भारतीय मानक
Indian Standard

IS 16336 (Part 3) : 2018

विद्युतीय सुविधाओं के संदर्भ में सूचना के आदान-प्रदान हेतु सामान्य सूचना माडल (सिम)

भाग 3 प्रणाली प्रचालन के मामले में एप्लिकेशन का उपयोग

Common Information Model (CIM) for Information Exchange in the Context of Electrical Utilities

Part 3 Application Use Cases for System Operation

ICS 33.200

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FOREWORD

This Indian Standard (Part 3) was adopted by the Bureau of Indian Standards, after the draft finalized by the Power System Control and Associated Communications Sectional Committee had been approved by the Electronics and Information Technology Division Council.

Power system operation utilities are facing problems of interoperability, due to growing size and complexity of the power network, and also use of various hardware and software systems from multiple vendors. This work is focused on identifying inter application interactions at Regional Load Despatch Center (RLDC) level. The sources of usecases collected here are in the basis of interviews of system operators and study of their operating procedures. Some of the key observations in this context are as follows:

a) Lack of standard inter-application protocol;
b) No application integration bus;
c) Applications exchange data by point-to-point interconnections;
d) Ad-hoc information exchange formats based on online forms, CSV, Excel, flat-files, emails or even PDF files; and
e) Modification / expansion is difficult due to tight coupling of applications.

Utilities are having a wide deployment of various software systems for real-time monitoring and optimized operations, also for achieving various business functions. There is a large number of information exchange scenario's and use cases that exists within inter utility environment as well as in intra utility environment. There are multiple software systems and components involved in these information exchange scenarios, and they are procured from different vendors at different point in time. Often these information exchanges demands very complex integration projects with high cost of execution, which either results in a case to case custom integration using ad-hoc methods or a no integration scenario creating information silos. With a case to case custom integration the number of integration adapters which are needed will increase drastically especially when additional integration requirement increases. Intention of this standard is to bring in a Common Information Model and a set of interface specification thus by enabling the vendors for providing standardized interfaces in various applications and application components which requires an exchange of real-time and non-real-time information.

This (Part 3) covers the aspects to identify the cases of information exchanges where CIM driven Integration can be applied. The base CIM standard and the Indian specific extensions are covered in IS 16336 (Part 1) and IS 16336 (Part 2).

International standards published by IEC, namely IEC-61970, IEC-61968 and IEC-62325 for intra application and inter application integration of systems is considered as the base standard for adopting a Common Information Model and Common Interface Specifications. Common Information Model provides a standard semantic model for a model based information exchanges in the context of Electrical utilities. Common Interface Specifications provides a standard set of services which defines how information is exchanged using the context of the standard model.

Indian Standard

COMMON INFORMATION MODEL (CIM) FOR INFORMATION EXCHANGE IN THE CONTEXT OF ELECTRICAL UTILITIES

PART 3 APPLICATION USE CASES FOR SYSTEM OPERATION

1 SCOPE

This standard covers, the following extensions to the CIM model as referred in IS 16336 (Part 1) to cater to the specific requirements which are not covered in the associated International Standards.

It provides extensions to the models specified in adopted IEC standards to cater country specific requirements which are not covered in the associated International Standards.

This standard presents a list of application use case identifying the information exchanges where CIM driven integration has potential to be implemented. Migration towards CIM can be taken up in a phased manner, and the use case list presented in this section helps the utilities in prioritizing the activities.

2 IDENTIFICATION OF USE CASES FOR CIM IMPLEMENTATION

The current scenario of application interactions in RLDC was studied various applications and their data exchanges are summarized in Fig. 1. Each of the information exchange path is a potential use case where CIM based integration can be applied. These exchanges are numbered as shown in Fig. 1, and these numbers are used as identifiers of the use cases. The rest of the section describes each of the use case defined in detail.

The following describe the components used in Fig. 1.

Name of the Component /Entity	*Description*
RLDC SCADA	SCADA stands for Supervisory Control and Data Acquisition system, which is used for monitoring, visualization, control and optimization of power system network spanning a large geographical area.
RLDC EMS	EMS stands for Energy Management Systems. While SCADA deals with communication, data acquisition and monitoring, the EMS focuses on power system engineering analysis on the data collected by the SCADA. Topology processing, state estimation, load flow studies are a few basic examples of EMS studies.
SCADA of SLDCs/ Other RLDCs/ NLDCs	The RLDC SCADA system regularly interacts by exchange of real-time data with the SCADA systems of NLDC, and SLDCs that are connected to it.
RLDC Website	The website of RLDC provides scheduling, operational and planning data of the RLDC system.
Scheduling Software	This software prepares the schedule on day-ahead basis for all the participants connected to the regional network.
MTOA & STOA Software	This software processes medium term open access and short term open access applications that are received by the nodal RLDC. This software is typically web-based where the traders /open access applicants fill an online open access form with the relevant details. They are later notified of the approval status of their application.
Network Expansion & Planning	As the load demand on the grid grows, and as the new generation plants are set up to meet this increasing demand, the power transmission network also needs to be expanded with addition of new lines and associated equipment. This module carries out the network expansion planning studies.
System Studies Group	The system studies groups performs various simulation studies on the power system network, such as load flow

