GENERAL DESCRIPTION

QNS is a software-only implementation of Qnovo adaptive charging technology which enables battery cycle life extension and faster charging for mobile devices. For batteries commonly deployed in mobile devices today, QNS supports charge rates up to 0.7C to 1.2C depending on cell chemistry and energy density.

Extending cycle life effectively "flattens the fade curve", which results in more daily use time for consumers as the battery ages. With the battery retaining more capacity over time, costly consumer returns due to poor battery life can be avoided.

For many mobile devices, charging speed is limited in order to meet battery lifetime requirements. QNS opens up the solution space, allowing a more flexible tradeoff between cycle life and faster charging – in many cases delivering both simultaneously. Additionally, all consumers see a more consistent battery experience, as QNS tightens the statistical distribution between cells, which is not possible with today's non-adaptive charging methods.

QNS runs on the system's application processor, and is implemented as a binary driver within the operating system kernel (***Figure 1***). Battery voltage, current and temperature are obtained from the system fuel gauge, and QNS instructs the charger IC to modify current to the battery to both maximize cycle life and minimize charge time.

Battery safety is of paramount importance in mobile devices. To ensure safety, QNS adheres to cell manufacturer specifications and utilizes safety mechanisms that are already in place in the mobile device.

KEY FEATURES

- Patented Qnovo adaptive charging optimizes performance of each individual battery
- Software-only implementation enables simple integration into mobile platforms without hardware changes
- Portable to Android, Windows and iOS operating systems
- Supports charge rates up to 1.2C, battery dependent
- Optional Qnovo Analytics module provides superior state-of-health and lifetime projection to improve customer service response

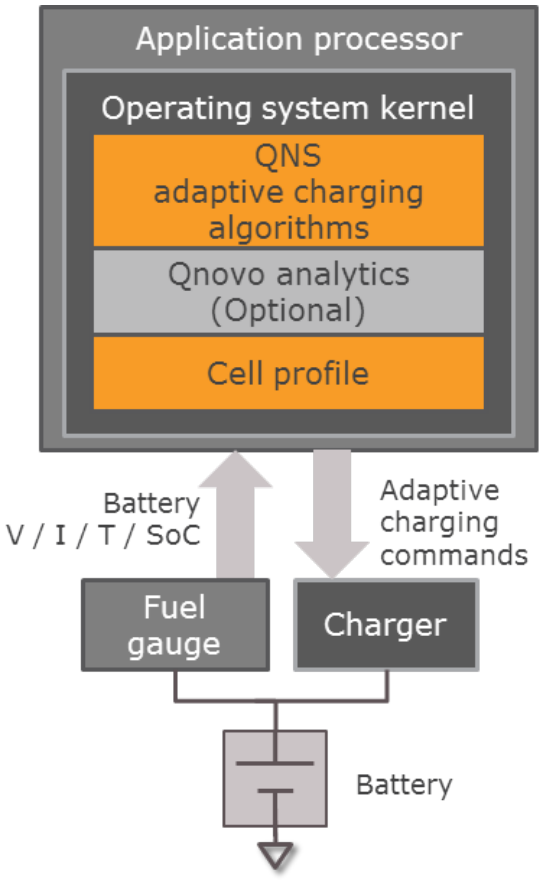

Figure 1: QNS system diagram

QNS FEATURES

	QNS
Approach	Intelligent adaptive
Battery model	Chemical degradation
Characterization	Cell family Real-time, each battery
Reduces battery-battery variation	Yes
Controls charge time growth with aging	Yes
Degradation mechanisms mitigated	Lithium plating SEI formation
Algorithm sample rate	Seconds
Temperature compensation	Pack thermistor
Fast charging	Up to ~1.2C/800 cycles
Swelling reduction	Yes

INTEGRATION FLOW