Technical Bulletin CS-14-14

84-Series Battery Statistics using Syslog

The Spectralink 84-Series handsets can be configured to produce battery statistics (e.g. current charge level, charge cycle count) for use by application partners. Applications can use these statistics to present battery analytics enabling Spectralink system administrators to better manage their deployed batteries, such as anticipating battery replacement based on actual usage rather than just based on days since deployed.

System Affected

All Spectralink 84-Series handsets.

Battery management statistics are supported on software release 4.3.1 or later.

Battery Management Overview

Historically, many customers reporting poor talk-time or stand-by time have been found to be using batteries past their working life, i.e. the battery has exceeded the charge-cycle count at which the battery performance degrades. Although the solution, to replace with new batteries is straightforward, customers have not always been aware of battery best-practices, i.e. replace after X months of use, and are somewhat surprised when they have to make an unplanned purchase. Battery analytics will help customers proactively track battery life, and allow customers to implement a battery management policy based on usage rather than date of introduction.

These battery statistics are not a panacea, as some customers may NOT want the administrative overhead of managing batteries individually, and instead the simpler replace-after-X-months may be preferable.

Useful Battery Statistics

To a system administrator, there are three relevant battery statistics:

Statistic	Description
Charge Cycle Count	Number of complete full discharges the battery has experienced.

	A full discharge means the battery has delivered the full charge capacity. Partial charges/discharges are accumulated to a full-discharge. For example, a user charges & discharges a battery using one-fifth of the battery capacity each-time. Therefore five (5) of these events would be the equivalent of one charge cycle. Spectralink suggests the 84-Series batteries have a useful life of approximately 500 charge-cycles. Beyond this the battery may perform sub-optimally and should be replaced.
Remaining Capacity	Estimate of remaining battery capacity, in mA-Hr (milli-Amp Hours). A fully charged battery should meet the design capacity and the remaining charge will decrease as the battery is used in a handset during a work-shift. Over the lifetime of the battery, the capacity of the battery is expected to decline. However the battery should deliver 80% of its initial capacity for the anticipated life-time of the battery.
Design Capacity	The capacity the batteries were designed to provide. 84-Series Standard Battery = 1150 mA-Hr 84-Series Extended Battery = 1800 mA-Hr

Using the Battery Statistics

Spectralink 84-Series handsets can be configured to output battery debug statistics to their log files (i.e. <mac-address>-ext.log, where *ext* is either app or boot, stored on the provisioning server) and also to a syslog server. The configuration parameters required are provided in the next section. Handsets produce battery information during boot-up, and can periodically generate a “real-time” battery status report to the log files during normal use. This document does not try to explain how to configure a syslog server or provisioning server, however this is fairly simple and widely documented on the Internet.

Logs can be easily parsed programmatically and the relevant data extracted. Below is an example from a syslog file. The exact format in the syslog will vary depending on the syslog server configuration and handset configuration, but the key concepts and fields (highlighted within the red circles) will remain the same.

Battery Statistics at Boot

The following section details the battery statistics generated during boot by a handset (when configured appropriately).

```
Aug 20 16:59:25 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Serial number: AC10113504A6
Aug 20 16:59:30 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Firmware version: 0x0013
Aug 20 16:59:35 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Manufacture date: 08/25/2011
Aug 20 16:59:40 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Day count: 842
Aug 20 16:59:45 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Cycle count: 59
Aug 20 16:59:50 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Design capacity: 1100
Aug 20 16:59:55 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Full capacity: 1155
Aug 20 17:00:00 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Fault count: 3
Aug 20 17:00:05 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Fault  1:  681/0x01
Aug 20 17:00:10 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Fault  2:  814/0x01
Aug 20 17:00:15 192.168.1.101 192.168.1.101 00907a0e804f|1408201655|batt |*|00|Fault  3:  815/0x01
```

These battery statistics were NOT specifically designed for third-party application partner use so some of the battery information is for Spectralink Internal use only. These internal fields are either not relevant and most likely confusing to anyone outside of the company.