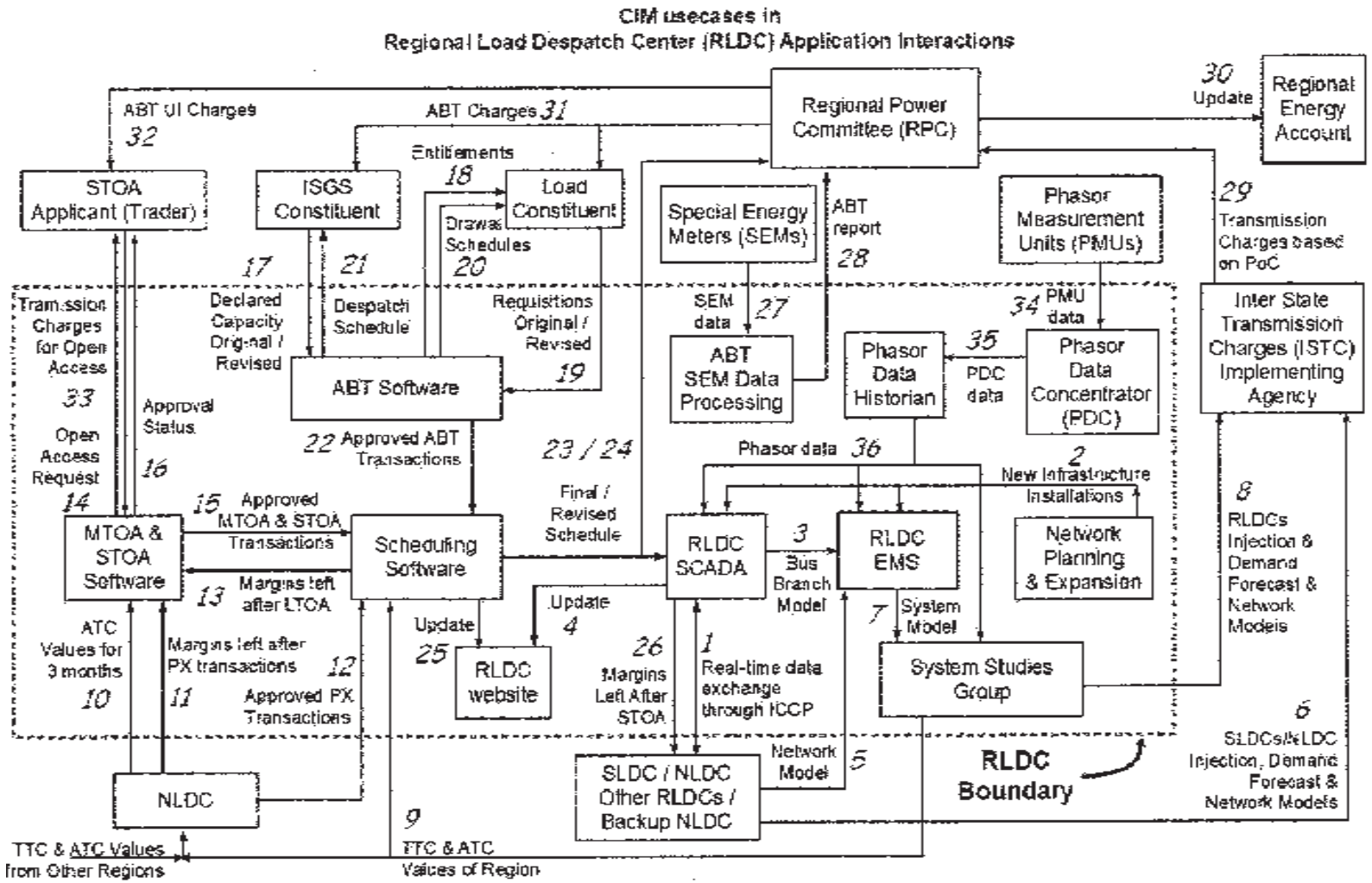

FIG. 1 RLDC APPLICATION INTERACTIONS. NUMBERS INDICATE USE CASE IDS

Name of the Component /Entity	*Description*
	analysis, optimal power flow analysis, contingency analysis etc. The objective is to provide plans from time-to-time to improve the operational efficiency and economy of the power system.
NLDC	The national load despatch center (NLDC) supervises and co-ordiantes with the RLDCs for achieving maximum efficiency and economy in the operation of the National Grid.
ABT Software	The ABT software is responsible for collecting, processing and disseminating the information of final schedules for all the participants of the ABT power pool in the region.
Load Constituents	The constituents of the regional power pool who consume or draw the power into the regional grid under the ABT mechanism.
ISGS Constituents	The constituents of the regional power pool who generate or inject the power into the regional grid under the ABT mechanism. Inter-state generating stations (ISGS) are typically the generation constituents in ABT. However, certain independent power producers (IPPs) are also entering the regional power pools.
Special Energy Meters (SEMs)	The ABT mechanism requires the net drawal and injection data of the load and generation constituents to be measured at certain set of predefined points in the network. Special energy meters are used for this purpose.
ABT Data Processing	The data collected from the SEMs in the field have to be processed to arrive at the actual drawal and injection values of energy by each of the participants in the pool. This task is carried on by the ABT data processing software.
STOA Applicant (Trader)	The STOA applicant or a trader is the party who applies for approval of STOA transaction to the respective nodal RLDC.
Regional Power Committee	As per IEGC, the one of the roles of regional power committee (RPC) include the following: Preparation of monthly Regional Energy Account (REA), weekly unscheduled interchange account, reactive energy account, and congestion charge account, based on data provided by RLDC, and renewable regulatory charge account based on data provided by SLDC/RLDC of the State/ Region.
Phasor Measurement Units	A phasor measurement unit (PMU) is a device which measures the electrical waves on an electricity grid, using a common time source for synchronization. Time synchronization allows synchronized real-time measurements of multiple remote measurement points on the grid.
Phasor Data Concentrator (PDC)	A PDC is a device providing a set of applications for collecting, processing, and streaming time-series data in real-time coming from the PMUs. In effect, PDC has following functions: The first is to collect and correlate synchrophasor data from multiple PMUs. The second is to then compress and transmit synchrophasor data either to a data historian for post-analysis or to visualization software for real-time viewing of a power system.
