व्यापक परिचालन में मसोदे

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ईटी 13/(P-4)/ टी 26	06 -02 -2015

तकनीकी समिति ईटी 13

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प्रेषती :

1. ईटी 13, 13/P-4 के सभी सदस्य
2. विद्युत तकनीकी विभाग परिषद के सभी सदस्य तथा
3. रूचि रखने वाले अन्य सभी निकाय

महोदय,

कृप्या निम्नलिखित मसौदे संलग्न है :

प्रलेख	शीर्षक
ईटी 13 (6823)	ए सी स्थित सीधा जुड़ा वाटआवर स्मार्ट मीटर वर्ग १ एवं २ - विशिष्टियां

कृप्या इन मसौदों का अवलोकन करें और अपनी सम्मतियॉ यह बताते हुए भेजें कि अंतत: यदि ये मानक के रूप मे प्रकाशित हो जाएँ तो इन पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठिनाइयॉ आ सकती हैं ।

सम्मतियॉ भेजने की अंतिम तारीख: 7-3-2015

सम्मतियॉ यदि कोई हो तो कृप्या अगले पृष्ठ पर दिए पत्र में अधोहस्ताक्षरी को उपरिलिखित पते पर भेज दें ।

यदि कोई सम्मति प्राप्त नहीं होती अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रलेखों को यथावत अतिंम रूप दिया जाएगा । यदि कोई सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के

अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेखों को अंतिम रूप दे दिया जाएगा ।

धन्यवाद,

भवदीय,

(महिम जैन)
।वैज्ञानिक एफ एवं प्रमुख (विद्युत तकनीकी)
संलग्न : उपरिलिखित

DRAFTS IN WIDE CIRCULATION

DOCUMENT DESPATCH ADVICE

Reference	Date
ET 13/T-26	**0 6 -02-2015**

TECHNICAL COMMITTEE ETD 13

ADDRESSED TO:
1.All Members of Equipment for Electrical Energy Measurement Tariff and Load Control, ET 13
2. Ac Static Direct Connected Watthour Smart Meters Class 1 and 2 ET 13/(P-4)
3. All Members of Electrotechnical Division Council; and
3. All other Interested.

Dear Sir(s),

Please find enclosed a copy of the following draft Indian Standard:

Doc No.	Title
ETD 13/ (6823)	Ac Static Direct Connected Watthour Smart Meters Class 1 and 2

Kindly examine the draft standards and forward your views stating any difficulties which you are likely to experience in your business or profession, if these are finally adopted as Indian Standards.

Comments, if any, may please be made in the format given overleaf and mailed to the undersigned.

Last date for comments: 7-3-1015

In case no comments are received or comments received are of editorial nature, you will kindly permit us to presume your approval for the above documents as finalized. However, in case of comments of technical in nature are received then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action, if so desired by the Chairman, Sectional Committee.

Thanking you,

Yours faithfully

(Mahim Jain)
Sc 'F' & Head (Electrotechnical)
Email: eetd@bis.org.in

Encl : See attachment.

Date	Document No.
-2-2015	Doc: ET 13(6823)

Sl. No.	Name of the Organization	Clause/ Sub-clause	Paragraph/ Figure/Table	Type of Comment (General/ Technical/ Editorial	Comments	Proposed Change

Doc ETD 13 (6823) : 2015

Draft Indian Standard

ac STATIC DIRECT CONNECTED WATTHOUR SMART METERS CLASS 1 AND 2 — Specifications

Bureau of Indian Standard
Manak Bhavan , Bahadur Shah Zafar Marg
New Delhi 110002

February 2015

FOREWARD

This Indian standard has been adopted by the Bureau of Indian Standard, following approval of the draft finalized by the Equipment for Electrical Energy Measurement, Tariff and Load control Sectional Committee (ET13), by the Electrotechnical Division Council.

The need for embracing low carbon energy through an innovative approach towards energy generation, distribution and efficient utilization was found to be the key for the much needed transformation in the energy and power sector so as to accomplish the sustainability in the long run. The thought process to circumvent this issue lead to the evolution of the much talked about “Smart Grid” which is defined as “an automated, widely distributed energy delivery network characterized by a two-way flow of electricity and information, capable of monitoring and responding to changes in everything upto customer premises appliances.” The Smart Grid would provide for the grid Reliability, Security, Efficiency, Environment friendly, Safety, Customer oriented approach, more distributed generation besides others. The energy security was prime motive but countries also had their specific drivers for embracing smart grid and rolled out policies, frame work and statutory guidelines, R&D activities, pilot studies and standardization etc.

