

9.2 RF Technology Requirements

The RF technology if used for NAN/IHD communication modules shall be in the frequency bands notified by Government of India.

Wireless technologies need to comply with the Indian statutory bodies that govern communication related aspects such as WPC (Wireless Planning Co-ordination wing) which oversees licensing and management of all wireless spectrums in India. Equipment Type Approval (ETA) is to be obtained for communication modules as per Department of Telecom, Government of India requirements.

Radio emission characteristics for the chosen band shall comply with latest NFAP and the G.S.R (General Statutory Rules) notifications from Department of Telecom, Government of India.

9.3 Communication Layer Protocol

9.3.1 The smart meter may use a layered Communication protocol stack. The top four layers of such a stack shall be as mentioned below:

Application	IS 15959 (Part 1) and IS 15959 (Part 2)
Transport	TCP/UDP
Network	IPv6 RPL
Adaptation	6LoWPAN RFC (6282)

9.3.2 For Connectivity C1 and C2 the network protocol shall be IPv6 RPL and 6Low PAN [RFC 6282] for convergence/adoption layer. For Connectivity C3 the network protocol shall be IPv6 RPL and IETF RFC 2464, 5072 and 5121, PPP (IETF RFC 1661).

9.3.3 The other layers may be as per 9.1.

10 TESTS AND TEST CONDITIONS

The smart meter both built-in and pluggable types as a composite unit shall be subjected to specified tests for metrology, for load switching capability, for data exchange protocol and for smart meter communicability.

10.1 Test for Metrology

The tests for metrology shall include the "Type Tests, Routine Tests, and Acceptance Tests" identified in IS 13779. The schedule and recommended sequence of type tests shall be as given below in Table 1. In Table 1, the sequence of tests mentioned is as that of Table 20 in IS 13779. The clause numbers in Table 1 against the name of the tests are the numbers of this standard.

10.2 Number of Samples and Criteria for Conformity

The requirements given in 12 of IS 13779 shall apply.

Table 1 Schedule of Type Tests

(Clause 10.1)

Sl No.	Test	Ref. to Clause of this Standard
(1)	(2)	(3)
i)	Test of Insulation Properties Impulse voltage test ac High voltage test Insulation resistance test	6.10.6
ii)	Test of Accuracy Requirements 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	6.12
iii)	Test of Electrical Requirement Test of power consumption test Test of influence of supply voltage Test of influence short-time over currents Test of influence of self-heating Test of influence of heating Test of influence of immunity to earth fault	6.10 6.10.1 6.10.2 6.10.3 6.10.4 6.10.5 6.10.7
iv)	Test for Electromagnetic Compatibility Radio interference measurement Fast transient burst test Test of immunity to electrostatic discharges Test of immunity to electromagnetic HF field Surge Immunity Test	6.11
v)	Test for Climatic Influences Dry heat test Cold test Damp heat cyclic test	6.9
vi)	Test for Mechanical Requirements Vibration test Shock test Spring hammer test Protection against penetration of dust and water Test of resistance to heat and fire	6.5

NOTES

- Following tests shall be carried out to assess for smart meter functional condition after the "Type test and acceptance test" for metrology is carried out but before "test of resistance to heat and fire".
 - Accuracy of the meter at pre-defined points [5 percent I_b , I_b and I_{max}] UPF.
 - Access and data read test.
 - Remote disconnect/connect
- For procedure to conduct functional tests [(b), (c) of note 1] reference may be made to IS 15959 (Part 2).

10.3 Display

Minimum 6+1 digits LCD display. For testing purpose, high resolution display having at least 3 decimal digits shall be provided.

10.4 Test for Load Switch

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

10.5 Test for Data Exchange Protocol

This test shall be carried out on optical port and the tests shall be performed as per IS 15959 (Part 1) and IS 15959 (Part 2) for conformity.

10.6 Tests for Smart Meter Communicability

10.6.1 The modules for WAN/NAN/IHD shall be approved by designated agency authorized by DoT and shall have ETA as mentioned in 9.2.

10.6.2 Test for Smart Meter Communicability

This standard provides for use of suitable communication technologies in the design of smart meters. However to assess the communication capability a few tests including a test for end to end communication capability are identified and included in IS 15959 (Part 1). These tests are meant for carrying out using Connectivity C1, C2 and C3.

11 SMART METER FUNCTIONAL REQUIREMENTS

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

11.1 Disconnection Mechanism

The Smart Meter shall support disconnection (all the switches shall operate) under the following conditions:

- a) Over current (minimum 105% of I_{max} in any phase for predefined persistence time),
- b) Load control limit (programmable and set by utility),
- c) Pre-programmed event conditions (factory set),
- d) Disconnect signal from utility control centre, and
- e) In case of pre-paid facility under defined/agreed conditions.

NOTES

- 1 Persistence time value to be provided by utility.
- 2 List of events for disconnection to be pre-programmed shall be provided by utility.

11.2 Reconnection Mechanism

The local reconnection due to disconnection under over current and load control limit shall be as follows:

- a) 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). If the consumption is within limits meter shall remain in normal connect mode,
- b) If the consumption is still more than the programmed limits, it will lock out and wait for 30 min (lock out period). After this period the meter shall reconnect the load and if the consumption is still above the limit, the procedure as defined above in (a) shall be repeated with status update to HES, and
- c) In all conditions other than 'Over current and load control limit' reconnection shall normally be done from HES. In case of failure of communication with HES, reconnection shall be possible through optical port locally with specified security.

11.3 Reconnection Mechanism for Prepayment Meter

As per agreed prepayment structure with utility.

11.4 Status of Load Switch

Indication of status of load switch (that is connected/disconnected) shall be available on display as well as at HES.

11.5 All connections and disconnections shall also be logged as events.

11.6 Smart Meters shall respond to:

- a) Meter readings on demand from HES,
- b) Scheduled meter reading from HES,
- c) Remote Firmware upgrade from HES, and
- d) All programming requests from HES.

11.7 Smart Meter shall detect 'First breath (power on) and Last gasp (power off)' condition and communicate to HES.

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