linkable to individual tickets for traceability and context.
5. Time tracking functionality shall be enabled for monitoring the effort spent on resolving each ticket.
6. One or more Service Level Agreements (SLAs) shall be applicable to tickets, with automatic assignment based on predefined conditions.
7. A Self-Service Service Request module shall be made available to end-users, allowing submission and status tracking of service requests.
8. Capability shall be provided to generate related tickets

ii. Evaluation Criteria

1. **Accuracy**: Data and AI predictions with <1% error rate across all features .
2. **Usability**: Intuitive navigation, <5-minute task completion for 90% of actions.
3. **AI Effectiveness**: >90% accuracy in analytics, simulations, chat responses and predictive tasks.
4. **Integration**: Robust connectivity with DISCOM systems, <2-second API latency, >99% sync reliability.
5. **Scalability**: Performance under full deployment load.
6. **Security**: Compliance with cybersecurity standards, no breaches in penetration tests.

07. Deliverables

The System Integrator is expected to deliver a fully Functional Mobile Application for Field Data Collection. A field-ready mobile application enabling linemen to digitize, validate and manage DISCOM assets with real-time data capture and AI-driven insights. Features include:

a. **Network Data Capture**: GPS-tagged recording of substations, transformers, feeders, poles and consumer connections.
b. **Asset Editing & Linkage Updates**: Interactive modification of asset details and network topology with AI-suggested corrections.
c. **AI-Based Data Validation**: Automated anomaly detection, cross-referencing with GIS and billing systems and real-time error flagging.
d. **Photo & Video Capture for Asset Identification**: AI-powered image recognition and OCR-based meter reading extraction.
e. **Alerts and Notifications:** Fault detection, high upstream DER power flow alerts and AI-driven trend notifications
f. **Scalable AI/ML Model** : Continuous learning from field corrections, adaptable from pilot (5 substations) to full deployment (400 substations).
g. **AI-Native Web Application for Grid Intelligence and Operational Optimization**
   i. **AI-Driven Dashboard:** Centralized analytics for grid health, energy losses and operational KPIs.
   ii. **Load Flow Analysis:** AI-powered diagnostics for voltage profiles, power losses and fault detection.

iii. **GIS-Based Asset Visualization:** Interactive map with real-time SCADA overlays, predictive insights and geospatial asset tracking.

iv. **What-If Simulations:** AI-modeled grid expansion, DER integration and load forecasting.

v. **AI-Chat Interface:** Custom GPT-powered assistant for querying grid data and generating actionable insights.

vi. **Digital Single-Line Diagrams (SLDs):** AI-generated, interactive network diagrams for planning and maintenance.

vii. **Asset & Consumer Data Management:** AI-enhanced repository for asset lifecycle tracking, consumer billing validation and anomaly detection.

viii. **Alerts and Notifications:** AI-driven fault, trend and high upstream DER power flow alerts with analytics..

h. **AI-Enabled Data Integration and System Interoperabilities**

i. **Seamless System Integration:** The platform will integrate with existing DISCOM infrastructure, including SCADA, RMS, billing systems and energy management tools, ensuring a unified data ecosystem.

ii. **AI-Driven Data Reconciliation:** Automated validation and cleansing of multi-source data to identify inconsistencies, flag discrepancies and ensure accurate reporting.

iii. **Predictive Insights for Operations:** AI models will analyze historical and real-time data to generate forecasts for power demand, fault occurrence and load balancing strategies.

iv. **Interoperability with Legacy and Emerging Technologies:** The system will support API-based communication with external tools, allowing future scalability and adoption of emerging grid technologies.

v. **Real-Time Monitoring & Alerts:** AI-powered event detection will continuously track critical grid parameters, flagging issues such as voltage fluctuations, outages and losses with automated escalation workflows.

i. **Preliminary Validated Dataset with Confidence Scores**

i. **Dataset Compilation:** A GIS dataset will be compiled, including asset records, geospatial attributes and metadata.

ii. **Confidence Scoring:** Confidence scores (0-100%) will be assigned to each entry.

iii. **Reliability Categorization:** Asset reliability will be categorized into high, moderate and low confidence levels.

iv. **Anomaly Detection:** Discrepancies and anomalies will be automatically classified.

v. **Validation Metadata:** Metadata and audit logs detailing validation methods will be maintained.

j. **Discrepancy Report with Proposed Resolutions**

i. **Discrepancy Identification:** A comprehensive list of identified discrepancies in asset records will be generated.

ii. **Suggested Corrections:** Proposed fixes for coordinate mismatches, duplicates and missing data will be provided.