In India several reforms programmes were launched by the Ministry of Power, Government of India with the objective of reducing the AT&C loss and to introduce IT enabled services. This has set the platform for launching the Smart Grid program. The India Smart Grid Task force was formed which had set the high level policies. The smart grid roadmap for India was released. The key drivers for India are identified as higher AT & C loss, distributed generation, and peak demand moderation. As fallout of this pilot projects were initiated. The smart grid projects are combination of several technology domains like Advanced Metering System (AMI), Sub station automation, SCADA, Distribution Management System, Demand Side management, Renewables Integration to grid, ICT and many more. The AMI will be a mandatory sub system of any smart grid project. AMI is a data / information transportation network encompassing the source and destination entities. For AMI functioning smart meter is a vital component for capturing real time electricity consumption data of the consumers. These data form the basis for various variety of operational and management process all of which would be directed towards efficiency improvement and benefit all stakeholders.

The idea of Smart grid is still evolving. The various domains of smart grid are infused with professional interventions to adopt and rollout standard process and products. Many standard making bodies like IEC, IEEE, NIST, CENELEC besides working groups are engaged in standardization activities of relevant areas. In India BIS has been rolling out several varieties of standards.

Realizing the importance of smart meter, the Central electricity Authority in India had brought out a report outlining the functional requirements in 2013. Simultaneously The Electrotechnical Technical Committee of BIS had brought out metering standards and among the many the currently used are IS 13779:1999, IS 14697: 1999, IS 15884:2010 and IS 15959:2010. Now it had taken the report of CEA as reference and developed this standard for smart meter. Recently, BIS had forged an understanding with IEEE the International professional organization which develops standards and reports. This new standard had chosen relevant IEEE standards for the purpose of these standards.

While writing this Standard it has been endeavored not to contradict on principle, the adopted standards of IEC and IEEE on which this standard is based. However, in case of any divergence/ disparity, not amounting to conflict of interpretations that may be revealed later, provisions of this specification will prevail.

INTRODUCTION

The rolling out of smart grid deployment pilots which depend heavily on data / information for delivering the desired functions has shifted the focus various data, its accessibility, data exchange, security, interoperability and usage among stakeholders.

The AMI will be a mandatory sub system of any smart grid project. AMI is a data / information transportation network encompassing the source and destination entities. AMI will be a combination of various technologies spread over the functional blocks namely HES – Head end System – IT system, WAN – Wide area network – backbone communication layer, SMN – Smart Meter Network – cluster of smart meters and data collecting unit and HAN – Home Area Network – Network of customer premises appliances.

AMI infrastructure will be designed to exchange data, events, commands and utility messages almost in real time. Besides supporting the execution of the supplier-consumer contract and providing the necessary billing data the smart meter becomes the source of valuable information for the efficient operation of the smart grid. The growing range of applications that depend on metering data leads to a growing amount of data to be exchanged within the smart metering system and via the interfaces to other systems. Smart metering systems must be adaptable to different communication media without creating any data incompatibilities for the supported applications.

The Smart Meters are a composite unit with static energy meter, communication module and control element. The smart meter also will have Time of Day registers. A smart meter will have functions like measurement, computation, event capturing, storing, communication and control. The smart meter would be required to provide data and information that are needed by various smart grid applications.

This standard has leveraged on the various provisions of Indian metering standards that are already in place, the upgrades in adopted IEC standards, selected IEEE standards. The combination of these standard make this smart meter spell out the rules for design, development and testing of smart meters. The provisions of this standard will enable design of external data collection units as well.

ac STATIC WATTHOUR SMART METERS,

DIRECT CONNECTED
CLASS 1 and 2

1. SCOPE

1.1 This standard specifies static watt-hour smart meters of accuracy class 1 and 2 for the measurement of alternating-current electrical active energy of frequency 50Hz network for single phase and three phase balanced and unbalanced loads. It applies to their type tests, routine tests and acceptance tests.

1.2 It applies only to static watt-hour direct connected meters consisting of measuring element(s), smart functions and register(s), display, load switch and communication module (two way) enclosed together in the meter case. It also applies to operation indicator(s) and test output(s). It also applies to multi rate tariff meters and meters in unidirectional or bidirectional energy measurement.

1.3 It does not apply to:

a. Watt-hour meters where the voltage across the connection terminal exceeds 600 V (line to line voltage for meters for poly phase systems)
b. Meters operated with external current transformers
c. Portable meters
d. Meters without internal load switch
e. Meters without internal communication module

2. REFERENCES

The Indian Standards (including all amendments) listed below are necessary adjuncts to this standard.

