



White Paper on National Smart Metering Program



Contents

Introduction	3
Distribution sector as the beneficiary of smart metering program	3
Smart metering service provider (SMSP):	5
Benefits of SMSP	7
Essentials for successful implementation:	7
SLA - Service level agreement between SMSP and distribution licensee	8
Smart Metering Data Interface (SMDI)	9
SMDI Interface*	10
Communication technology	10
Annexure 1	11
SLA - Service level agreement between SMSP and distribution licensee	11
Annexure 2	14
Smart Metering Data Interface	14



Introduction

The 5-year vision document of Ministry of Power, Government of India has set the following goals for distribution sector:

- Access to 24 x 7 power for all
- Improve financial viability and sustainability of distribution licensees
- Reduce losses to normative or better

To achieve the above goals, following actions are proposed:

- Implement smart prepayment metering to improve collection efficiency
- Increase transparency in losses through accurate energy audits

In the tariff policy 2018, the focus areas identified to achieve the main objectives of National Electricity Policy, include:

- Quality and reliability of supply
- Proper Energy accounting
- Timely payment & subsidy through direct benefit transfer

In order to ensure that the burden of the inefficiencies of the distribution licensees is not passed on to the consumers, the normative level of AT&C loss is stated as 15% for determination of tariff.

The system shall shift gradually to the pre-paid mode, which will improve collection efficiency and reduce the working capital requirement of all distribution licensees. Use of smart prepayment meters shall be able to facilitate the direct benefit transfer of subsidy to targeted consumer segments.

Distribution sector as the beneficiary of smart metering program

Financial health of the distribution sector has been a perennial problem which couldn't be recovered despite multiple investments and financial restructuring schemes. The sector is reeling under sustained stress; such as increasing ACS and ARR gap, huge regulatory assets, outstanding dues to generation sector, unrealized subsidy, to name a few.



The distribution sector can and needs to trade itself out of this problem without increasing tariffs. The only way this is feasible is by increasing collection efficiency. For most distribution licensees even a 600 – 800 basis points increase will stop the cash losses.

In the interest of national survival and the goal of becoming a \$ 5 trillion economy the scheme needs to be simple, easy to implement and provide common guidelines to all states. This problem is only second to the banking reforms needed for India to progress.

National smart metering program (NSMP) is a vehicle to deliver the above benefits directly to the distribution licensee.

Smart metering programs typically outsource many of the functions and responsibilities. Although it relieves the distribution licensees from carrying out such large projects, a big drawback of this model is that the overall task is divided between multiple parties; as a result it is very likely to have missing links and lack of expertise to deliver the success in end-to-end responsibility.

Single entity responsibility is best to work with innovative business model; which encompasses asset funding, installation, system operation, data distribution and value added services to distribution licensee, for an allocated administrative area.

Critical Success Factors for Smart Metering Program to Deliver Loss Reduction

- | | |
|--|--|
| <ul style="list-style-type: none"> • Single entity accountability for each circle will bring efficient and effective output compared to multi-party projects | <ul style="list-style-type: none"> • Data analytics for theft detection, energy accounting, DT load balancing, power transformer optimization etc. |
| <ul style="list-style-type: none"> • Proper Standards of Performance for discoms and also ensure customer awareness on the same | <ul style="list-style-type: none"> • Prepayment system to recharge anytime from anywhere - end to end responsibility within a circle |
| <ul style="list-style-type: none"> • Transparent & timely disbursement of subsidy through proper direct benefit transfer mechanism | <ul style="list-style-type: none"> • Timely tariff revision, while keeping cost to serve and consumer convenience in mind |
| <ul style="list-style-type: none"> • Complete metering from Feeder to DT to consumer end for accurate energy accounting within the circle | <ul style="list-style-type: none"> • Power quality measurement and improvement for reliable 24 x 7 power for all |



We have been trying to commoditise each individual component of the smart metering system. This does not provide for a robust end to end system. By doing the above we should commoditise the provision of smart metering services. This will ensure maximum innovation and efficiency for the distribution licensee.

