

ToU : Time of use  
 WPC : Wireless planning co-ordination  
 NFAP : National frequency allocation plan

## 5 SMART METER ARCHITECTURE

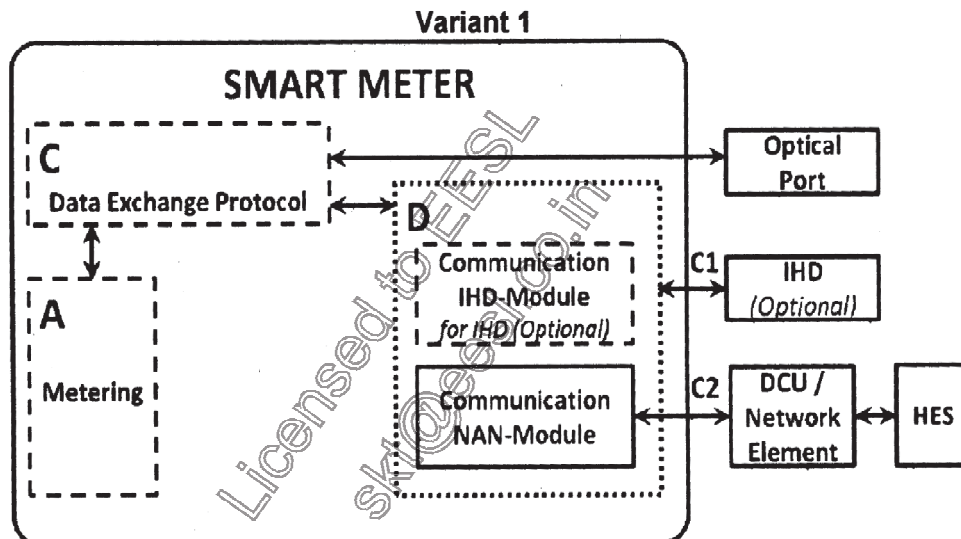
5.1 The smart meter is a component of Advanced Metering Infrastructure. For the purpose of this standard the smart meter is conceived as single unit comprising of following functional zones:

- Metering,
- Load switch (not applicable in this part of standard for transformer operated meters),
- Data exchange and communication protocol, and
- Communication modules.

2.2 The smart meters may 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 categorized into two variants.

Based on the technical feasibility buyer may choose the combination of the variants best suited for a given geographical area. The Smart meter shall have either NAN or WAN module as mandatory communication module for communicating to DCU or HES, respectively.

If IHD is chosen, then there could be a suitable additional communication module within the Smart Meter. The two variants are diagrammatically represented in Fig. 1 and Fig. 2. These variants are applicable to both built in type and pluggable type of smart meters.



### LEGEND

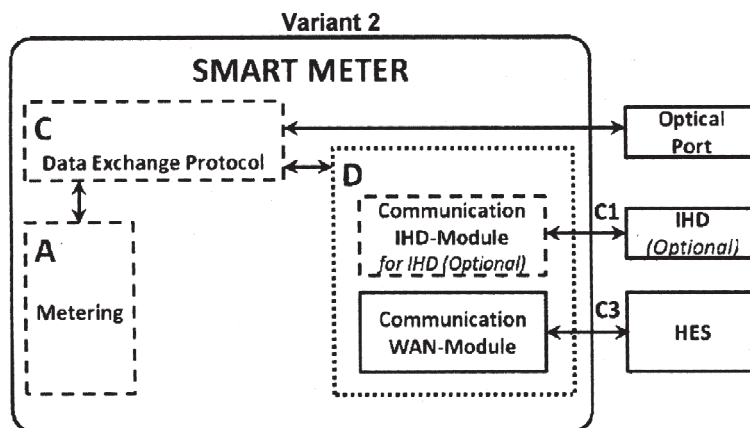
A – Metrology  
 C – Data Exchange and Metering Protocol  
 D – Communication

Optical port — As per IS 15959 (Part 2)  
 C1 – IHD Connectivity SM → IHD (optional)  
 C2 – NAN Connectivity SM → DCU

### NOTES

- The smart meter variant based on Fig. 1 shall provide connectivity C2 for two way communication with DCU using a NAN module.
- If IHD is chosen this smart meter shall provide connectivity C1 for two way communication with IHD using the same NAN module or a suitable additional module as per buyer-seller agreement.

FIG. 1 SMART METER ARCHITECTURE (FOR TRANSFORMER OPERATED METERS)



**LEGEND**

A – Metrology

C – Metering protocol

D – Communication

Optical port — As per IS 15959 (Part 2)

C1 – IHD Connectivity SMIHD (Optional)

C3 – WAN Connectivity SMaHES

**NOTES**

- 1 The smart meter variant based on Fig. 2 shall provide connectivity C3 for two way communication with HES using a WAN module.
- 2 If IHD is chosen this smart meter shall provide connectivity C1 for two way communication with IHD using a suitable additional module as per buyer-seller agreement.