13779:1999	ac STATIC WATTHOUR METERS, CLASS 1 AND 2 -SPECIFICATION
15884:2010	Alternating Current Direct connected static Payment Meters for Active Energy (Class 1 AND 2) – Specification
15959:2011	Data Exchange for Electricity Metering reading, tariff and load control - Indian Companion Specification
IEEE 802.15.4	Standard for Local and metropolitan area networks.
IEEE 1901-2010	Standard for Broadband Over Power Line Networks: Medium Access Control and Physical Layer Specifications.
IEEE 1901.2-2013	Standard for Low-Frequency Narrow band power Line Communications for Smart Grid Applications

3. TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 General Definitions

All definitions of IS 13779 shall apply.

3.2 Definitions Related to Functional Elements

All definitions of IS 13779 shall apply.

3.3 Definitions of Mechanical Elements

All definitions of IS 13779 shall apply.

3.4 Definitions Related to Insulations

All definitions of IS 13779 shall apply.

3.5 Definitions Related to Meter Quantities

All definitions of IS 13779 shall apply.

3.6 Definitions of Influence Quantities

All definitions of IS 13779 & IS 15884 shall apply.

3.7 Definitions of Tests

All definitions of IS 13779, IS 15884 & IS 15959 shall apply.

3.8 Definitions Related to Load Switching

All definitions of IS 15884 shall apply.

3.9 Definitions of General Smart Metering Terms

3.9.1 Smart Meter – Smart meter is an AC static watt-hour meter with Time of use registers, internal connect & disconnect switches with two way communication capability. It is designed to measure flow of energyr, store and communicate the same along with other parameters defined in this standard. It can be remotely accessed for data; programming and load switch there by enabling rollout of Advanced Metering Infrastructure.

3.9.2 Remote Communication Capability **-** Remote communication shall provide wired or wireless communication between smart energy meter and other network device.

3.9.3 Neighbourhood Area Network [NAN] – These are group of meters all of which communicate in a two way mode with the DCU/NE. These two entities exchange data or commands under the control of HES.

3.9.4 Home Area Network [HAN] **–** This is a network of customer premises appliances. The appliances can be controlled as and when required by HES. But for the purpose of this standard the HAN covers only IHD.

3.9.5 Data Concentrator Unit [DCU] / Network Element / Grid Router – This device acts as a secured transparent node in NAN to exchange all the data / information between the smart meters and HES. This device also aids in and other advanced metering infrastructure (AMI) applications, such as IHD communication and distribution automation (DA).

3.9.6 Head End System [HES] – This entity is a set of ICT based systems situated at the top of smart metering system. It monitors and controls the smart meters, DCU. Its applications work on the smart meter data and discharge various utility and customer tasks.

3.9.7 In Home Display [IHD] – This is a compact display module located in the customer premises and presents relevant data/information pertaining to consumption of energy by the consumer and messages received from HES.

3.9.8 Hand Held Unit [HHU] – This is a device used to locally download the meter data. This device can also be used to programme the meter with required security access. The device shall communicate through the optical port of the meter.

4. Smart Meter Architecture

The smart meter is a component of Advanced Metering Infrastructure. For the purpose of this standard the smart meter is conceived as single unit comprising of following functional zones:

A) Metering
B) Load Switch
C) Metering Protocol
D) Communication modules

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The Smart Meters can have wide usage and the buyer may like to choose desired features to meet the objectives of their overall system and site conditions. In order to facilitate such a flexible approach, the Smart meter architecture are categorised into 6 variants based on the communication modules used. The 6 variants are diagrammatically represented in Fig. 4.1 to 4.6 below: The table 4.1 and the foot notes describes the attributes of each of these variants.

