

Technical Disclosure: Battery Identity Recognition & System Scheduling for Mobile Terminals

1. Core Concept

With the return of removable battery designs, mobile devices will encounter various battery specifications. This project proposes a Hardware-Software Synergy solution. By identifying the physical "identity" of the battery, the system kernel automatically matches corresponding performance profiles, enabling a "Hardware-driven Tuning" experience without user intervention.

2. Hardware Identification Logic

The system supports three physical identification paths to ensure reliability across all environments:

- * Resistor-based (ADC): Samples voltage via an ID Resistor pin. High-performance batteries are identified by specific voltage ranges (e.g., 0.5V).
- * Contactless (NFC/RFID): Reads encrypted metadata and UIDs from an embedded tag via the host's NFC coil. This path provides higher security against counterfeit batteries.
- * Hybrid Mode: Supports simultaneous ADC pre-identification and NFC deep verification, ensuring stability even when physical contacts are degraded by wear or dust.

3. Kernel-level Scheduling Implementation

Upon detecting a battery insertion interrupt (IRQ), the system invokes the Kernel Engine to dynamically modify the following parameters:

- * DVFS (Dynamic Voltage & Frequency Scaling): Adjusts CPU/GPU frequency ceilings and boost sensitivity (e.g., boosting from 2.4GHz to 3.2GHz).
- * Thermal Wall: Relaxes Thermal Design Power (TDP) thresholds based on the battery's physical discharge rating.
- * System Linkage: Automatically triggers 144Hz high-refresh-rate modes and enters dedicated gaming UI environments.

4. Workflow & Safety

The system operates in a closed-loop:

- * Detection: Captures voltage level changes to trigger detection circuitry.
- * Parsing: Retrieves the ID signal or NFC payload and queries the Policy DB.
- * Execution: Differentiates between "High-Performance," "Standard," and "Unknown" batteries. Unknown units automatically trigger a Safe/Restricted Mode to protect hardware.
- * Reset: Monitors "Plug-out" events and immediately resets all kernel parameters to factory defaults.

5. Technical Advantages

- * Automation: Direct hardware-to-software scheduling logic.
- * Safety: Uses physical discharge capability as a key scheduling weight to prevent battery degradation.
- * Robustness: Multi-modal redundancy ensures correct policy matching in extreme outdoor conditions.