Phasor Data Historian	The phasor data historian is a repository or archive of the phasor data for later detailed analysis.
Inter-State Transmission Charges (ISTC) Implementing Agency	It is the agency that is responsible for preparation of point of connection Transmission charges for the participants as per their usage of the Inter-state Transmission System (ISTS).
Regional Energy Account	This account keeps track of net payments and reimbursements of ABT related amounts. The detailed status report of the account is made available on websites of RPCs on weekly basis.

3 DESCRIPTION OF USE CASES

The use cases are described in detail in the following tables. The use cases are numbered as shown in Fig 1. The same numbers shall be referred using a prefix UC to identify particular usecase across the industry. For example, the usecase titled - Inter Control Center real-time SCADA data exchange, shall be identified as IS 16336 (Part 3) — UC 1 and is referred as No. 1 in Fig. 1.

Use Case ID	**UC 1**
Use Case Name:	**Inter control center real-time SCADA data exchange**
Actors:	1. SLDC 2. RLDC 3. NLDC
Description:	The real-time SCADA data measurements are to be continuously relayed from every substation RTU to the local Master Control Center where the SCADA functions are carried out. Subsequently certain predefined subset of data is transferred up the hierarchy from SLDC to RLDC to NLDC. These data exchanges are needed for monitoring and reliable system operation at all levels. The data to be exchanged includes the continuous variables such as frequency, active and reactive flows over lines, bus voltages at substation bus bars, generation and load values, transformer loadings etc. The discrete data such as transformer tap positions, Circuit Breaker and Isolator switching status, etc are also included.
Trigger:	Continuous flow of data
Pre-conditions:	The ICCP link between the control center is cofigured and active
Post-conditions:	The scada data is received
Current Scenario:	For data exchange between control centers ICCP protocol is used. Although the ICCP is a standard protocol for transfer of data, the data itself may not be standardized. The matching of data on either end control centers is carried out on the basis of Interoperability Tables (IOT) and Bilateral Tables (BLT), creation of which is costly when the different vendor's systems are involved on either ends.
Frequency of Use:	Data is received every 2 s (Not all variables are sent every 2 s)
Special Requirements:	If the ICCP link is between different vendors then mapping of data labels needs to be done.
Assumptions:	The IOT and BLT Tables are accurate and up-to-date.
Notes and Issues:	The IOT and BLT Tables are configured with mutual understanding between vendors at either end.