iii. **Severity Classification:** Discrepancies will be categorized by severity level (critical, moderate, low).

iv. **Resolution Methods:** Resolution approaches (GIS-based corrections, manual validation, database merging) will be outlined.

v. **Validation Summary:** A summary of validation checks and error detection metrics will be included.

k. **Supervisor-Approved Dataset with Action Log**
   i. **Final Dataset:** A dataset with all discrepancies resolved and validated will be delivered.
   ii. **Action Log:** A detailed log of modifications, updates and corrective actions will be maintained.
   iii. **Approval Sign-Off:** Validation and approval from designated DISCOM authorities will be documented.
   iv. **Confidence Score Comparison:** Pre- and post-validation confidence scores will be analyzed.
   v. **Residual Issues Summary:** Documentation of remaining data issues requiring future attention will be provided.

l. **Comprehensive Validation Report with Accuracy Metrics & Visual Summaries**
   i. **Final Validation Status**: The completion status of the dataset validation will be reported.
   ii. **Accuracy Metrics:** The percentage of validated data and flagged data for further review will be documented.
   iii. **Geospatial Visualizations:** Heat maps comparing original vs. corrected asset locations will be created.
   iv. **Correction Breakdown:** Graphical analysis of corrections by asset type (substations, feeders, transformers) will be presented.
   v. **Audit & Compliance Logs:** Validation process records and regulatory compliance documentation will be included.

m. **Deployment, Training & Technical Support**
   i. **Scalable Deployment Architecture:** On-premise or cloud-based deployment tailored to DISCOM's IT infrastructure, ensuring high availability, security and compliance with regulatory standards.
   ii. **User Training and Capacity Building:** Hands-on training sessions, instructional manuals and AI-driven interactive guides to ensure efficient system adoption by field engineers, operational staff and management teams.
   iii. **Continuous Technical Support & Maintenance:** Dedicated support for troubleshooting, performance monitoring and software updates to keep the system optimized and up to date.
   iv. **Customization & Future Expansion:** Modular architecture allowing customization based on evolving DISCOM needs, with provisions for integrating additional AI-powered analytics and automation capabilities.

08. Project Management

a. The implementation of the AI-powered grid digitization, network modeling, load flow analysis, grid simulation and expansion planning solution is envisaged to be completed within a period of 9 months, followed by a subscription of 1 year which may be extended by an additional 2 years on the same terms and conditions.

b. **Implementation Framework**

   i. All project activities shall be executed as per the schedule indicated below. Each activity is to be accompanied by a formal presentation of the associated deliverables.

A deliverable shall be deemed complete only upon submission of both hard and soft copies, followed by the corresponding presentation to the ISA.

ii. A detailed **Project Implementation Schedule** is to be submitted, covering but not limited to the key milestones and deliverables outlined in the indicative timeline table below. This schedule is to include a comprehensive list of all proposed activities and deliverables for each phase of the project lifecycle.

iii. The following timeline is indicative in nature and provides a high-level view of the anticipated project phases and durations. The selected agency is expected to develop and submit a detailed activity-wise implementation plan, inclusive of post-implementation phases and ongoing support arrangements.

iv. All software licenses for the GIS, Network Analysis, Roster Management and Load Forecasting system shall be procured and supplied. The quoted price must cover the entire lifecycle of the contract, including:

1. License and subscription procurement,
2. Updates and renewals
3. Change requests
4. Periodic updates for mobile applications.

v. The schedule of activities and associated timelines (in months) is provided in the table below. All references are with respect to "T0", which denotes the date of Letter of Award (LoA).

S. No.	Project Phase	Project Activity & Deliverables	Time Schedule	Frequency
1	Project Initiation	- Governance & Planning: Project kick-off, Charter finalization, Governance and escalation matrix, Communication plan - Resourcing & Setup: Team mobilization, Onsite office setup, Resource and deployment plan - Workstream Structuring: Detailed project plan with WBS, Project templates (reports, SLA monitoring, attendance) - Survey & Assessment: Field survey strategy, License requirement mapping, Network feasibility study, Change readiness assessment	T0 + 2 Months	Once

