

TENAGA NASIONAL BERHAD

ADVANCED METERING INFRASTRUCTURE (AMI) PROJECT UPDATES

SIRIM QAS INTERNATIONAL, SHAH ALAM

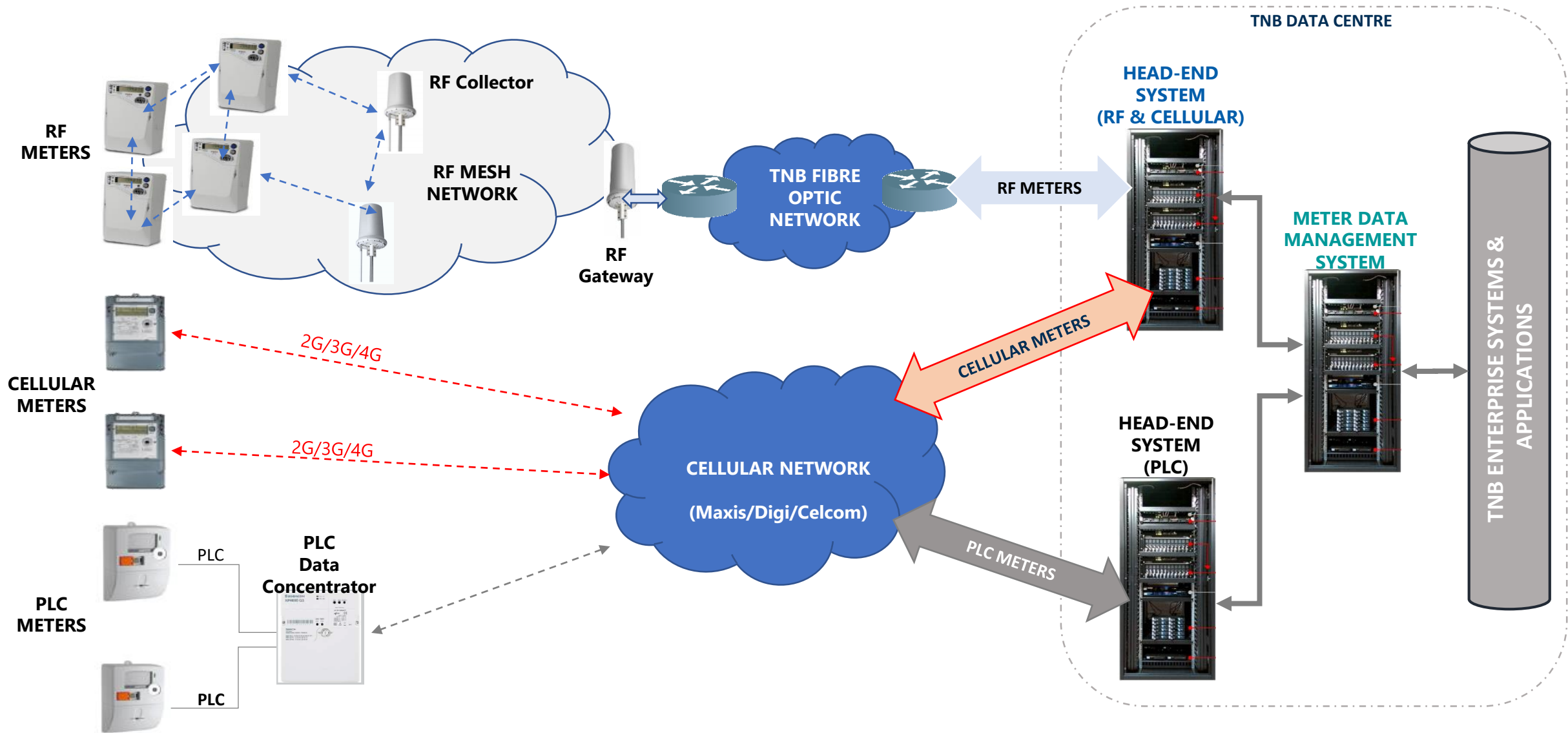
03 MAY 2019

AMI Implementation Plan

Target Completion Date	2018	2019	2020
Estimated Number of customers	160k*	580k	760k
TOTAL	1.5 million		

* Completed.