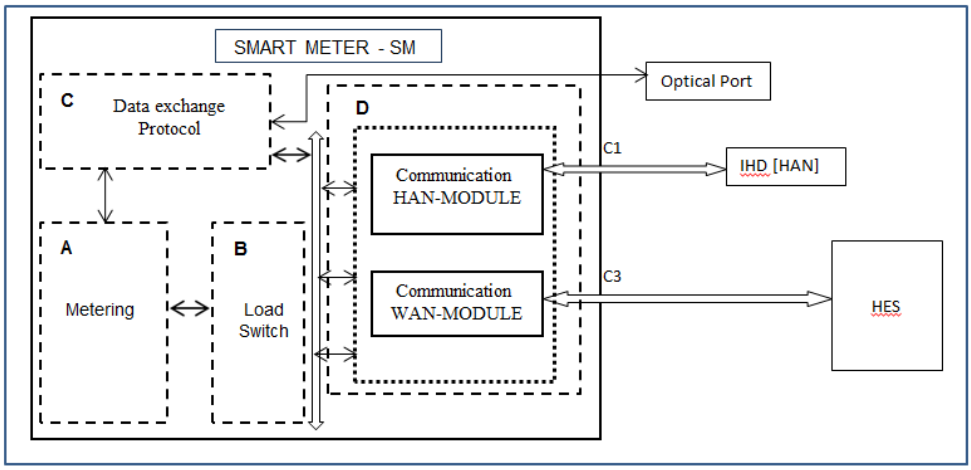


Fig 4.1 - Smart Meter Architecture

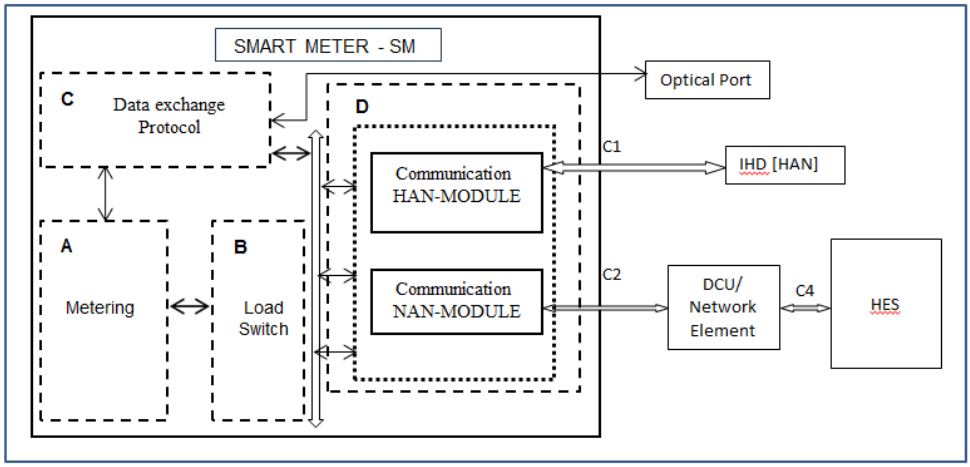
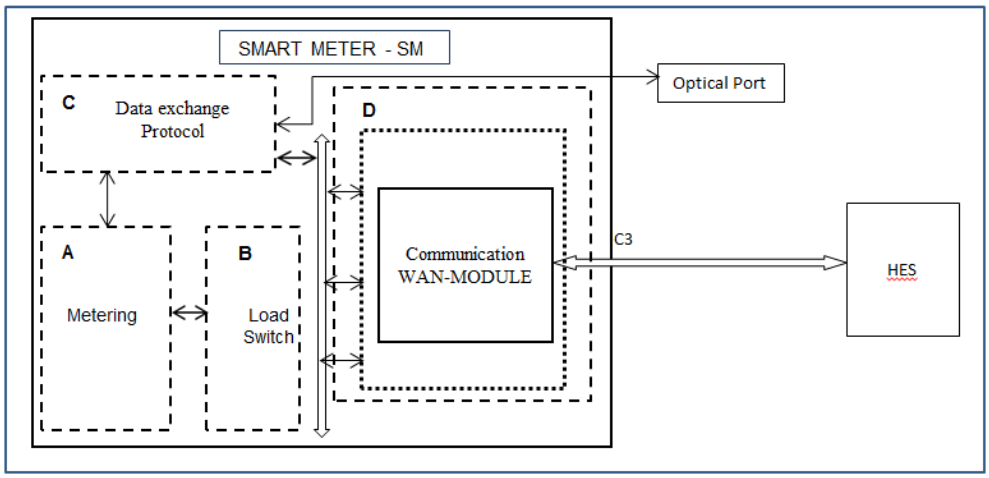


Fig 4.2 - Smart Meter Architecture



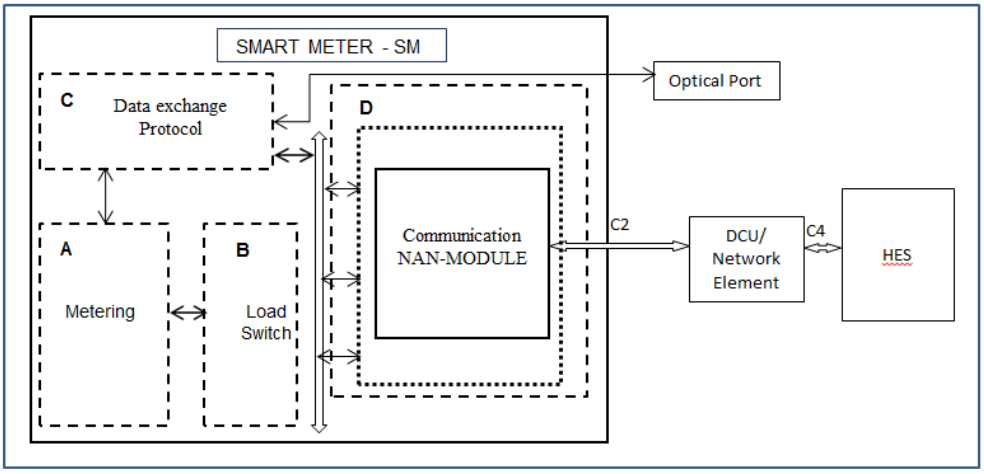
LEGEND:

A – Metering
B - Control
C – Metring Protocol
D – Communication

Optical port as per IS 15959

C3 – Connectivity SM ↔ HES

Fig 4.3 - Smart Meter Architecture



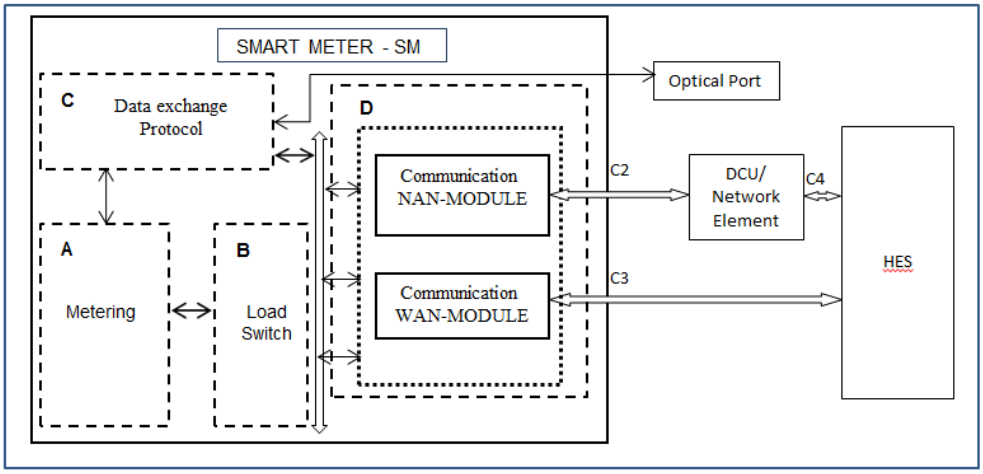
LEGEND:

A – Metering
B - Control
C – Metring Protocol
D – Communication

Optical port as per IS 15959

C2 – Connectivity SM ↔ DCU
C4 – Connectivity DCU ↔ HES

Fig 4.4 - Smart Meter Architecture



LEGEND:

A – Metering
B - Control
C – Metring Protocol
D – Communication

Optical port as per IS 15959

C2 – Connectivity SM ↔ DCU
C3 – Connectivity SM ↔ HES
C4 – Connectivity DCU ↔ HES