		- Data & Change Strategy: Data digitization plan, Training & OCM roadmap, SLA & performance monitoring design - Risk & Quality: Risk assessment, QA plan, Methodology and governance standards - Process Mapping: As-is documentation, Gap analysis, Initiation of data collection & cleansing		
2	Field Survey	- Planning: Finalize attribute list, Create detailed field survey plan, Approvals from all DISCOMs - Execution: Field team deployment, Pilot survey and training, Mobile app deployment - Validation: Monthly status reports, Data sign-offs by DISCOM officials - Digitization: QA/QC on collected data, Publish digitized records	T0 + 6 Months	Once
3	Business Blueprinting	- Requirement Gathering: Workshops for functional and technical specs - Blueprint Design: HLD/LLD documentation, Updated BoM/BoQ, BPML, Reengineered process flows - Integration Mapping: Reporting, Interfaces, Conversions, Enhancements - User Structure: Authorization matrix, Utility organogram, Role-based user listing - Detailed To-Be Report including business blueprint and design documents, high-level and low-level design specifications, updated Bill of Material/Bill of Quantity, Business	T0 + 3 Months	Once

		Process Master List, Business Process Re-engineering, Development Scope, FRS & BPML mapping, Business Solution Design Document, Functional and Technical Requirement Specifications, Requirements Traceability Matrix, Non-functional Requirements Specifications and module-based roles and responsibilities. We will also create a mapped organogram of the utility and identify role-based end-users of the GIS, Network Analysis, Roster management and Load Forecasting system. - Business Blueprint/Elaboration phase closure report: A comprehensive overview of the business blueprint and elaboration phase of the project. - Security & Continuity: Cybersecurity framework - Change Management Planning: Training planning, Change workshops		
4	Design & Customization	Environment Setup: - Establish Test, Development and QA environments - Deploy required application servers and database instances. - Design, development & customization reports for GIS, Network Analysis, Roster Management, Load Forecasting systems. - Baseline Configuration and Documentation - Customization and Configuration documentation - OEM Audit Report (1st Iteration – Draft & Final with compliance) - User Profiles and Roles Documentation	T0 + 3 Months	Once

		Mobile App: - UI/UX design tailored for field users - Module integration: GIS map, asset info, performance dashboard - Offline data capture, sync protocol setup - Field testing and iterative feedback incorporation	T0 + 6 Months	Once
		GIS, Network Analysis, Roster Management, Load Forecasting: - System design and base configuration - Customization and role-based access configuration - Integration with legacy systems and internal platforms - Functional and integration testing cycles	T0 + 12 Months	Once
		Directory: - Setup organizational directory structure - Define inter-departmental relationships and hierarchy mapping - Configure access control and user groups - Enable search and filter functionalities	T0 + 9 Months	Once
		Chat-based Natural Language Querying Module: - Design chat interface for querying across modules - Implement NLP backend integrated with GIS, Analytics, Notification systems	T0 + 12 Months	Once

		- Train system with domain-specific query intents - Conduct functional, accuracy and load testing		
		AI-Driven Analytics: - Define data sources, indicators and visualization parameters - Develop predictive analytics models (asset performance, load trends) - Build configurable dashboards for decision-makers - Test model performance and data pipeline reliability	T0 + 12 Months	Once
		Alerts and Notifications: - Design alert creation and acknowledgement workflows - Implement notification system - Define user roles and jurisdictions - Conduct integration testing with Directory and Mobile App	T0 + 12 Months	Once
		- Testing Reports: Load, Stress, Integration, Performance - Test Plans, Scripts, Logs, Issue Resolution - Pilot Report - UAT Report post delivery and implementation - RICEFW customization documentation - Data Archiving Plan	T0 + 12 Months	Once

		- Initiate training sessions for internal teams and pilot users - Prepare training manuals, walkthrough videos and help documentation - Refined End User Training Plan - Training Manuals, FAQs	T0 + 12 Months	Monthly
5	Pilot Rollout and Stabilization	- Infrastructure: Hardware inspection and delivery for pilot - Data Management - System Deployment: Mobile App and Web App rollout - Operationalization: Demonstration, Acceptance, Go-live at pilot sites - Capability Building: Documentation, Staff training, Stabilization support - System Support: Stabilization assistance for pilot locations - System Acceptance: Maps, Network Analysis, Roster Management, Load Forecasting system acceptance - Go-Live: Full go-live of pilot setup and mobile application	T0 + 12 Months	Once
6	Enterprise Go-Live	- Infrastructure Rollout - Full Deployment: Rollout of all modules including mobile app - Training: Final training and user handholding - Dependencies: Go-live contingent on completion of Design & Customization phase	T0 + 12 Months	Once

7	Subscription	- System Support: Stabilization and O&M support for all locations - Final Acceptance: System-level acceptance across locations - Completion: Full Go-Live confirmation - Long-term Support: End-to-end O&M of GIS, Network Analysis, Roster Management, Load Forecasting systems including mobile app - Scope: Includes all licenses, updates, enhancements, support services - Exit Management Plan	1 Year (Post Go-Live)	Continuous