Advanced Metering Infrastructure (AMI)



Mandatory Technical Requirements

AMI Features and Functionality



Technical Requirement and Features of Advanced Metering Infrastructure (AMI)

No.	Tender Requirements
Automatic Meter Reading	<ul style="list-style-type: none">• All Register Reading• TOU Reading• Maximum Demand• Billing on Demand• Meter Time synchronization• Customized Rates and Billing Date• Automated billing function• Billing info available on SMART APPS and Web Portal• All data stored in non-volatile memory
Load Profiling	<ul style="list-style-type: none">• Electricity consumptions• Trending Pattern of customer by type, tariff, area• kW, kWh, kVar, kVarh. Voltage and Current• Status event in Load Profiling

AMI Features and Functionality



Technical Requirement and Features of Advanced Metering Infrastructure (AMI)

No.	Tender Requirements
Tamper Detection / Theft Notification	<ul style="list-style-type: none">• Revenue Protection• Voltage and Current reading by phase• Alarms• Event Log such as meter cover open, wrong installation• Meter push tamper log / info as it happens
Supply Automation	<ul style="list-style-type: none">• Remote Connect / Disconnection from back office system• Final Reading before disconnect / reconnect• Final payment check before reconnect / Disconnect
Outage Event Management	<ul style="list-style-type: none">• Last gasp detection of outages up to individual customer
Time of Use / Interval Based Billing	<ul style="list-style-type: none">• TOU Based pricing (1/2 hourly basis)

Standards



Standard	Description
MS IEC 62052-11	Electricity Metering Equipment (a.c)- General requirements, tests and test condition-Part 11: Metering Equipment
MS IEC 62053-21	Electricity Metering Equipment (a.c)-Particular requirements – Part 21: Static meters for active energy (classes 1 & 2)
MS IEC 62053-23	Electricity Metering Equipment (a.c)-Particular requirements – Part 23: Static meters for Reactive energy (classes 2 & 3)
IEC 62056 / ANSI C12.19	IEC 62056 - Electricity Metering – Data exchange for meter reading, tariff and load control. ANSI C12.19 – American National Standard for Utility Industry End Device Data Tables.
IEC 62059-31-1 or IEC 62059-32-1 or IEC 62059-41.	<ul style="list-style-type: none"> • Electricity metering equipment - Dependability - Part 31-1: Accelerated reliability testing - Elevated temperature and humidity • Electricity metering equipment - Dependability Part 32-1: Durability – Testing of the stability of metrological characteristics by applying elevated temperature • Electricity metering equipment – Dependability – Part 41: Reliability prediction
IEC 60068	Environmental Testing
BS 7856-2013	Code of practice for special design and other features of alternating current watt-hour meters for active energy
IEC 61358	Acceptance inspection for direct connected alternating current static watt-hour meters for active energy (Classes 1 and 2)
IEC 62056-21	Direct local data exchange (3rd edition of IEC 61107) describes how to use COSEM over a local port (optical or current loop)
IEC 27001	Information Security Management Systems

Quality Assurance

Meter Initial Qualification

- ✓ Pattern Approval – COA – Product Certification (ST – SIRIM)
- ✓ Full Type Test based on IEC 62051/52,56 and 59

Pre Delivery

- ✓ Factory Acceptance Test (FAT- 1st batch acceptance based on on IEC 62051/52 and AMI features capabilities and performance)
- ✓ Factory Quality Inspection (ISO 9001, ISO/IEC 17025 and Components and Process Audit)
- ✓ Lot Acceptance Test (LA)

In contract assessment

- ✓ Factory Acceptance Test (FAT- Acceptance based on IEC 62051/52 and AMI features capabilities and performance on every 1k batch)
- ✓ Sampling test of IEC 62059 Reliability Testing (Type testing and periodical Acceptance based on every 20k batch)
- ✓ Factory Quality Inspection and Components Audit (IEC 62051/52- every batch of 50k)