Use Case ID	**UC 2**
Use Case Name:	**SCADA/EMS model updation with new equipment installations**
Actors:	1. Model Manager 2. SCADA / EMS models at RLDC
Description:	Whenever there are new installations in the system such as addition of new elements, lines, transformers, or RTU's the models at the control center SCADA / EMS systems are to be updated to keep it in accordance with the physical infrastructure. All the associated entries in the databases, the SCADA display maps and tables, and the EMS models are the to be configures with the correct parameters of the new elements.
Trigger:	Monthly basis and whenever new elements are installed.
Pre-conditions:	New infrastructure is installed and commissioned in the network.
Post-conditions:	The model in the control center data base should match with the physical infrastructure.
Current Scenario:	The addition of new elements all over the network are informed to the RLDC from time-to-time and the updations are made in the databases by the model manager.
Frequency of Use:	As and when the new equipment is installed and added to the grid.
Special Requirements:	The new equipment should be given unique identification names.
Assumptions:	The current model is up-to-date and accurate.
Notes and Issues:	Keeping the network models consistent with the actual physical infrastructure in the field is important issue.

Use Case ID	**UC 3**
Use Case Name:	**Bus-branch model exchange**
Actors:	1. RLDC SCADA 2. RLDC EMS
Description:	The SCADA system represents the network model in the most detailed node-breaker form. However, to carry out high-level system studies and simulations the legacy EMS softwares would require the latest network models in Bus-branch model form. This can be achieved by carryout topology processing, state estimation.
Trigger:	Model generated and exchanged on a fixed time interval basis.
Pre-conditions:	Topology processing and state estimation are completed.
Post-conditions:	The current bus-branch model is received at the other control center.
Current Scenario:	In the current scenario if the SCADA and EMS software are supplied by the same vendor then the bus-branch model can be extracted and used. However, if SCADA and EMS vendors are different than the generation and exchange of real-time bus branch models have interoperability problems which can be addressed by using CIM.
Frequency of Use:	To be determined as per the requirements of the system operator.
Special Requirements:	The boundary entities between two models needs to be accurately represented in the models when the received models are merged.
Assumptions:	The topology processor and the state estimator are running to generate the current bus branch model.
Notes and Issues:	The naming scheme and the representation of boundary elements needs to be well defined.

Use Case ID	**UC 4**
Use Case Name:	**Updating of RLDC website with SCADA data**
Actors:	1. RLDC SCADA system 2. RLDC website
Description:	The actual measured values of drawls and injections of each of the constituents of the region that are received at the SCADA are also updated to the real-time page of the RLDC website.
Trigger:	The values are updated every 1 min.
Pre-conditions:	The data required for the website is extracted from the SCADA
Post-conditions:	The website shows the latest values with accurate timestamp.
Current Scenario:	Certain high level aggregated SCADA data at RLDC, such as the actual drawl and the actual injection by the constituents. The voltage levels of the important high voltage buses are also displayed on the websites.
Frequency of Use:	Websites updated every 1 min or 2 min.
Special Requirements:	A dedicated webserver with a database and access to SCADA data is needed.
Assumptions:	The time lag between SCADA data and the website data is minimum.
Notes and Issues:	The time stamps present on the websites of each of the of the five RLDCs are not synchronized.

Use Case ID	**UC 5**
Use Case Name:	**SLDC to RLDC power system network model exchange**
Actors:	1. State Load Despatch Center (SLDC) (sender) 2. Regional Load Despatch Center (RLDC) (receiver)
Description:	For the purpose of TTC and ATC calculation to be carried out by RLDC at regional level, all the state constituents submit their power system network models to RLDC. The models would be submitted three months in advance and updated regularly as and when new information arrives which effect changes in the model. These models reflect the expected scenario of availability of elements in state power system network factoring in the planned outages for lines and units.
Trigger:	Starting 3 months in advance and whenever model changes
Pre-conditions:	1. Certain predefined naming convention to identify the buses and branches need to be in place. 2. The modelling of boundary elements need to be arranged so as to enable merging of models with minimal effort.
Post-conditions:	Receipt of acknowledgement from RLDC.
Current Scenario:	The network models of SLDC.
Frequency of Use:	Starting 3 months in advance and whenever model changes.
Special Requirements:	Each state network model, has to be merged with other state network models to form a regional model. These models are estimation of load-generation scenario in the near future, used for planning studies.
Assumptions:	The estimated load-generation scenario is accurate.
Notes and Issues:	—