Note: *The Project timelines and schedule mentioned above is indicative and will be finalized based on discussion and agreement between ISA/user and the SI. Initially, a draft schedule will be provided with respective deliverables to ISA/user for their review and feedback within stipulated timelines. ISA/user will provide feedback within the agreed timelines to make necessary changes, corrections, if required. A revised schedule document will be resubmitted. Feedback and revision of documents and deliverables will be an iterative process.*

c. Roles and Responsibilities

1. **Responsibilities of the System Integrator (SI)**

1.1. **Development, Deployment and Maintenance of Digital Solutions**

1.1.1. Design, develop and deploy a fully functional mobile and web-based platform for real-time grid intelligence, asset mapping and consumer data validation.

1.1.2. Ensure robust cloud-native or on-premise deployment, optimized for scalability, high availability and seamless user experience.

1.1.3. Implement automated software updates, security patches and performance optimizations to maintain system reliability.

1.2. **Comprehensive Grid Digitization and Data Accuracy Assurance**

1.2.1. Conduct an exhaustive, one-time digitization of DISCOM's grid infrastructure, ensuring accurate mapping of transmission and distribution assets, substations, transformers, feeders and consumer connections.

1.2.2. Validate and reconcile existing GIS layers, asset records and power flow data to eliminate discrepancies and ensure a high-fidelity digital twin of the grid.

1.2.3. Establish a data governance framework to ensure data accuracy, consistency and regular updates in alignment with network modifications.

1.3. **End-to-End Technical Support for Ongoing Grid Updates**

1.3.1. Provide continuous technical assistance for capturing, updating and integrating changes in the grid infrastructure, such as new asset installations, maintenance activities and consumer connections.

1.3.2. Implement automated workflows for real-time data updates, ensuring the digital representation of the grid remains current and reflects all modifications.

1.4. **Seamless System Integration with DISCOM's Existing IT Ecosystem**

1.4.1. Ensure interoperability with DISCOM's IT landscape, including SCADA, RMS, billing systems and energy management platforms, facilitating unified data access.

1.4.2. Develop and manage secure APIs and data pipelines for real-time information exchange across legacy and modern grid management systems.

1.4.3. Leverage AI-driven data harmonization to standardize and reconcile information from multiple sources, enhancing decision-making accuracy.

1.5. **Training and Knowledge Transfer for Operational Readiness**

1.5.1. Design and execute structured training programs for DISCOM personnel, including field engineers, control room operators and administrative staff, ensuring efficient system adoption

1.5.2. Deliver customized learning modules, including hands-on workshops, instructional videos and AI-powered interactive guides, to enhance user proficiency.

1.5.3. Provide train-the-trainer sessions to develop in-house expertise within DISCOM for system maintenance and troubleshooting.

1.6. **Real-Time Monitoring, Advanced Analytics and Continuous System Enhancements**

1.6.1. Deploy AI-driven analytics dashboards for real-time monitoring of grid performance, energy losses, asset health and operational KPIs.

1.6.2. Implement predictive maintenance models, leveraging AI/ML to anticipate grid failures and optimize asset management.

1.6.3. Offer continuous system improvements, incorporating technological advancements to enhance grid resilience and efficiency.

1.7. **Ensuring Data Security, Compliance and Cybersecurity Resilience**

1.7.1. Implement robust cybersecurity protocols aligned with national and international standards, ensuring protection against cyber threats, unauthorized access and data breaches.

1.7.2. Ensure end-to-end encryption, role-based access control (RBAC) and multi-factor authentication (MFA) to safeguard sensitive DISCOM data.

1.7.3. Conduct periodic security audits, penetration testing and vulnerability assessments to uphold system integrity.

1.7.4. Maintain compliance with regulatory frameworks, including CERC, CEA and DISCOM-specific IT policies for data governance and cybersecurity.

2. **Responsibilities of the DISCOM**

2.1. **Provision of Grid Asset Data, GIS Layers and Power Flow Records**

2.1.1. Grant comprehensive access to existing asset registries, GIS maps, feeder configurations and power distribution records to enable system integration.

2.1.2. Share historical and real-time data from SCADA, RMS, billing systems and energy meters to facilitate data validation and analytics-driven insights.

2.2. **Integration Support for Seamless Data Exchange**

2.2.1. Facilitate technical collaboration with IT teams to establish secure API-based integration between the new digital platform and existing DISCOM infrastructure.