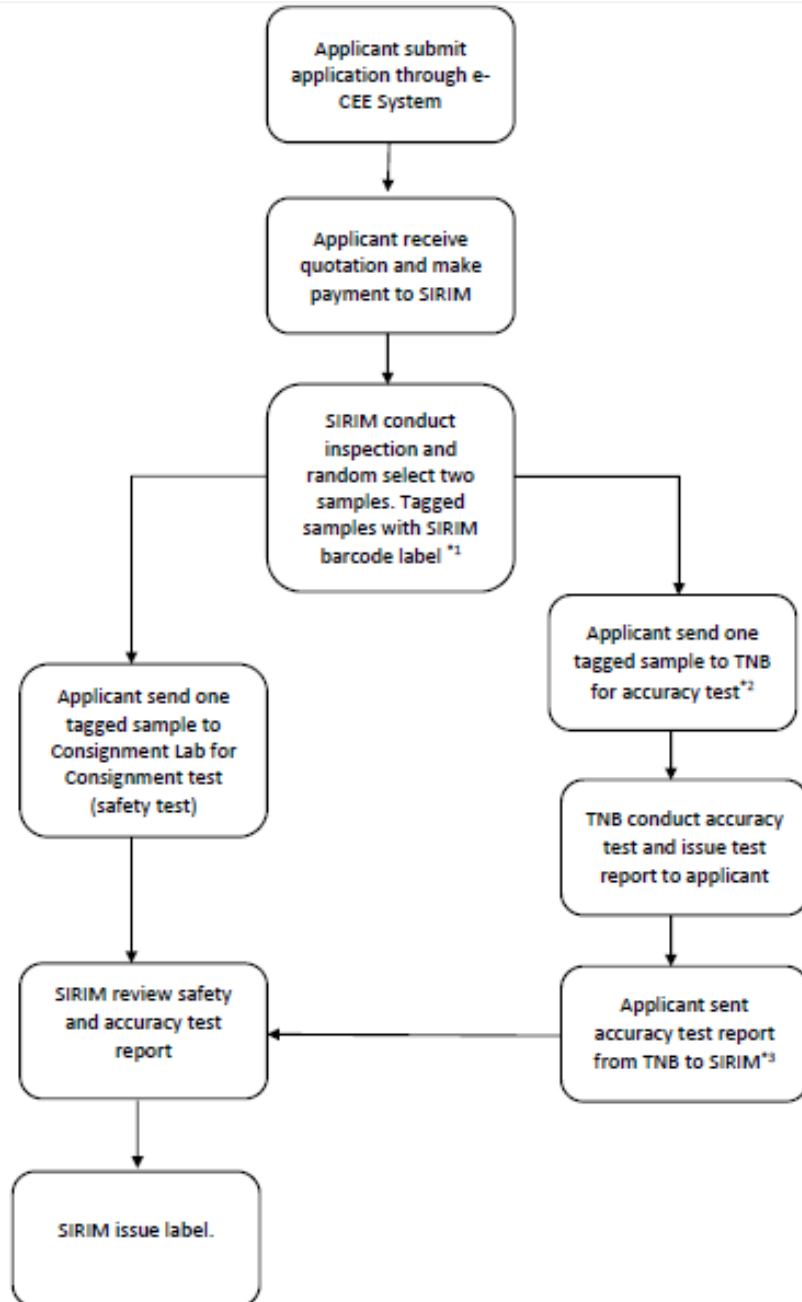
Enhanced Smart Meter Specification & Quality

- ✓ Meter Cyber Security
 - ✓ Device Language Message Specification (DLMS)
 - ✓ Unique key for all meters
 - ✓ Key Management System

- ✓ Failure Rate
 - ✓ 0.05% acceptable failure rate per month (failure to meet, suspension / termination)
 - ✓ 1.0% acceptable failure rate over 3 years warranty period (failure to meet, suspension / termination)