Use Case ID	**UC 6**
Use Case Name:	**SLDCs / NLDC injection, demand forecast and network model**
Actors:	1. SLDC / NLDC 2. Interstate Transmission Charges (ISTC) Implementing Agency
Description:	To facilitate the calculation of Transmission Service Charges (TSC) the network model is to be determined with the details of ownership of each component of the transmission system, transmission paths, loss allocations etc.
Trigger:	Updated yearly basis.
Pre-conditions:	The latest model is prepared for ISTC.
Post-conditions:	The model in the control center data base should match with the physical infrastructure.
Current Scenario:	A new tracing based Transmission Pricing Methodology to be followed for TSC is under implementation.
Frequency of Use:	Whenever ISTC charges have to be updated. (Typically yearly)
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 7**
Use Case Name:	**Bus-branch models for system studies**
Actors:	1. RLDC EMS 2. System Studies
Description:	Once the real-time bus-branch model is created, it can be used as basic input for a variety of high-level simulation studies. The objective of these studies is to achieve improvements in security of the system. To prepare action plans in the case of contingencies. For planning of system operation and for supporting operational decisions.
Trigger:	A model every few minutes. (Suggested)
Pre-conditions:	Topology processor and state estimator results are available and model is prepared.
Post-conditions:	The system-studies will be carried out.
Current Scenario:	High-level studies in real-time are carried in very limited extent in the current scenario, where the simulation tools and the EMS system belongs to the same vendor.
Frequency of Use:	As regularly as practicable.
Special Requirements:	The system studies group may be using a variety of EMS software for carrying out the studies. The models needs to be prepared according to the requirements of the studies.
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 8**
Use Case Name:	**Regional network model for transmission pricing**
Actors:	1. System Studies Group at RLDC 2. Transmission Pricing Module
Description:	To facilitate the calculation of Transmission Service Charges (TSC) the network model is to be determined with the details of ownership of each component of the transmission system, transmission paths, loss allocations etc.
Trigger:	Updated yearly basis.
Pre-conditions:	—
Postconditions:	The model in the control center data base should match with the physical infrastructure.
Current Scenario:	A new tracing based Transmission Pricing Methodology to be followed for TSC is under implementation.
Frequency of Use:	Updated yearly basis
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 9**
Use Case Name:	**TTC & ATC values of region**
Actors:	1. Systems Studies Group 2. Scheduling Software at RLDC & NLDC website
Description:	The ATC values are needed for clearing STOA and MTOA transactions such that the power flows that occur due to the approved transactions will not violate the flow limits of the system.
Trigger:	To be updated every day. The ATC / TTC values are posted for each day upto next three months. These values are revised as and when new transactions are cleared.
Preconditions:	The model used for ATC estimation is updated with latest infomation.
Postconditions:	The ATC values are received and incorporated into the scheduling software.
Current Scenario:	The systems studies group at RLDC carries out some offline studies on projected network models and determine ATC.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	Corridor based ATCs are calculated (need to shift to area based ATCs).
Notes and Issues:	—

Use Case ID	**UC 10**
Use Case Name:	**ATC values are published for next 3 months**
Actors:	1. NLDC 2. STOA Module at RLDC
Description:	NLDC after receiving the TTC (total transmission capacity) and ATC (available transmission capability) values from respective RLDCs, calculates the resultant TTC and ATC values at National level for each constituent. This TTC and ATC information is prepared for each IR (inter-regional) corridor and constituent 3 months in advance. This value is continuously updated as and when newer STOA and MTOA transactions get approved.
Trigger:	Daily updating the data upto next 3 months.
Preconditions:	The latest TTC and ATC values have to be received by NLDC.
Postconditions:	STOA receives software and incorporates the ATC values.
Current Scenario:	The ATC and TTC values are updated on the NLDC website and they are downloaded and fed to the STOA software. Different RLDCs may use different formats and software for the same.
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 11**
Use Case Name:	**Margins left after PX transactions**
Actors:	1. NLDC website 2. STOA module in RLDC
Description:	Power exchanges are allotted a certain amount of transmission capacity to be used to support power transfers as a result of power exchange transactions. After the market clearing procedures carried out by power exchanges the allotted capacity remaining unused by PX will be surrendered back to the NLDC. This information is in turn relayed to respective RLDCs and SLDCs so that the unused capacity is then utilized to clear short-term open access transactions if any.
Trigger:	4:30 pm everyday
Pre-conditions:	The market is cleared by power exchanges.
Post-conditions:	NLDC receives the information on surrendered capacity.
Current Scenario:	This information is currently sent from both existing PXs to the NLDC and the NLDC then updates its website.
Frequency of Use:	—
Special Requirements:	—
Assumptions:	The network is uncongested after markets are cleared and some capacity remains after PX transactions.
Notes and Issues:	—