2.2.2. Provide comprehensive access to critical grid-related data, including:

2.2.2.1. Static asset registries, GIS layers, feeder configurations and transformer records for one-time digitization and periodic updates to enable network modeling, load flow analysis and asset management

2.2.2.2. High-frequency SCADA/RMS data, relay switch states, circuit breaker statuses and transformer health sensor data to support monitoring, fault analysis and predictive maintenance

2.2.2.3. Consumer billing records, meter data and load profiles updated monthly or hourly for billing accuracy, loss reduction and demand forecasting

2.2.2.4. Distributed Energy Resources (DER) data with high-frequency generation and status updates to ensure effective integration, grid stability and simulation capabilities

2.2.2.5. All sources are to be integrated via existing system APIs and supported by adequate network bandwidth to ensure interoperability and synchronization between mobile/web applications and central systems.

2.3. **On-Ground Coordination with Field Teams for Data Validation**

2.3.1. Enable direct engagement with linemen, field engineers and operational staff for on-site asset verification and real-time data collection.

2.3.2. Ensure that field teams validate and update grid information, resolving inconsistencies between digital and physical records.

2.4. **Allocation of IT Infrastructure and Cloud Resources**

2.4.1. Provision necessary server capacity, cloud storage and networking resources for hosting and running the new system efficiently.

2.4.2. Ensure sufficient bandwidth and network access for seamless data transmission from remote field locations to the central repository.

2.5. **Support for Field Testing, Pilot Runs and Full-Scale Implementation**

2.5.1. Assist in pilot deployments, testing system performance in select zones before full-scale rollout.

2.5.2. Provide feedback loops for system refinements, ensuring operational alignment with DISCOM's workflows.

2.5.3. Facilitate progressive deployment, ensuring a smooth transition from legacy processes to AI-powered grid management.

2.6. **Appointment of a Nodal Officer for Project Coordination**

2.6.1. Designate a single point of contact (SPOC) responsible for coordinating between DISCOM teams and the System Integrator.

2.6.2. Ensure timely decision-making, approvals and issue resolution to streamline project execution.

2.7. **Ensuring Adoption and Effective Utilization of the New System**

2.7.1. Drive organizational change management, ensuring that personnel across departments effectively adopt the new AI-driven platform.

2.7.2. Establish KPIs for system utilization, monitoring its impact on operational efficiency, revenue protection and loss reduction.

2.7.3. Promote a data-driven decision-making culture, leveraging insights from the system to enhance grid management strategies.

Sl. No.	Project Activities	Compliance (Yes/No)
1	Unit testing of all configured modules including GIS, Network Analysis, Roster Management, Asset Management and Load Forecasting	
2	Finalization and delivery of customized objects for GIS, Network Analysis, Roster Management, Asset Management and Load Forecasting systems based on blueprint and design specifications	
3	End-to-end system integration testing covering module interactions and reporting pipelines	
4	Performance testing including load, stress and backup recovery scenarios across configured systems and mobile app infrastructure	
5	Installation and provisioning of GIS, Network Analysis, Roster Management, Asset Management and Load Forecasting applications across pilot sites and field locations	
6	AI powered GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration Software Provisioning & Installation	
7	User Acceptance Testing (UAT) conducted post pilot delivery including UAT report and stakeholder sign-off	
8	Creation of end-user accounts with mapped roles and authorization matrix based on utility organogram and user structure design	
9	AI powered GIS based Asset Management, Network Analysis, Roster Management & Load Forecasting for DER Integration System Accessibility to all End Users	
10	Completion of baseline configuration and system customization as per finalized design including documentation.	
11	Cutover planning with detailed checklist of tasks, dependencies and timelines for go-live rollout	

12	Execution of structured end-user training sessions with documentation, manuals and helpdesk readiness	
13	Final tuning and optimization of deployed modules based on feedback from pilot run and performance testing	
14	Completion of stabilization phase post pilot rollout with resolution of initial issues, user support and QA sign-offs	
15	Demonstrated stable functioning of all key modules for six continuous months including real-time data flow and dashboard updates	
16	Issue logbook maintained during stabilization including root cause analysis and applied solutions for each problem	
17	Readiness of IVR systems, ITSM integration and operational tools required for post-go-live management and service monitoring	
18	Setup of support helpdesk, ticketing system, contact escalation channels and SLAs	
19	Finalization of Service Level Agreements covering system uptime, issue resolution timelines, training support.	
20	Formal approval for full system go-live post successful stabilization and stakeholder sign-off	

09. Maintenance Support and Service Levels

a. Monitoring of Performance and Service Levels

i. Appropriate tools and processes shall be provisioned and implemented for continuous monitoring of application performance and availability. This shall include:

1. Availability, uptime and performance monitoring of assigned applications and associated infrastructure components.
2. Monitoring of application-specific parameters such as request rates, active user sessions and elasticity triggers.
3. Review and analysis of service level reports to detect deviations from agreed service levels.
4. Identification and reporting of service-level agreement infringements.
5. Troubleshooting activities shall be initiated to detect, isolate and mitigate system outages and performance issues.

ii. To ensure uninterrupted functioning of mission-critical business processes and ISA operations, a **12x7 support model** shall be established, encompassing proactive monitoring, incident resolution and service continuity across all key solution components.

b. **Application Installation & Testing Summary**

i. **Comprehensive Software Deployment**

1. **Supply and install the complete** suite: application software, database, integration tools and middleware.
2. Deliver customized source code along with perpetual licenses and documentation for all components.

ii. **Stakeholder-Centric Design**

1. Incorporate stakeholder feedback into key design elements including:
    a. User interface and navigation
    b. Data entry, storage, retrieval methods
    c. Output formats such as reports, dashboards and query tools
    d. Overall application workflow and usability
2. Ensure alignment with the ISA's operational context and future scalability needs.
3. The unit system for various parameters envisaged shall be in SI (Metric) units and cost in Indian Rupees.

iii. **Testing Environment & User Acceptance Testing (UAT)**

1. Establish a separate Testing environment for UAT, fully equipped and isolated from the Production setup.
2. Populate environment with all necessary:
    a. Configuration parameters
    b. Functional rules
    c. Master data relevant to operations
3. Conduct formal UAT cycles with ISA stakeholders to validate business process compliance and technical robustness.

iv. **Patch Management & Fix Validation**

1. Evaluate all patches and fixes first within the Development environment by the support team.
2. Migrate successfully tested updates to the Testing environment for UAT.
3. Ensure production deployment only after formal approval post-UAT completion.

v. **Data Management Standards**

1. Propose industry-standard best practices and protocols for:
    a. Regular data backup and archival
    b. Secure purging of obsolete data
    c. Seamless restoration in case of failure or disaster

2. Ensure data integrity, traceability and compliance with ISA's retention policies.

c. **Performance Requirements**

i. To ensure a seamless and responsive user experience across both the web portal and mobile application, the following performance metrics shall be met for all concurrent users:

1. **General Page Load Times**

a. **Static Page Load Time (Web Portal)**

i. Avg. load time: < 50 ms

ii. Applies to all apps, regardless of config/sizing

iii. Measured by TTFB via third-party tool (by SI)

b. **Dynamic Page Response Time (DISCOM Portal)**

i. Avg. response time: < 1 sec

ii. Excludes human input time

iii. Measured by TTFB via third-party tool (by SI)

c. **ISA Business Application Responsiveness**

i. Avg. response time: < 1 sec

ii. Excludes human input time

iii. Measured by TTFB via third-party tool (by SI)

iv. Login page and other primary pages: Must load within 2 seconds.

v. Home page with integrated analysis tools: Load time shall not exceed 4 seconds.

vi. Full functional screen after login (menu + UI elements): Load time must be ≤ 4 seconds.

vii. Page transition on menu selection: Must load within 4 seconds.

2. **Map and Spatial Data Rendering**

a. Complete map (with all feature classes) on browser and mobile app: Must load within 4 seconds.

b. Background map from the map server: Load time shall be ≤ 15 seconds.

c. Zooming into search results: Must complete within 4 seconds.

3. **Feature and Attribute Management**

a. Create, delete, or modify a feature: Each operation must complete within 4 seconds.

b. Saving a created or deleted feature with all associated attributes: Must complete within 30 seconds..

4. **File Upload Performance**

a. Uploading Excel/XML files into the application: Upload process must complete within 30 seconds.

5. **Spatial Query Processing**

a. Simple spatial query results on map: Must display within 15 seconds.
b. Complex spatial query results on map: Must display within 30 seconds.

d. **Project Implementation Phase SLA (During Implementation)**

i. **Penalty against Delay in Implementation Phase Completion**
"T0" – Date of Letter of Award