By taking these small steps we can ensure two things:

1. The best private parties from around the world will come and participate
2. The Government of India, State governments or state owned enterprises will not have to fund a single rupee towards the program

Smart metering service provider (SMSP):

Large scale rollout of smart meters is the collective enterprise and collaboration of meter manufacturers, installation contractors, asset financiers, communication network operators and data service providers. The SMSP (smart metering service provider) is a new industry participant that combines all these responsibilities. A single SMSP takes all these responsibilities in a circle with no overlap within that circle.

A uniform policy/direction by Government of India Today the meters are part of regulated asset base of distribution licensee. The metering assets as well as the metering services shall be taken over by SMSP. In this regime, the meter shall cease to exist as a commodity product; rather the provision of smart meter services becomes the commodity.

The SMSP shall arrange for meter asset provisioning (MAP) that finances the smart meters and their installation. The SMSP's responsibilities shall cover all metering services i.e. supply, installation, operation and maintenance of the assets, prepay and data services for the entire program lifecycle. Thus, under the national smart metering program, the metering assets shall be removed from the regulated asset base of distribution licensee and replaced by single charge for the provision of smart metering services.

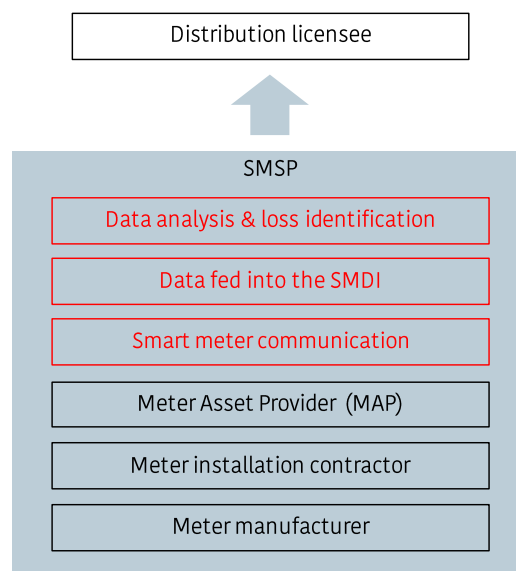
Today	Meters are part of regulated asset base	Metering services by different contractors
Target Date	Meters come out of regulated base	Metering services by SMSPs by circle



The SMSP will be responsible for providing all metering services, including metering for distribution feeders, distribution transformers and all categories of consumers in a circle.

Responsibility of SMSP:

- Sourcing, installation and upkeep of all meters in one circle from feeder to consumer for 10 years
- Smart prepayment system infrastructure provisioning
- Data delivered to Smart Metering Data Interface (SMDI)*
- Loss identification as input to reduce losses
- Preparation of data needed to lodge FIRs in all theft cases



Following shall be their respective responsibilities:

SMSP Responsibility	Distribution Licensee Responsibility
<ul style="list-style-type: none"> • Meter asset provisioning and metering services (supply, installation, O&M) across network for feeders, transformers, and consumers in a circle • Smart prepay system infrastructure provision like vending and recharge, interface with multiple payment options, help desk tech support • Data delivery to distribution licensee at specified frequency through SMDI* • Analysis and MIS reports to distribution licensee with energy accounting, loss identification 	<ul style="list-style-type: none"> • New Connection release and service line provisioning to connection point • Network augmentation and operation & maintenance of distribution network • Managing consumer records, tariff definition and payment collection • Customer care, complaint handling and generating monthly statement to consumer • Monthly payment to SMSP for all bundled services during project lifetime



Benefits of SMSP

- **Opex based services contract.** Therefore, no upfront capital expense and stress on distribution licensee's exchequer. Payments will be done from collection itself
- **Achievement of better operational efficiency** and ensuring quality of meters & services for 10 years, through end-to-end service contract entailing meter assets and metering services
- **Single point responsibility** in each circle from feeder to DT to consumer for better loss identification and roll out of smart metering while keeping minimum contracts
- **Feeder and DT data analysis** along with consumer consumption pattern will draw full picture of circle-wise performance
- **Better predictability** of cost to serve
- **Consumer visibility on consumption** in monetary terms, helping in energy budgeting and conservation
- **Diversity of deployments** with multiple SMSPs, minimizing the overall risk of distribution licensee

