TECHNICAL SPECIFICATIONS (HARDWARE TRACK) - v1.8

LAGOS SMART METER HACKATHON 2020

HACKATHON BACKGROUND

The **Lagos Smart Meter Hackathon 2020** is designed to address the huge metering deficit in Nigeria. Estimates from analysts indicate that 60% of Nigerian households are not metered. A key impediment is the price of the existing meters. Therefore, this huge market potential is driving the need for hackers, partners, sponsors, and manufacturing companies to join us in making meters more affordable, promoting smarter cities and overall, improving our livelihoods. The Lagos State Ministry of Energy and Mineral Resources is the title sponsor of the Hackathon.

PREREQUISITE

Use of this functional requirement document (FRD) assumes that you have successfully registered your hardware team on **www.lagossmartmeter.com**

SPECIFICATION OVERVIEW

This document provides a detailed scope of what is expected of your submission for the **Hardware Track** of the **Lagos Smart Meter Hackathon 2020**. Please pay detailed attention to all information as it may impact the viability of your submission as well as the judge's appraisal should you be selected.

PROCESS TIMELINE

- **Team Registration:** July 30, 2020 - August 28, 2020
- **Prototype Build and Finalization:** July 30, 2020 - August 28, 2020
- **Prototype Submission Deadline:** August 28, 2020

SPECIFICATION SCOPE

You have chosen to participate in the Hardware Track, and you are expected to build a physical (hardware) prototype of a Smart Meter for the Hackathon. You are to incorporate the below features, specifications & guidelines. Any features marked (bonus) are not compulsory but can be an added benefit for selection and appraisal.

- **Electrical:** Electrical specifications for the device prototype
    - **Voltage:** 240V
    - **Operating Voltage:** -40% to +20% Vref
    - **Current Rating:** For smart energy meters as per NMC V.02 & NESMR 5(100) A
    - **Reference Frequency:** 50Hz ± 5%
    - **System:** Single Phase
    - **Internal Battery:** Lithium CR2025 - 1HF [Internal Battery or an equivalent Giving Total Stand-By Life of 15 Years (Minimum)]
    - **Auxiliary Battery:** 12 DC Supply [for downloading stored data]
    - **Storage Temperature:** Up to 70℃
    - **Life Span:** 15 Years
    - **Relative Humidity (Non-Condensing):** Up to 96% at 45℃
    - **Burden:** 2VA/phase in voltage circuit and 1VA/phase in current circuit
- **Connectivity & Communication:** IOT Enabled
    - **Standard:** AMI (Advanced Metering Infrastructure), By-pass Monitoring. DLMS/COSEM Communication.
    - **Communication: Device should be able to accept and respond to instruction sets through any or all of the following protocols:**
        a. **Http REST endpoint over private or public network**
        b. **Bluetooth**
        c. **Wi-Fi**
        d. **USB**
        e. **Socket**
        f. **HTTP html/web application dashboard over private or public network**
        - **Applicants should provide documentation detailing instructions sets that the device accepts as commands. All features listed**

in this specification document should be covered by these instruction sets.

- **Applicants should provide documentation detailing responses to be expected from the device and their meaning**
- **Applicants should provide documentation detailing steps on how to connect to the device via the chosen communication protocol.**

  - Auto-Shut Off: Settings to auto-shut off after predefined interval if there is disconnection from platform servers

- **Others:** Other minimum requirements
  - **Display Unit:** LCD or equivalent displaying useful information
  - **Terminal Configuration:** PH-N, N-PH (symmetrical)
  - **LCD:** To be six digits
  - **Accuracy Class:** 1
  - **Terminal Hole Diameter:** 9mm
  - **Detection of Missing Potential:** Loss of potential lead: date & time recorded restoration of normal supply also to be recorded.
  - **Power On/Off:** Meter shall detect power off and power on and event recorded
  - **Connection Diagram:** To be displayed on the terminal cover
  - **Provision of Sealing Position:** To be provided on the meter
  - **Terminal Cover:** Shall be of transparent type
  - **Optical Port Provision:** IR Port to transfer locally through common meter reading instrument (CMRI)
  - **Influence Quantities i.e. External MAG Field Waveform 10% of 3rd Harmonics:** Meter shall work satisfactorily with guaranteed accuracy limit
  - **Removal of Terminal Cover:** Presence of a tamper detector/switch to recognize the removal
  - **Reverse Current Flow:** Detect and record energy under this condition
  - **Internal Potential Links:** To be internal, not external
  - **Presence of Tamper Switch:** Register and record occurrence in event log
  - **Measurement Element:** Current measurement element of live and neutral should be there
  - **Relay/Breaker:** 2-pole INTERNAL relay or circuit breaker
- **Billing:**
  - **CTS:** Meter to be compatible with CTS Standard token loading.
  - **Virtual Top Up:** Device must be compatible with over the air electronic payment top up modes (using Cards, USSD, etc. or a payment gateway)
- **Manufacturing:** Important details to aid mass manufacturing (if selected):

- **Motherboard Schematic Diagram:**
- **Cover Tooling Drawing:**
- **3D Printable Version (Bonus):** Possession of 3D-printable blueprints in STL, OBJ or equivalent format

- **Device Costing: Provide reasonable evidence that Total Cost of final Meter to end user** would be approximately N10,000, US$30 or equivalen**t when mass produced i.e. at commercialization**
- **Safety:**
  - Insulation

SUBMISSION DETAILS (REQUIRED AS EVALUATION & SELECTION CRITERIA)

The Hackathon will accept either a working prototype device OR a working electronic/electrical design that can be subsequently manufactured.

- Thus, applicant must submit:
  - A Video of WORKING Prototype (in use).

  AND/OR

  - PDF of Electronic & Electrical diagram of motherboard and device schematic designs/diagrams.
  - Sketch or 3D diagram of device/casing
- Prototype or Design MUST meet all requirements listed above.
- Show of previous or similar work.

INTELLECTUAL PROPERTY & REWARD

The rights to the intellectual property of the winning prototype and/or design will be owned by the Lagos State Government (the Title Sponsor) at the end of the competition. **A prize money will be awarded to the winning team or individual in addition to a percentage of the intellectual property royalties from the winning solution for 5 years from the go-to-market date.**

The samples, drafts sketches, prototypes, designs, presentation of the submission of hardware track of the Competition with registered patent shall remain the Intellectual Property of the participants until submission of the winning entry into this competition and transfer such Intellectual Property rights to the State Government.

DISCLAIMER

- By entering into the Lagos Smart Meter Hackathon 2020 competition, the Lagos State Government is exempted from any liability relating to the product, design, Intellectual Property rights, presentation amongst others or any other liability that may arise during or after the competition.
- The participant shall absolutely assume all risks and liabilities associated to the design, presentation, Intellectual Property rights including but not limited to third party claim and or litigation that may arise from the Competition.
- The non-winning applications of this competition shall not in any way sue or institute legal action against the State Government on any issue relating to Intellectual Property rights and or the Competition and shall be bound by outcome/result of the competition.
- Considerations shall not be given to any submission(s) made after the deadline irrespective of the commencement of registration by the individual or team.