S. No.	Project Phase	Time schedule	Penalty*
1	Project Initiation	T0 + 2 Month	0.X% per week of delay or part thereof
2	Field Survey	T0 + 9 Month	
3	Business Blueprinting	T0 + 3 Month	
4	Design & Customization	T0 + 12 Months	
	Environment Setup	T0 + 3 Months	
	Mobile App	T0 + 3 Months	
	GIS, Network Analysis, Roster Management, Load Forecasting	T0 + 9 Months	
	Directory	T0 + 9 Months	
	Chat-based Natural Language Querying Module	T0 + 9 Months	
	AI-Driven Analytics	T0 + 9 Months	
	Alerts & Notifications System	T0 + 9 Months	
	Testing Reports	T0 + 9 Months	
	Training	T0 + 9 Months	
5	Pilot Rollout and Stabilization	T0 + 8 Month	0.X% per week of delay or part thereof
6	Enterprise Go-Live	T0 + 9 Months	0.X% per week of delay or part thereof
7	Subscription	1 Year (Post Go-Live)	0.X% per week of delay

			or part thereof

**Penalty shall be imposed on the total awarded project cost deliverable in each phase as defined in EOI.*

Facility Management Phase SLA Overview (Post Implementation)

Component	Definition / Policy
Monthly Availability Formula	% Availability = ((Actual Uptime + Scheduled Downtime) / Total Monthly Hours) × 100
Actual Uptime	Total hours in a month when each equipment or component is available for use.
Scheduled Downtime	Permitted downtime due to preventive/scheduled maintenance or infrastructure issues not attributable to the Service Provider.
Planned Downtime Limit	Max 4 hours/month/equipment allowed for preventive maintenance.
Maintenance Agreement	Scheduled maintenance (e.g., patching/upgrades) must be mutually agreed upon; activities should be consolidated to minimize impact.
Total Monthly Hours	24 hours × No. of days in the month.
Downtime Recording Start	Begins at call registration/notification of issue to SI.
Downtime Recording End	Ends when issue is resolved and service is restored.
Exclusions from Downtime	- Approved scheduled maintenance; - Failover time ≤ 30 min; - Bugs affecting partial services; - Deferred downtime if DISCOM continues using faulty equipment
Failover Grace Time	Up to 30 minutes allowed in cluster setup; beyond that, treated as downtime with penalties.
Special Condition	If DISCOM delays equipment release for repairs, downtime count starts after handover to SI.

Typical Facility Management Services (FMS) availability & duration of their requirement

Support Category	**Criteria**	**Maximum Response Time**	**Maximum Resolution time**
Critical	The system is unable to be used for normal business activities. There is certainty of financial loss to DISCOM.	15 Minutes	60 Minutes

High	There is a problem with a part of the system, which impacts on DISCOM's decision making. No viable workaround is available. There is a likelihood of financial loss.	1 Hour	6 Hours
Medium	The efficiency of users is being impacted but has a viable workaround.	2 Hours	24 Hours
Low	A fault, which has no particular impact on processing of normal business activities.	8 Hours	48 Hours
Note:	Financial loss means inability to bill or collect revenue from the system		

Service Delivery & Performance Monitoring

S. No.	Service	Parameter	Service level	Validation	Penalty
1	Availability Management				
1.1	Business Applications Software (Core GIS, Network Analysis, Roster management and load forecasting system)	Availability of Business Application Software as mentioned in the Scope of Work	>=99.5% uptime	Availability & Downtime Reports measured using Management Tool. Measured 24*7 Basis and Validated by Monthly SLA Performance Report.	>= X% but <X% of SLA X% of Quarterly Subscription Cost >= X% but <X% of SLA X% of Quarterly Subscription Cost >= X% but <X% of SLA XX% of Quarterly Subscription Cost >=X% of SLA X% of Quarterly Subscription Cost

1.2	Business Supporting Applications (Geo-tagging, Mobile Apps, Web-services, Asset Management, Alerts & Notifications System , Dashboard, Ticketing)	Availability of supporting Applications and System Software Services which are required to support the Business Applications as mentioned in Scope of Work	>= 99.5% uptime	Availability & Downtime Reports measured using Management Tool. Measured 24*7 Basis and Validated by Monthly SLA Performance Report.	>= X% but <X% of SLA X% of Quarterly Subscription Cost >=X% but <X% of SLA X% of Quarterly Subscription Cost >=X% but <X% of SLA X% of Quarterly Subscription Cost >=X% of SLA X% of Quarterly Subscription Cost
1.3	Change Management	Resolution of Change Management ticket	99%	Monthly Reports	X% of Quarterly Subscription Cost if agreed date for requested change is not adhered
1.4	Release Management	Resolution of ticket logged in incident management tools	99%	Reports generated from Ticket logging system	X% of Quarterly Subscription Cost for each default capped at X%
1.5	Problem Management	SI shall analyse all the incidents and provide a root cause report every month if there are more than 5 incidents of the same type. SI shall take the needed corrective action to prevent further issues due to the same cause.	100% timely submissio n covering all incidents logged in that month	Root cause Report. Incident Report stating problems. faced by the users. Report detailing corrective and preventive actions	X% penalty of Quarterly Subscription Cost, if the SI does not submit a problem report for that month. X% penalty of Quarterly Subscription Cost if the SI does not perform the corrective action for more than one calendar month.