Essentials for successful implementation:

Following are the binding rules to carry out SMSP model:

1. No licensee shall own a SMSP
2. Rollout of smart metering with the concept of one circle one SMSP
3. Metering shall be done from feeder to distribution transformers to consumers for proper identification of loss
4. Standard data interface for all SMSPs in order to provide data to any distribution licensee, i.e. Smart Metering Data Interface (SMDI)*
5. Introduce a payment security mechanism for SMSPs
6. Selection of appropriate communication technology by SMSP based on geography and application



SLA – Service level agreement between SMSP and distribution licensee

The service level performance to be delivered by SMSP (smart metering service provider) to distribution licensee for ensuring prepayment vending, billing statement, energy audit/accounting and other business uses etc. for a scalable smart metering deployment and associated services

The defined SLAs shall be binding between SMSP and distribution licensee; to be measured periodically and to remain consistent and sustainable for entire project life cycle. The SLA definition considers the dependency in public / private communication network performance; and optimal use of manpower only as a last resort to collect data from site in case of exceptions. At the end, the complete data delivery shall serve the purpose of its business use.

S#	Services to be delivered by SMSP under SLA**	Category of Services
1	<ul style="list-style-type: none"> • Meter installation • Scheduled reading for interval data of feeder and DT • Scheduled reading for billing data of HT consumers, LTCT consumers and LT consumers • Prepayment transactions • Critical event data • Outage information • MIS reports 	Planned services (scheduled or pre-defined tasks)
2	<ul style="list-style-type: none"> • On-demand reading • Tariff upgrade • Configuration change • Disconnection / reconnection request • Change of load limit • Remote firmware upgrade 	Unplanned services (initiated on need basis)

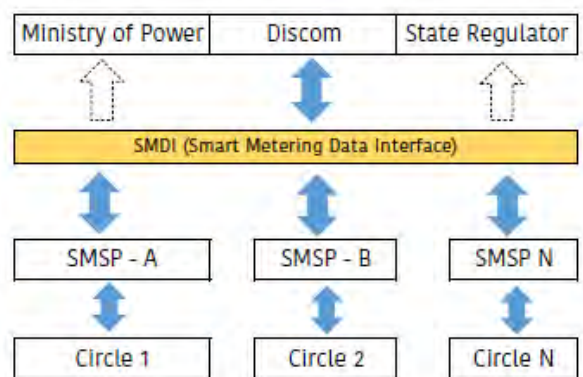
** Detailed SLAs are attached as Annexure 1



Smart Metering Data Interface (SMDI)

In order to serve the distribution licensee by multiple SMSPs (circle wise allocation), a standard data interface is a necessity.

The **Smart Metering Data Interface (SMDI)*** shall be a common interface definition for the data exchange between all SMSPs and distribution licensees across the country. Each of the distribution licensee and SMSP shall have their own systems in place; each of them shall be complying with the common SMDI definition at the interface level.