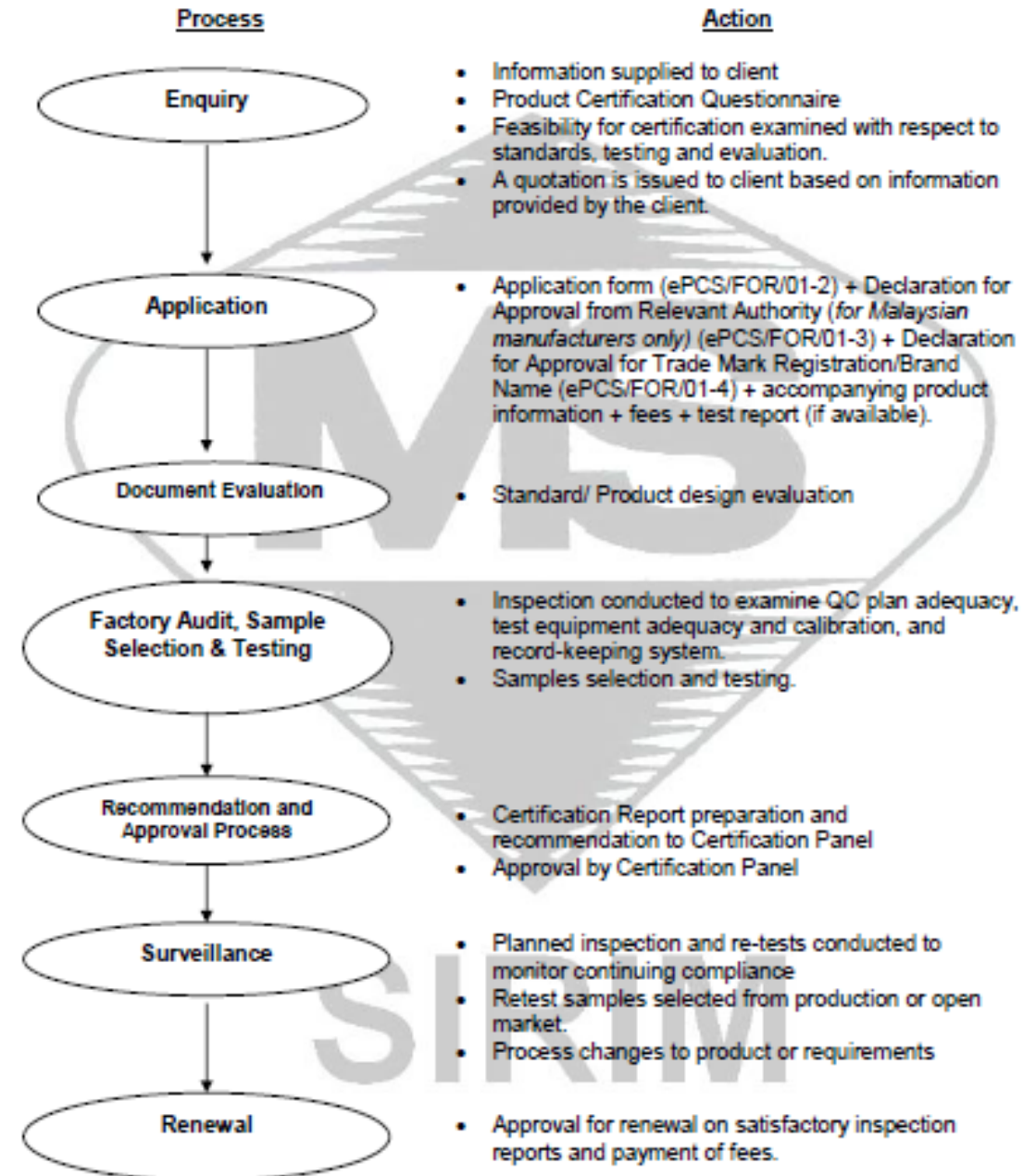
Pattern Approval National Metrology Laboratory (SIRIM-NML)

Batch certification



vs

Product certification



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Thank You



Standby Slides

Meter Specification Clarifications

Meter Specification Clarifications

Ref. No.	Specification	Clarification
1.	GPRS/3G	3G and backward compatible
2.	Events/ Alarms which are sent in real time must be provided with snapshot details in real time.	Mandatory requirement
3.	Every meter in the lot must be tested according to TNB specified load points and the test report to be submitted prior to LAT.	Mandatory requirement
4.	Able to display reading code 01, 09, 11, and 51 on LCD display.	Mandatory requirement