1.6	Implementation of Audit/ Regulatory Recommendations	Implementation of audit recommendations given by ISA or its auditor/ regulator which have been agreed by SI to be implemented.	100%	Completion within agreed timeline and Reports	X% of Quarterly Subscription Cost for every day's delay on an incremental basis capped at X%
1.7	Resource Management	Number of shift days for which resource present at the designated location / Total number of shift days	>=98% averaged over all resources designated for SI services - calculated on a monthly basis	Attendance track Call Log Audit calls/ visits Measured on a monthly basis	If the resource availability is less than 98%, then payment shall be deducted based on the pro-rata basis. (Total Quarterly Subscription Cost per day divided by nos. of persons deployed) * (Total non-available Personnel)
		Resource provided is not as per specified certification / experiences	100% compliance	Experience Certificate and CV of FMS personnel submitted by SI to the DISCOM	Per day deduction per resource person = 0.5 * (Monthly value for that manpower) / 30
1.8	SLA Monitoring Report	Availability of SLA reports covering all parameters required for SLA monitoring within the defined time	7 working days from the end of the month	Monthly Report	X% of Quarterly Subscription Cost
2	Performance related SLAs				

2.1	Response time is an important factor from the perspective of End User Experience	Average loading time of Static Page in a Web Portal for all the applications irrespective of the configuration changes made by the user and the respective sizing (such as compute and memory) implications.	< 50 milli seconds	To be measured by Time to First Byte (TTFB) through any third-party monitoring tool to be provided by the SI.	If the deviation is: • Less by X% of SLA, then X% of Quarterly Subscription Cost • >X% but < X% of SLA, then X% of Quarterly Subscription Cost • >=X% but <10% of SLA Then 10% of Quarterly Subscription Cost • >=X% of SLA then X% of Quarterly Subscription Cost
2.2	Responsiveness of DISCOM portal would be critical to solution's performance	Average response time of Dynamic Content Pages in a Web Portal (excluding Human Input time) for all the applications irrespective of the configuration changes made by the user and the respective sizing (such as compute and memory) implications.	< 1 sec	To be measured by Time to First Byte (TTFB) through any third-party monitoring tool to be provided by the SI.	
2.3	Responsiveness of ISA Business Application	Average response time for ISA Business Application (excluding Human Input time)	< 1 sec	To be measured by Time to First Byte (TTFB) through any third-party monitoring tool to be provided	

				by the SI.	
3	Transaction Commit Performance	Process operations response times	>=90%	Update transactions to commit transactions: 2 seconds. Simple query: 3 seconds Complex query: 4 to 8 seconds Batch Operations: 15 Mins	X% of Quarterly Subscription Cost
4	Helpdesk Service Levels support				
4.1	Simple Query Response Time	Critical priority	Should be resolved within 1 hour	Has critical impact on Purchasers operations. There is certainty of financial loss.	If the deviation is: Less by X% of SLA, then X% of Quarterly Subscription Cost >X% but < X% of SLA, then 3% of Quarterly Subscription Cost >=X% but <X% of SLA, then 5% of Quarterly Subscription Cost >=X% of SLA, then 10% of Quarterly Subscription Cost
4.2	Complex Query Handling	Urgent priority	Should be resolved within 4 hours	The problem with impact on a part of system and Purchasers operations. There is a likelihood of financial loss.	
4.3	Batch Operation Completion	High priority	Should be resolved within 6 hours	The high impact problem with effect on the efficiency of users.	
4.4	Critical Incident – Business Disruption	Medium priority	Should be resolved within 24	The low impact problem with effect on the	

			hours	efficiency of users.	
4.5	Major Incident – Partial System Impact	Low priority incident	Should be resolved within 48 hours	A fault, which has no particular impact on normal business activities.	
4.6	High Impact – User Efficiency Degradation	Re opened incidents	Call reopened should be less than 10% of the total call closed	The call logged by the ISA user should be resolved on a permanent basis. The call closed by the help desk should not be reopened by the ISA users within 2 days' time.	

Remarks: Although SLA penalties shall be calculated as per above table, however total penalty to be deducted is to be capped at 20% of the Monthly Invoicing Value (FMS Cost).