Fig 4.5 - Smart Meter Architecture

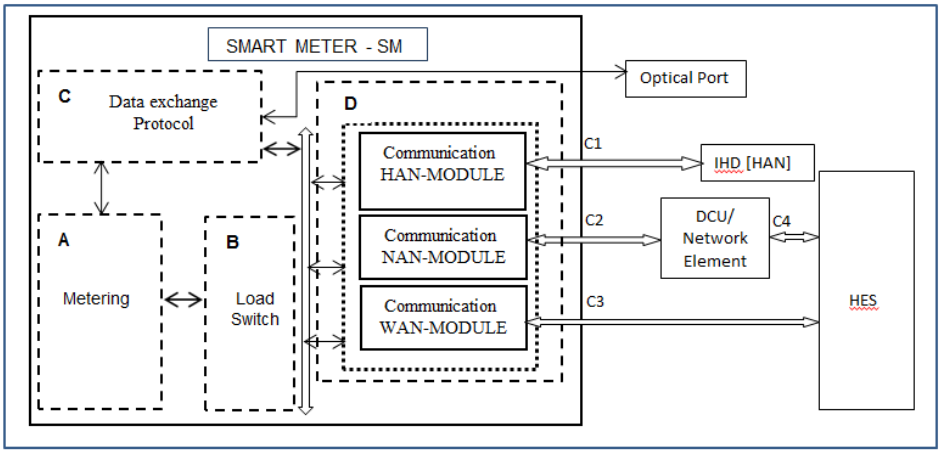


Fig 4.6 - Smart Meter Architecture

Table 4.1

Fig No. / No of Modules	Connectivity	Usage	Technology	Carrier Standard	Network layer	Data Exch. protocol	Max. Total Meter Power Consumption
Fig 4.1 / 2	C1 – HAN C2 – NAN	IHD DCU / NE	RF PLC RF PLC	NOTE 1.1 NOTE 1.2 NOTE 1.1 NOTE 1.2	NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.2	IS 15959	9W & 20VA
Fig 4.2 / 2	C1 – HAN C3 - WAN	IHD HES	RF PLC CELLULAR	NOTE 1.1 NOTE 1.2 NOTE 1.3	NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.3	IS 15959	13W & 25VA
Fig 4.3 / 1	C3 - WAN	HES	CELLULAR	NOTE 1.3	NOTE 2.1 & 2.3	IS 15959	8W & 20VA
Fig 4.4 / 1	C2 – NAN	DCU/NE	RF PLC	NOTE 1.1 NOTE 1.2	NOTE 2.1 & 2.2 NOTE 2.1 & 2.2	IS 15959	6W & 15VA
FIg 4.5 / 2	C2 – NAN C3 - WAN	DCU/NE HES	RF PLC CELLULAR	NOTE 1.1 NOTE 1.2 NOTE 1.3	NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.3	IS 15959	11W & 25VA
Fig 4.6 / 3	C1 – HAN C2 – NAN C3 - WAN	IHD DCU/NE HES	RF PLC RF PLC CELLULAR	NOTE 1.1 NOTE 1.2 NOTE 1.1 NOTE 1.2 NOTE 1.3	NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.2 NOTE 2.1 & 2.3	IS 15959	14W & 30VA

NOTE: 1.WAN/ NAN/ HAN Standards:

1.1 RF Technology:- IEEE 802.15.4g (865-867MHz; 2.4GHz)

1.2. PLC Technology:- IEEE 1901

1.3. Cellular Technology:- 2G / 3G / 4G/ WiMax

2. Network Layer Standards:

2.1 IPV4 / IPV6 RPL - Network

2.2 6Low PAN (RFC 4944) – Convergence

2.3 IETF RFC 2464, 5072 and 5121, PPP (IETF RFC 1661)

3. Any new Communication technology will be reviewed by BIS technical Sectional Committee.

5.0 Part A: Metering

5.1 Metering Requirement

It is normative requirement of smart meter. Metering and Metrology requirement should be according to IS 13779 for this standard.

5.1.1 Classification

The classification as per of IS 13779 shall apply.

5.1.2 RATINGS

5.1.2.1 Standard Reference Voltage - As per clause 5.1 of IS 13779

5.1.2.2 Standard Basic Current - As per clause 5.2 of IS 13779

5.1.2.3 Maximum Current - As per clause 5.3 of IS 13779 with maximum current not exceeding 100A for both 3 Phase & 1 Phase meters.

5.1.2.4 Standard Reference Frequency - As per clause 5.4 of IS 13779

5.2. General Constructional Requirements

The requirements given in clause 6.1 to 6.4 of IS 13779 shall apply.

The communication modules shall be built inside and integral part of the smart meter.

The load switch for disconnect/connect purpose shall be mounted inside the meter with suitable arrangement.

5.2.1 Terminals — Terminal Block(s) — Protective Earth Terminal

The requirements given in clause 6.4 of IS 13779 shall apply.

5.2.2 Terminal cover

The requirements given in clause 6.5, 6.5.1, 6.5.2 and 6.7 of IS 13779 shall apply

5.3 Clearance and Creepage Distances

The requirements given in clause 6.6 of IS 13779 shall apply.

5.4 Resistance to heat and fire

The requirements given in clause 6.8 of IS 13779 shall apply.

5.5 Mechanical requirements

The requirements for Mechanical shall be as per clause 12.3 of IS 13779

The requirements for protection against penetration of dust and water shall be as per clause 6.9 & 12.5 of IS 13779 shall apply

5.6 Display of Values

The requirements given in clause 6.10 of IS 13779 shall apply. The non-volatile memory shall support retention period of 10 years.

5.7 Output device

The requirements given in clause 6.11 of IS 13779 shall apply

5.8 Marking of Smart Meter

The requirements given in clause 7 of IS 13779 shall apply.

The following additional information shall also be provided as applicable in the name plate:

a) Bidirectional Communication technology for WAN/NAN/HAN with frequency.

b) Symbol of load switch.

5.9 Climatic condition

The requirements given in clause 8 of IS 13779 shall apply.

5.10 Electrical requirements

5.10.1 Power Consumption

The measurement of power consumption in the voltage and current circuits shall be determined as described in the following clauses.

5.10.1.1 Voltage circuits - The active and apparent power consumptions in each phase of a direct-connected meter at reference voltage, reference temperature, and reference frequency shall not exceed 3.0 W and 10 VA, including the auxiliary power supply consumption.

For communication modules the additional power consumption per module at reference conditions shall be 3W & 5VA for PLC or RF. For cellular technologies it shall be 5W and 10VA.

The above figures are mean values. Switching power supplies with peak values in excess of these are permitted but attention should be paid to the rating of associated voltage transformers.

5.10.1.2 Current Circuit – The apparent power taken by each current circuit of a direct connected payment meter at maximum current, reference frequency and reference temperature shall not exceed a value in VA equivalent to 0.08 x Vref x Imax.

5.10.2 Influence of supply voltage

The requirements given in clause 4.4.2 of IS15884 shall apply.