Use Case ID	**UC 12**
Use Case Name:	**Approved power exchange transactions**
Actors:	1. ABT scheduling software at RLDC (sender) 2. To all interested parties via website (receivers)
Description:	After accommodating all long term contracts, ABT, STOA, and PX transactions and adjusting for losses, the final drawl / generation schedules for all the participants in the regional power pool is to be prepared.
Trigger:	By 6:00 pm on current day for next day.
Pre-conditions:	The PX transactions are to be finalized.
Post-conditions:	The website shows the latest PX transactions.
Current Scenario:	The final schedules are prepared by the ABT scheduling software and the final schedules are uploaded on the web. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 13**
Use Case Name:	**Margins left after LTOA**
Actors:	1. Scheduling software at RLDC 2. MTOA and STOA Software
Description:	The scheduling software after calculation of final LTOA (or ABT) transactions schedule, certain margins may be left in the Transmission corridors. This left over margins can be used for STOA and MTOA transactions which can be cleared on day ahead basis. Hence this information is provided to the MTOA and STOA Software.
Trigger:	Day Ahead (when the final schedules are prepared).
Pre-conditions:	—
Post-conditions:	—
Current Scenario:	A csv file is generated by the scheduling software with pre-defined format and sent to the MTOA & STOA Software.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 14**
Use Case Name:	**Participant sends open access (STOA or MTOA) request**
Actors:	1. Open Access customer (Sender) 2. Nodal RLDC, STOA module – Approval in-charge (Receiver)
Description:	Open access customer through a trader or by self applies for an open access transaction based on the ATC margins published at the RLDC website.
Trigger:	As and when open access customer sends a request.
Pre-conditions:	1. ATC margins are published and ATC is available on the corridor on which the proposed MTOA or STOA transaction takes place.
	2. No defaults in the payments by open access customer in paying the open access charges of previous transactions.
Post-conditions:	Approval or Rejection of the open access request.
Current Scenario:	A web based service is provided with user login and password facility for eligible open access customers to login and fill pre-designed online application forms for MTOA or STOA (as seen in case of WRLDC).
Frequency of Use:	As and when the OA request is submitted (starting from 3 months in advance).
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 15**
Use Case Name:	**Approved Bilateral (MTOA and STOA) Transactions**
Actors:	1. STOA software of RLDC (sender) 2. Scheduling software at RLDC (receiver)
Description:	The participants from any region / state may enter into a bilateral contract of energy transfer from any other region / state. All such transactions are treated under STOA (short term open access) and need to be approved by all the involved nodal agencies (SLDC / RLDC) so that there is no congestion on the inter-regional links. These STOA transactions can be contracted 3 months in advance and the approval status of each of these transactions is determined by each SLDC / RLDC after performing system studies. Thus, the final approved transactions under STOA are to be included in the day ahead scheduling process.
Trigger:	By 3:00 pm on current day for next day.
Pre-conditions:	STOA and MTOA transactions are cleared for the day ahead.
Post-conditions:	Acknowledgement is received by the module.
Current Scenario:	This information is being sent as a .csv file with predefined row and column index specifications. This may cause problems in keeping the softwares updated, whenever there are new STOA or MTOA customers enter into the OA market. The information exchanges are not CIM compliant. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 16**
Use Case Name:	**Sending approval status of open access transaction**
Actors:	1. Nodal RLDC, STOA module – Approval in-charge (sender) 2. Open Access customer (receiver)
Description:	Open access customer through a trader or by self applies for an open access transaction based on the ATC margins published at the RLDC website.
Trigger:	Daily
Preconditions:	System studies to confirm if the transaction can be approved. Preparation of approval.
Postconditions:	Receipt of acknowledgement from OA customer or trader. OR confirmation for display in webpage.
Current Scenario:	The status of open access transactions can be found by logging in to the web-based open access site using a pre-assigned user ID and password.
Frequency of Use:	As and when OA request is approved.
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 17**
Use Case Name:	**Declared capacity by ISGS (original or revised)**
Actors:	1. ISGS (sender) 2. ABT software at RLDC (receiver)
Description:	The generating participants in the regional ABT pool have to declare the capacity of generation units that can be made available for generation in each time block for the next day is to be declared in advance.
Trigger:	by 8 am on current day for next day. In case of revision at least 6 time blocks ahead of the time block in which revision is requested. (1 time block = 15 min)
Pre-conditions:	ISGS calculates the availability of the plant.
Post-conditions:	Receipt of acknowledgement by RLDC.
Current Scenario:	Different regions use different methods to collect the declared capacity data from the ISGS. Methods include, web-based uploading of data to sending the capacity in predefined excel formats via email. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	Day-ahead.
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 18**
Use Case Name:	**Entitlements for constituents**
Actors:	1. ABT scheduling software at RLDC (sender) 2. Load constituents, or SLDCs (receiver)
Description:	Based on predefined percentage allocations for each constituent's share in the ISGS the entitlements are to be calculated (by the ABT scheduling software) and announced to all the SLDCs.
Trigger:	by 10 am on current day for next day
Pre-conditions:	The RLDC should have received the declared capacities from the ISGS and other generating constituents.
Post-conditions:	All the load constituents receive respective entitlements for all 96 time blocks for the next day.
Current Scenario:	The entitlements for each time block for the next day are displayed on the respective RLDC websites. Methods include, web-based uploading of data to sending the requisition information in predefined Excel formats via email. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	Day Ahead
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 19**
Use Case Name:	**Requisitions (original and revised) from constituents**
Actors:	1. Load constituents, or SLDCs (sender) 2. ABT scheduling software at RLDC (receiver)
Description:	Based on entitlements the constituents provide their respective requisitions of power from the regional power pool.
Trigger:	By 3:00 pm on current day for next day
Pre-conditions:	Entitlements have to be prepared.
Post-conditions:	The requisitions are received by the RLDC.
Current Scenario:	The entitlements for each time block for the next day are displayed on the respective RLDC websites. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	Day ahead or when revision is sought
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 20**
Use Case Name:	**RLDC sends drawl schedules to constituents**
Actors:	1. RLDC – ABT scheduling software (sender) 2. Load constituent (receiver)
Description:	RLDC sends the prepared drawl schedules for the applicable time blocks to each of the Load Constituents.
Trigger:	When ever the revision number changes. (Increment revision number by 1)
Pre-conditions:	Preparation of drawl schedule.
Post-conditions:	Receipt of acknowledgement from constituent or confirmation that the RLDC website is updated with the latest schedule information.
Current Scenario:	The revised schedule is displayed on the respective RLDC website alongwith the revision number. The load constituents are expected to observe the RLDC website for latest revisions. The information is displayed as HTML table and is not in CIM complaint format.
Frequency of Use:	As and when there is a new revision of scheduling on account of various reasons.
Special Requirements:	—
Assumptions:	All the constituents are web enabled.
Notes and Issues:	—