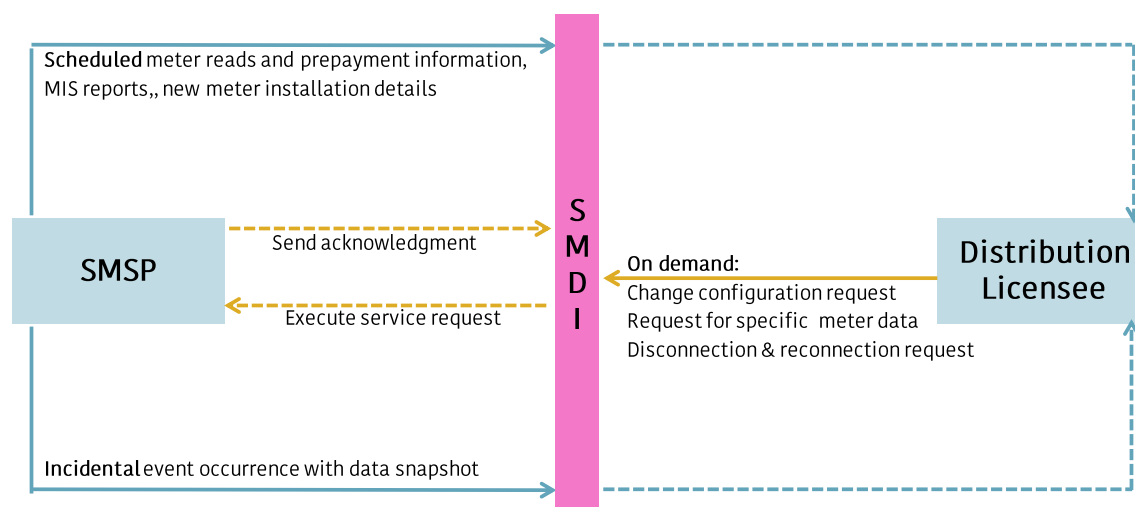


SMDI shall serve the purpose of interoperability at the data interface point, where multiple systems of distribution licensees and SMSPs co-exist. SMDI will be a win-win proposition for both the entities. For example, one distribution licensee, when served by multiple SMSPs working circle wise, shall not face any variability in receiving data from all of them. Similarly,

SMDI shall be:

1. A common data interface that will be decided and published nationally, for all distribution licensees and SMSPs to follow.
2. Apart from feeding the data into distribution licensee's system, it will also be deliver data into national loss calculation systems and can be published on state and federal portals from here.

There could be “scheduled” (MIS reports, meter data as well as payment information etc.), “on demand” (change in tariff category, profile data, sanctioned demand, meter configuration etc.) and “incidental” (event occurrence etc.) data exchanges between SMSP and distribution licensee through SMDI as illustrated below:



Blue – Planned Services; Yellow – Unplanned Services

SMDI Interface*

Initiated by SMSP	SMDI	Initiated by Distribution Licensee
Meter installation information		Configuration change data
Scheduled reading data		Tariff upgrade command
On-demand reading data		On-demand reading request
Prepayment transaction data		Load limiting request
Critical event notification		Disconnection / reconnection request
Outage information		
MIS reports		

* Details on Annexure 2

Communication technology

The right choice of technology would be one of the decisive factors for successful implementation of smart metering. It shall consider:

1. Low capital and operating cost to meet large scale rollout
2. Meets desired performance for smart metering use cases
3. Suitability for different geographies (urban/rural)



Annexure 1

SLA - Service level agreement between SMSP and distribution licensee

The following are the service level performance to be delivered by SMSP (smart metering service provider) to distribution licensee

S.No	Services to be delivered by SMSP	Frequency of service	Service Level Agreements (SLA) between SMSP & distribution licensee
1	Data delivery - Interval data of distribution feeder meters	Scheduled reading, every day	<ul style="list-style-type: none"> • 90% of meters within 8 hours after midnight, every day • 95% of meters within 48 hours after midnight, every day • 100% meters within 48 hours after month end
2	Data delivery - Interval data of all distribution transformer meters	Scheduled reading, every day	<ul style="list-style-type: none"> • 90% of meters within 24 hours after midnight, every day • 95% of meters within 72 hours after midnight, every day • 100% meters within 72 hours after month end
3	Data delivery - interval data of all HT consumer meters	Scheduled reading, every day	<ul style="list-style-type: none"> • 90% of meters within 24 hours after midnight, every day • 95% of meters within 48 hours after midnight, every day • 100% meters within 48 hours after month end
4	Data delivery - billing data of all HT consumer meters	Scheduled reading, every month	<ul style="list-style-type: none"> • 90% meters within 8 hours after month end • 95% of meters within 24 hours after month end • 100% meters within 48 hours after month end