5.10.3 Influence of Short -Time Overcurrents

The requirements given in clause 4.4.3 of IS15884 shall apply.

5.10.4 Influence of Self heating

The requirements given in clause 4.4.4 of IS 15884 shall apply.

5.10.5 Influence of Heating

The requirements given in clause 4.4.5 of IS 15884 shall apply.

5.10.6 Insulation Requirements

The requirements given in clause 9.5 of IS 13779 shall apply.

5.10.7 Immunity to earth fault

The requirements given in clause 9.6 of IS 13779 shall apply.

5.11 Electromagnetic Compatibility

The requirements given in clause 4.5 and 5.5 of IS 15884 shall apply.

5.12 Accuracy Requirements

The requirements given in clause 11, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6 and 11.7 of IS 13779 shall apply.

5.13 Test and Test Conditions

Provided under Part E of this document

6.0 Part B Load Switch Requirement

6.1 Load switching capability

The smart meter shall be provided with switching elements, integral with the meter enclosure, to control the flow of electricity to the load at the instance of connect / disconnect commands as per functional needs of the system. For Single Phase, two load switches one each in phase and neutral shall be provided. For three load switches one in each phase shall be provided. The switches are to be rated to carry maximum current continuously under normal operating conditions and to withstand the switching transients during make and break operations.

6.2 Performance requirements for load switching.

The requirements given in clause 4.6.6.2 of IS 15884 shall apply.

7.0 Part C Data Exchange Protocol

The requirements as per IS 15959 shall apply.

8.0 Part D Communication Requirement

The smart meter shall have an inbuilt communication module capable of providing two way data transfer with DCU or HES or HAN (IHD) as per the system application requirement. The communication module(s) may be of PLC or RF or other cellular technologies.

8.1 Connectivity:

The ports and connectivity requirements shall be as described in clause 4 of this document.

8.2 Remote Communication Requirements

The communication module for WAN / NAN / HAN may be of any combination of profiles as per Table 4.1. The communication technology options are listed against a framework for the relevant network as well as the relevant layer for each of the smart meter architecture given Fig 4.1 to 4.6.

8.2.1 Low Power RF PHY/MAC Requirements based on Smart Utility Networks (SUN).

IEEE 802.15.4g Physical layer is referred as SUN (Smart Utility Network) PHY. This standard defines support for different International ISM band frequencies and a number of regional bands allocated for utility communication in different countries or regions.

Meters supporting communication based on IEEE-802.15.4g over low power radio frequency of sub Ghz and Ghz license free spectrum have to comply with the frequency bands defined under National Frequency Allocation Plan (NFAP) -2011 and any subsequent revisions to it.

8.2.2 SUN 2.4 GHz PHY Layer

2.4 GHz license free frequency band defined in NFAP-2011 is also an International license free band as per ITUT free ISM band recommendations. Meters which support low power radio frequency communication using 2.4 GHz band can adopt the frequency band and PHY layer definitions as is in the IEEE-802.15.4g standard document.

Radio emission characteristics for the band should comply with latest NFAP and the G.S.R (General Statutory Rules) notifications from Department of Telecom Govt. of India. Necessary Equipment Type Approvals has to be obtained from WPC (Wireless Planning Co-ordination wing).

8.2.3 SUN Sub GHz (865MHz-867MHz) PHY Layer

865-867MHz band license free band defined in NFAP-2011 as a regional band for India.

The following frequency band definitions helps to adopt IEEE-802.15.4g standard for the 865-867 MHz regional band in India without impacting the base standard and its implementation.

Frequency Band & Data Rate

PHY (MHz)	Frequency Band(MHz)	Spreading Parameters		Data Parameters		
		Chip rate (kchip/s)	Modulation	Bit Rate (kb/s)	Symbol Rate (ksymbol/s)	Symbols
865	865-867	-	Filtered 2FSK	50	50	Binary

Channel Numbering

Chan Center Freq = Chan Center Freq0 + Chan Num × Chan Spacing

where Chan Center Freq0 is the first channel center frequency in MHz, Chan Spacing is the separation between adjacent channels in MHz, Chan Num is the channel number from 0 to Total Chan Num–1, and Total Chan Num is the total number of channels for the available frequency band.

Frequency band (MHz)	Modulation	Modulation Index	Chan Spacing (MHz)	Total Num Chan	ChanCenterFreq0 (MHz)
865-867	MR-FSK operating mode #1	1	0.2	9	865.125

Channel Number	Channel Central Frequency(MHz)
0	865.125
1	865.325
2	865.525
3	865.725
4	865.925
5	866.125
6	866.325
7	866.525
8	866.725

8.2.4 REGULATORY STANDARDS & REQUIREMENTS

Wireless technologies need to comply with the Indian WPC (Wireless Planning Co-ordination wing) that oversees licensing and management of all wireless spectrums in India. A WPC Equipment Type Approval (ETA) is required for utilizing the license free bands (2.4GHz as well as the 865-867MHz band) in India. For information the present relevant regulation is specified in G.S.R. 168 (E) issued on 11th Mar 2005, extended in G.S.R. 37 (E) dated 10th Jan 2007, and extended in G.S.R 564(E) dated 30th Jul 2008

9.0 PART E - TESTS AND TEST CONDITIONS

Number of Samples and Criteria for Conformity – The requirements given in clause 12 of IS 13779 shall apply.