Use Case ID	**UC 21**
Use Case Name:	**RLDC sends despatch schedules to ISGS**
Actors:	1. RLDC – ABT scheduling software (sender) 2. ISGS constituent (receiver)
Description:	RLDC sends the time block -wise generation despatch to each of the ISGS.
Trigger:	Whenever the revision number changes. (Increment revision number by 1)
Pre-conditions:	Preparation of despatch schedule.
Post-conditions:	Receipt of acknowledgement from constituent or confirmation that the RLDC website is updated with the latest schedule information.
Current Scenario:	The revised schedule is displayed on the respective RLDC website along with the revision number. The ISGS constituents are expected to observe the RLDC website for latest revisions. The information is displayed as HTML table and is not in CIM complaint format.
Frequency of Use:	As and when there is a new revision of scheduling on account of various reasons.
Special Requirements:	—
Assumptions:	All the constituents are web enabled.
Notes and Issues:	—

Use Case ID	**UC 22**
Use Case Name:	**Approved ABT transactions**
Actors:	1. ABT software 2. Scheduling software at RLDC
Description:	Once the ABT schedules are finalized all the constituents are informed about their ABT drawl and generation schedules. This information is to be provided to the scheduling software so that the final schedule is prepared. This final schedule is used in the RLDC
	SCADA system for monitoring and real-time operation purposes.
Trigger:	Day ahead
Preconditions:	ABT drawls are prepared
Postconditions:	—
Current Scenario:	The ABT software sends the final approved ABT transactions in pre-determined XLS format to the scheduling software. Modifications to the format are difficult.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 23**
Use Case Name:	**Final Schedule**
Actors:	1. Scheduling software at RLDC 2. SCADA at RLDC
Description:	The final drawl and injection schedule for all the participants (both generation and load) that are participating the regional power pool is prepared and sent to the SCADA system and also to the regional power committee. This information is used in real-time for monitoring purpose, and post facto for commercial settlement purpose.
Trigger:	Day ahead for the next day
Pre-conditions:	—
Post-conditions:	The RLDC SCADA system receives the final schedules for each time block of the next day.
Current Scenario:	A csv file is generated and sent to the SCADA system with the scheduling information.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 24**
Use Case Name:	**Revised Schedule**
Actors:	1. To all interested parties via website / email / phone (sender) 2. ABT scheduling software at RLDC (receivers)
Description:	The published schedules on the respective RLDC websites are to be reviewed by all constituents and corrections / changes or revisions (if any) are to be communicated to the RLDC by 10 pm. The RLDC calculates and freezes schedule for each time block of next day by 11 pm.
Trigger:	By 10:00 pm on current day for next day. The schedule may be revised by any participants by informing RLDC 6 time blocks in advance. Under contingency conditions the RLDC operators can themselves revise schedules with effect from 4 time blocks later.
Pre-conditions:	Earlier version of schedule is available.
Post-conditions:	The new revision is incorporated in the schedule in SCADA.
Current Scenario:	The final schedules are revised by the ABT scheduling software and the revised schedules are uploaded on the web with the sequential revision number. All the data exchanges occur under the supervision and intervention by the operator in the control center.
Frequency of Use:	As and when revision is received
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 25**
Use Case Name:	**Updating of RLDC website with schedules**
Actors:	1. Scheduling software 2. RLDC website
Description:	As and when the final schedules are prepared they are updated in the respective RLDC websites. This information is also updated as and when there are revision in the schedule on account of forced outages etc. The constituents are expected to continuously monitor RLDC website for update of latest revision. This information is also available for general public.
Trigger:	Daily
Pre-conditions:	The final schedule is prepared.
Post-conditions:	The website is updated.
Current Scenario:	There are pre-designed scripts that extract data from scheduling software and transfers them on to the web server, using file transfer protocol.
Frequency of Use:	Daily
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 26**
Use Case Name:	**Margins left after STOA**
Actors:	1. RLDC SCADA system 2. NLDC, other RLDCs, and SLDCs