5	Data delivery – billing data of all LTCT consumer meters	Scheduled reading, every month	<ul style="list-style-type: none"> 90% meters within 24 hours after month end 95% of meters within 48 hours after month end 100% meters within 72 hours after month end
6	Data delivery – billing data of all LT consumer (prepaid) meters	Scheduled reading, every month	<ul style="list-style-type: none"> 90% meters within 24 hours after month end 95% of meters within 72 hours after month end
7	Delivery of top up amount / tariff token, in case of smart prepayment	Need basis	<ul style="list-style-type: none"> 90% of meters within 5 mins Remaining 10% meters within 15 mins (delivered to meter or intimated to consumer)
8	Remote tariff update / configuration change commands executed	Need basis	<ul style="list-style-type: none"> 90% of meters within 24 hours 95% meters within 72 hours 98% within 7 days Rest ensured before tariff activation date
9	Remote load limiting commands executed for selected consumers (not for mass volume)	Need basis	<ul style="list-style-type: none"> 90% of meters within 10 minutes 95% of meters within 8 hours 98% within 48 hours
10	Remote disconnect / ready-for-connect for selected consumers (not for mass volume)	Need basis	<ul style="list-style-type: none"> 90% of meters within 10 minutes 95% of meters within 8 hours 98% within 48 hours
11	Data delivery – critical event data (e.g. tamper) for HT consumer category	On Occurrence	<ul style="list-style-type: none"> 90% cases within 5 mins 95% within 24 hours
12	Data delivery – critical event data (e.g. tamper) for LTCT consumer category	On Occurrence	<ul style="list-style-type: none"> 90% cases within 15 mins 95% within 24 hours



13	Data delivery - critical event data (e.g. tamper) for all LT consumer category	On Occurrence	<ul style="list-style-type: none"> 90% cases within 60 mins 95% within 24 hours
14	Data delivery - outage information of feeder & distribution transformer	On Occurrence	<ul style="list-style-type: none"> 90% cases within 5 mins
15	Data delivery - outage Information from consumer meters (not for mass outage)	On Occurrence	<ul style="list-style-type: none"> 90% cases within 5 mins (outage for specific consumers) In case of mass outage, feeder and distribution transformer outage data will be used for reporting of consumers
16	Remote firmware update commands executed	Need basis	<p>< 20k endpoints:</p> <ul style="list-style-type: none"> 90% of meters within 72 hours 95% meters within 7 days Remaining 5% within 10 days <p>< 50k endpoints:</p> <ul style="list-style-type: none"> 90% of meters within 5 days 95% meters within 10 days Remaining 5% within 15 days <p>> 50k to 200k endpoints:</p> <ul style="list-style-type: none"> 90% of meters within 10 days 95% meters within 20 days Remaining 5% within 30 days <p>> 200k to endpoints:</p> <ul style="list-style-type: none"> 90% of meters within 15 days 95% meters within 30 days Remaining 5% within 45 days



Annexure 2

Smart Metering Data Interface

Service delivery	Service interface	Initiated by	Interface methodology
Installation of new meters	NotifyInstalledMeterdetails	SMSP	File based (Push)
Receive scheduled reads (meter data as well as prepayment information)	Notifyscheduledreaddata	SMSP	File based (Push) Data file (S) of all meters data as per scheduled frequency and data configuration
Receive critical event notifications	NotifyEventOccurance EventwithSnapshotdata	SMSP	Webservice (Push)
MIS reports (scheduled)	NotifyMISreports	SMSP	File based (Push)
Change configurations for specific meters	Changetariffcategory ChangeSanctionedDemand ChangeMeterConfiguration UpdateConsumerDetails SetDebtRecoveryPlan NotifyRequestStatus	Licensee	Webservice (request_response) Alternatively, licensee to send an email to SMSP system email ID in prescribed file format which will be processed by SMSP system and file with completion status will be sent to requesting email ID of licensee
On demand requests for specific meter data	GetBillingData GetDailyData GetEventData GetFinancialData GetTransactionData GetVendingTransactionData	Licensee	Webservice (request_response) Alternatively, licensee to send an email to SMSP system email ID in prescribed file format which will be processed by SMSP system and file will be sent to requesting email ID of licensee
Disconnection/ Reconnection request for specific meter	DisconnectionConnection NotifySwitchStatus ReconnectConnection NotifyReadytoReconnectSta tus	Licensee	Webservice (request_response) Alternatively, licensee to send an email to SMSP system email ID in prescribed file format which will be processed by SMSP system and file with completion status will be sent to requesting email ID of licensee



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