FIG. 2 SMART METER ARCHITECTURE (FOR TRANSFORMER OPERATED METERS)

**6 METERING**

**6.1 Metering Requirement**

Metering and metrology requirement shall be according to IS 14697.

**6.1.1 Classification**

The classification as per 4 of IS 14697 shall apply.

**6.1.2 Ratings**

**6.1.2.1 Standard reference voltage**

As per 5.1 of IS 14697.

**6.1.2.2 Standard basic current**

As per 5.2 of IS 14697.

**6.1.2.3 Maximum current**

As per 5.3 of IS 14697.

**6.1.2.4 Standard reference frequency**

As per 5.4 of IS 14697.

**6.2 General Constructional Requirements**

The requirements given in 6.1 to 6.4 of IS 14697 shall apply. The communication modules shall be either built in type or plug in type as mentioned in 1.4. The plug-in communication modules shall be properly secured on the smart meter, both physically and electrically, so as

to avoid any possible tampering with adequate provision for sealing.

**6.2.1 Terminals-Terminal Block(s) —Protective Earth Terminal**

The requirements given in 6.4 of IS 14697 shall apply.

**6.2.2 Terminal Cover**

The requirements given in 6.5, 6.5.1, 6.5.2 and 6.7 of IS 14697 shall apply.

**6.3 Clearance and Creepage Distances**

The requirements given in 6.6 of IS 14697 shall apply.

**6.4 Resistance to Heat and Fire**

The requirements given in 6.8 of IS 14697 shall apply.

**6.5 Mechanical Requirements**

The requirements for mechanical shall be as per 12.3 of IS 14697 and the requirements for protection against penetration of dust and water shall be as per 6.9 and 12.5 of IS 14697 shall apply.

**6.6 Display of Values**

The requirements given in 6.10 of IS 14697 shall apply. The non-volatile memory shall support retention period of 10 years.

## 6.7 Output Device

The requirements given in 6.11 of IS 14697 shall apply. Distinct LED/LCD indicators shall be provided for communication in progress.

## 6.8 Marking of Smart Meter

6.8.1 The requirements given in 7 of IS 14697 shall apply.

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

- a) Communication technology for WAN or NAN (with carrier frequency).
- b) Communication technology if IHD is supported (with carrier frequency).

## 6.8.2 BIS Certification Marking

The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 6.9 Climatic Condition

The requirements given in 8 and 12.6 of IS 14697 shall apply.

## 6.10 Electrical Requirements

### 6.10.1 Power Consumption

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

#### 6.10.1.1 Voltage circuits

The active and apparent power consumptions of a transformer operated Smart meter for each circuit at reference voltage, reference temperature, and reference frequency shall not exceed 5.0 W and 15 VA during the idle mode of communication module. This applies to either one NAN or one WAN module present in the smart meter. If a separate module for servicing to IHD is present, the above figures shall not exceed 6W and 18VA during the idle mode of communication module.

The additional power requirement during data transmission shall not exceed 7 W per communication module. The smart meter shall be capable of sourcing additional power for powering the plugin communication module as agreed to between the buyer and the seller.

#### 6.10.1.2 Current circuit

The apparent power taken by each current circuit of a

CT operated smart meter at maximum current, reference frequency and reference temperature shall not exceed a maximum of 1 VA.

### 6.10.2 Influence of Supply Voltage

The requirements given in 9.2.1 and 9.2.2 of IS 14697 shall apply.

### 6.10.3 Influence of Short Time Over currents

The requirements given in 9.2.3 of IS 14697 shall apply.

### 6.10.4 Influence of Self-Heating

The requirements given in 9.3 of IS 14697 shall apply.

### 6.10.5 Influence of Heating

The requirements given in 9.4 of IS 14697 shall apply.

### 6.10.6 Insulation Requirements

The requirements given in 9.5 of IS 14697 shall apply.

### 6.10.7 Immunity to Earth Fault

The requirements given in 9.6 of IS 14697 shall apply.

## 6.11 Electromagnetic Compatibility

The requirements given in 10 of IS 14697 shall apply.

## 6.12 Accuracy Requirements

The requirements given in 11, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6 and 11.7 of IS 14697 shall apply.

## 6.13 Test and Test Conditions

Given in 9 of this standard.

## 7 DATA EXCHANGE PROTOCOL

The requirements as per IS 15959 (Part 1) shall apply. The data exchange protocol chosen for Smart Meter shall be as per IS 15959 (Part 3) including specific requirements for Smart Meters for the application layer. This application layer protocol which is primarily DLMS/COSEM shall work through the other layers as given in 8.

## 8 COMMUNICATION REQUIREMENT

The NAN, WAN and IHD communication modules that are shown in Fig. 1 and Fig. 2 are for establishing connectivity with smart meter by the external entities such as DCU and HES, respectively and optionally with IHD. These are either wired or wireless communication technology, the choice of technology shall be chosen by the buyer based on the technical feasibility best suited for a given geographical area. The communication module(s) may be of PLC or RF for NAN and cellular technologies or OFC technology for WAN.

### 8.1 Connectivity Technologies

8.1.1 The connectivity C1, C2 and C3 in variant 1