The relevant fields are explained below, other fields (listed as “Spectralink Internal Use only”) should not be presented in applications.

Field	Description
Serial number	Unique battery serial number. This is the same number printed on the battery label and within the battery barcode.
Firmware version	Spectralink Internal Use only.
Manufacture date	Spectralink Internal Use only.
Day count	Spectralink Internal Use only.
Cycle count	Number of complete full discharges the battery has experienced.
Design capacity	Design capacity in mA-Hr.
Full capacity	Estimate of full-charge capacity (mA-Hr).
Fault count	Spectralink Internal Use only.
Fault	Spectralink Internal Use only.

Periodic Battery Statistics

84-Series handsets can be configured to generate battery statistics periodically. Below is an example of one periodic update.

```
Aug 22 09:59:00 192.168.1.101 192.168.1.101 00907a0e804f|1408221000|slog |3|00|####################
Running showBatteryStat  ####################
Aug 22 09:59:05 192.168.1.101 192.168.1.101 00907a0e804f|1408221000|slog |3|00|Battery status: 1103
mA-Hr / 1100 mA-Hr (100%), 4083 (4173) mV, -273 mA
```

The relevant syntax is:

`Battery Status: X mA-Hr / Y mA-Hr (Z%), A (B) mV, C mA`

Field	Description
X	Remaining Capacity
Y	Approximate Design Capacity
Z	Percentage of X to Y
A	Spectralink Internal Use only.
B	Spectralink Internal Use only.
C	Spectralink Internal Use only.

Implementation Considerations

An 84-Series standard battery is rated for 1150mA-Hr, but the battery incorrectly returns a design capacity value of 1100 mA-Hr. The handset may report a remaining battery capacity > 1100 mA-Hr, and thus the remaining capacity is larger than the reported design value. An application should handle this anomaly.

It is possible software errors, algorithmic approximations, or environmental conditions may affect the accuracy of the reported values. All reported statistics should be considered as estimates, and are for informational purposes only.

Configuring the Handset

The following list provides the key configuration parameters required to generate the battery statistics messages to a syslog server (using example IP address 192.168.1.11). Additional parameters are required for configuring the handset for normal operation, so the below list is not complete. For example, device parameters require an accompanying device.x.set parameter set to “1” in order for the parameter to be read by the handset. For additional clarification regarding configuration parameters please refer to the 84-Series Administration Guide and also see the troubleshooting chapter which has more information on setting up syslog and logging.

```
<device.syslog
     device.syslog.serverName="192.168.1.11"
     device.syslog.renderLevel="1"
     device.syslog.transport="UDP"
     device.syslog.prependMac="1"
     device.syslog.facility="16">
</device.syslog>
<log>
  <log.render
      log.render.type="1"
      log.render.level="1"
      log.render.realtime="0"
      log.render.stdout="1"
      log.render.file="1"
      log.render.file.size="16">
  </log.render>
  <log.level
      log.level.change.batt="1"
      log.level.change.slog="1">
  </log.level>
  <log.sched
      log.sched.2.level="3"
      log.sched.2.name="showBatteryStat"
      log.sched.2.period="3600"
      log.sched.2.startDay="0"
      log.sched.2.startMode="rel"
      log.sched.2.startTime="0"
  </log.sched>
</log>
```

Configuration Parameter	Description
Device.syslog.*	These parameters setup logging to a syslog server.
Log.sched.*	These parameters setup calling the periodic “showBatteryStats” method that generates the battery statistics. 3600 represents sending a battery statistics every one hour.
Log.level.*	These enable the relevant logging modules, both “slog” and “batt” need to be set to 1.
Log.render.*	These control the logging to the logging files on the *provisioning server*.

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The *Product Warranty and Software License and Warranty* and other support documents are available at http://support.spectralink.com.

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