9.1 Type test for metrology

The schedule and recommended sequence shall be as given in Table 9.1. The table 9.1 is as per IS 13779; table 20 standard and the numbers indicate clause numbers of this document.

Table 9.1 Schedule of Tests

Test of Insulation Properties	**5.10.6**
Impulse Voltage test _	
ac High voltage test	
Insulation test	
Test of Accuracy Requirements	**5.12**
Test on limits of error	
Interpretation of test results	
Test of meter constant	
Test of starting condition	
Test of no-load condition	
Test of ambient temperature influence	
Test of repeatability of error	
Test of influence quantities	
Test of Electrical Requirement	**5.10**
Test of power consumption test	5.10.1
Test of influence of supply voltage	5.10.2
Test of influence short-time over currents	5.10.3
Test of influence of self-heating	5.10.4
Test of influence of heating	5.10.5
Test of influence of immunity to earth fault	5.10.7
Test for Electromagnetic Compatibility	**5.11**
Radio interference measurement	
Fast transient burst test	
Test of immunity to electrostatic discharges	
Test of immunity to electromagnetic HF field	
Test for Climatic Influences	**5.9**
Dry heat test	
Cold test	
Damp heat cyclic test	
Test for Mechanical Requirements	**5.5**
Vibration test	
Shock test	
Spring hammer test	
Protection against penetration of dust and water	
Test of resistance-to heat and fire	

9.2 Display

Minimum 6 digits LCD display. For testing purpose, high resolution display having atleast 3 decimal digits shall be provided.

9.3 Type Test for Load switch

The requirements as per Clause 4.6.6.2 of IS 15884 shall apply. This test shall be tested on a separate sample.

9.4 Type Test for Protocol

As per test plan for IS 15959.

9.5 Tests for Communication technology

9.5.1 The modules for WAN/ NAN/ HAN shall be type approved by designated agency like WPC.

9.5.2 Test for Smart Meter

Functional tests

The test plan for end to end communication performance is to be carried out this will have list of selected tests that are identified under IS 15959 test plan. This shall include:

- Test for association
- Data read
- Profile read
- Selective access
- Interval data
- Selective Programmability
- Reporting of events
- Connect / Disconnect
- Data Integrity test
- Performance test
- Stress test

Functional validation test for communication performance to be carried out before and after:

- Test of Insulation Properties
- Test for Electromagnetic Compatibility
- Test for Climatic Influences
- Test for Mechanical Requirements

Functional validation tests to be carried out are:

- Accuracy of the meter at pre-defined points.
- Access and interval data read test.
- Remote Disconnect/ Connect

Part F – Smart Meter Functional requirements

The smart meter developed as per this standard is required to support handling of following operational requirements:

1 . Disconnection Mechanism:

The SM shall support Disconnection (all the switches shall operate) on the following conditions:

i Over current (105% of Imax in any phase for predefined persistence time)
ii Load Control Limit (Programmable and set by utility)
iii Pre-programmed Tamper conditions (Factory set).
iv Disconnect signal from utility control centre.
v In case of pre-paid facility under defined/agreed conditions.

2. The local reconnection for over current and Load control Limit mechanism are as follows:

i The switch re-connection shall be decided by meter locally. It will try to re-connect the load up to predefined time, with predefined interval (time and interval is programmable by utility).
ii If the consumption is still more than the programmed limits, it will lock out and wait for 30 minutes (lock out period).

If the consumption is still above the limit, the procedure as defined above in i) and ii) shall be repeated.

Reconnection Mechanism from Utility Control Centre:

Reconnection shall normally be done from HES except for Over current and Load Control limit. In case of failure of communication/HES, reconnection shall be possible through HHU locally and the same shall be password protected.

Reconnection mechanism for prepayment meter:

As per agreed prepayment structure.

Status of Load Switch – indication of status of relay i.e. Connected / Disconnected should be available on display as well as through communication to HES.

Connection and Disconnection should also be logged as events**.**

3. Smart Meters shall respond to:

- Meter readings on demand from HES
- Scheduled meter reading from HES
- Remote Firmware upgrade from HES
- Clock synchronisation from HES
- First breath and Last gasp – indicating power on and power off respectively to HES