Description:	Once the long-term and short-term transactions are approved and final schedules are prepared. The RLDC estimates the margins left on the IR links, that can be traded on the power exchanges. Thus information is then sent to the NLDC and SLDCs.
Trigger:	Day ahead
Preconditions:	—
Postconditions:	—
Current Scenario:	—
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 27**
Use Case Name:	**ABT meter data**
Actors:	1. Special Energy Meter (SEM) 2. ABT SEM Data Processor
Description:	The SEM meters are located at the interface points of all the Participants in the regional power pool. This data is collected and stored locally in the field which needs to be retrieved and processed at the RLDC.
Trigger:	Weekly
Pre-conditions:	—
Post-conditions:	Once all the SEM files are received, they are processed to prepare ABT report.
Current Scenario:	The SEM data is collected manually using certain hand held devices in the filed and the raw text files containing the previous weeks archived data along with SEM's identification number are relayed to the RLDC. For this sometimes email is also used.
Frequency of Use:	Weekly
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 28**
Use Case Name:	**ABT Report**
Actors:	1. ABT SEM Data processor 2. Regional power committee (RPC)
Description:	A software system is used for processing the raw SEM data files to calculate the time block-wise net actual drawls of each constituent. Data from multiple SEM meters needs to be algebraically summed to get the actual drawl of the constituents. The average frequency recorded by the SEM in each of the 15 time blocks is also collected
	from the SEMs and included in the ABT SEM data report.
Trigger:	Weekly
Pre-conditions:	All the SEMs data for the week is received at the RLDC.
Post-conditions:	An ABT SEM data report is generated and sent to the RPC
Current Scenario:	This process is carried out by dedicated software systems in respective RLDCs.
Frequency of Use:	Weekly
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 29**
Use Case Name:	**Transmission charges based on point of connection (PoC) lariff**
Actors:	1. Interstate transmission charges (ISTC) implementing agency 2. Regional power committee (RPC)
Description:	The transmission service charges are to be calculated for each of the participant in the power pool. The point of connection (PoC) method is used and the PoC charges need to be revised from time-to-time considering the changes in the transmission network.
Trigger:	Yearly
Pre-conditions:	—
Post-conditions:	—
Current Scenario:	—
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 30**
Use Case Name:	**Updation of the regional energy account**
Actors:	1. Regional power committee (RPC) 2. Regional energy account
Description:	As and when the RPC calculates the final charges to be payed under the ABT mechanism the bills are prepared and accordingly the regional account is updated.
Trigger:	Weekly
Pre-conditions:	Completion of ABT charges calculation
Post-conditions:	—
Current Scenario:	—
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 31**
Use Case Name:	**ABT charges**
Actors:	1. Regional power committee (RPC) 2. ISGS and load constituents
Description:	The final ABT tariff charges are calculated and sent to all the constituents.
Trigger:	Weekly.
Pre-conditions:	—
Post-conditions:	—
Current Scenario:	—
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 32**
Use Case Name:	**Open access UI charges**
Actors:	1. Regional power committee 2. STOA Trader / applicant
Description:	The actual power injections or drawls of the participants of the STOA transactions may be different that the scheduled power transaction. The deviations are charged as UI charges for open access.
Trigger:	—
Pre-conditions:	—
Post-conditions:	—
Current Scenario:	—
Frequency of Use:	—
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

Use Case ID	**UC 33**
Use Case Name:	**Publishing of open access transmission charges**
Actors:	1. Nodal RLDC, STOA module – Approval in-charge (sender) 2. Open access customer (receiver)
Description:	Transmission company levies OA charges for the approved OA quantum. Normally OA charges levied and published to the OA customer or trader as line item in the approval document. However, when there is any additional OA charges are to be levied, such charges are calculated post-facto approval and published to OA customer.
Trigger:	—
Pre-conditions:	Additional OA charges prepared.
Post-conditions:	Receipt of acknowledgement from OA customer or trader.
Current Scenario:	—
Frequency of Use:	As and when additional OA charges are calculated.
Special Requirements:	—
Assumptions:	—
Notes and Issues:	—

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