Technical Bulletin CS-09-17

Tech Bulletin Title

This technical bulletin explains the Li-Ion battery storage requirements; technical specifications; and provides tips to maximize useful life expectancy.
Note: These instructions also apply to OEM handsets manufactured by Spectralink that are based on Spectralink 8020/8030 handsets

This technical bulletin applies to Spectralink 8020 and 8030 handsets and OEM derivatives.

Battery Pack Technical Specifications

Each Spectralink 8020 and 8030 battery pack utilizing advanced Lithium-ion (Li-ion) cell chemistry with the following performance specifications:

- Talk time - up to 4/6/8 hours (see Table 1)
- Standby time - up to 80/120/160 hours (see Table 1)
- Call server protocol, WLAN infrastructure; and Push-to-Talk will reduce actual performance
- Some conditions which negatively affect performance: Talk time is known to be reduced in a network environment with excessive jitter. Standby time is known to be reduced if handsets experience frequent reboots or frequent disconnections and reconnections to the wireless network. If handsets are frequently rebooting for no apparent cause or frequently displaying “No SVP Response” contact the designated service organization to identify specific issue.
- Full charge time – 4/6/8 hours (see Table 1)
- When proper storage and charging practices are followed; the battery pack is expected to have a service life of approximately 500 charge /discharge cycles. Spectralink strongly encourages customers to replace battery packs every year (from the date code printing on the battery label) or after 500 charge cycles
- Battery packs can be charged either in Spectralink 8020 and 8030; or in the rear slot of a dual slot charger; or in a quad charger slot
- Charging the battery pack in the handset is possible powered off or powered on in the “Standby” state. When charging, the handset will present “Charging” status on the display

Table 1

Battery Type	Talk Time	Stand-by Time	Charge Time
Standard	Up to 4 hours	Up to 80 hours	Up to 2 hours
Extended	Up to 6 hours	Up to 120 hours	Up to 3 hours
Ultra-Extended	Up to 8 hours	Up to 160 hours	Up to 4 hours

Call server protocol, WLAN infrastructure; and Push-to-Talk will reduce actual performance

Battery Pack Storage & Inventory Management Recommendations

Spectralink would like to emphasize the optimum storage and handling procedures for Battery Packs for the Spectralink 8020 and 8030.

Spectralink 8020 and 8030 handset battery packs continue to be produced from the advanced Lithium-Ion (Li-Ion) cell chemistry designed to be resistance to high temperatures; safely used in extreme environments; and deliver a long service life provided optimal storage and charging practices are followed.

As with other rechargeable Li-Ion based products, Spectralink 8020 and 8030 battery packs should not be stored or kept idle for an extended period of time, rather they should be cycled at regular intervals to ensure they maintain the expected lifetime.

During sales channel distribution and prior to deployment at a customer site, battery stock should be managed by shipping or using batteries with the oldest date code first. Typically this is a FIFO (First In, First Out) process. This will help ensure, on average, batteries do not sit on-the-shelf longer than necessary. It is also recommended to maintain lean inventory levels to avoid holding batteries for extended duration. If batteries are stored for an extended period of time, periodic maintenance charges may be necessary.

This model battery pack storage recommendations are as follows:

- Battery packs must be fully charged using the appropriate Spectralink battery charger before first use. Full charge time is dependent on battery model (see Table 1)
- Battery packs should not be stored more than five months at room temperature prior to use/sale
- If for some reason a battery pack is stored more than five months it must have a periodic maintenance charge to maximize batteries useful lifetime. The maintenance charge should bring the battery up to its full capacity.
- In cases where battery packs are stored for an extended time (greater than five months) the battery should return to almost complete capacity after two to three charge/discharge cycles. The first

battery pack charge after prolonged storage usually yields a lower capacity than normal.

Battery Charge Cycles and Maximizing Useful Life Expectancy

Defining initial expectations for battery performance is straightforward compared to quantifying a batteries total useful life expectancy. The defined number of expected battery lifetime charge cycles can be used to approximate end of useful life for a battery but is not a definitive number.

- End of useful life is defined as the point a battery no longer satisfies a customer's expectation for talk-time and/or stand-by time or when battery is unable to accept any charge
- When approaching end of life total stand-by time will degrade before total talk-time and batteries which are used regularly will likely accept some charge long before they unable to accept any charge
- Some customers will have a higher tolerance for the reduced performance near end of life which will extended the realized battery end of life
- Battery performance degrades consistently until near end of life when performance degrades sharply until battery will no longer accept a charge

Spectralink 8020 and 8030 Lithium-Ion (Li-Ion) batteries will deliver approximately 500 charge cycles before performance starts to degrade. For this battery technology a single charge cycle is defined as each time a battery is drained of approximately 80% of full charge capacity. The 80% or greater discharge could occur in a single use or in multiple uses followed by a full charge. Example: Battery is drained of 20% of capacity then charged four times; the total of the four 20% discharges equals an 80% discharge – one charge cycle.

To obtain the maximum service life from the Li-Ion batteries:

- Charge batteries after each use without regard to "Low Battery" warning (Note: discharges to handset "low battery" message or full discharges (to handset power off) do not reduce useful battery life
- Handsets should be powered off when not in use
- Powered on handsets should stay within the facility wireless coverage area, handsets discharge batteries more quickly when the wireless network is extremely weak; not stable; or is unavailable
- Extreme environment negatively affects battery life, specifically extreme cold (below -5°F or - 20°C) and in extreme heat (greater than 158°F or 70°C)

- Batteries do not suffer from the "memory effect" however fully discharging batteries (until handsets power off) will reset the internal chip which communicates battery charge information to the handset. Result may mean slightly longer service life per charge cycle before the "low battery" warning is displayed. Recommended full discharge, until the "Low Battery" message on the handset, approximately every 30 days.

- After a period of non-use (more than a few days) batteries may deliver slightly less than full performance for the first few charge cycles. This fact is true for extended storage and for new out of the box batteries.

Life Expectancy and Battery Management Strategies

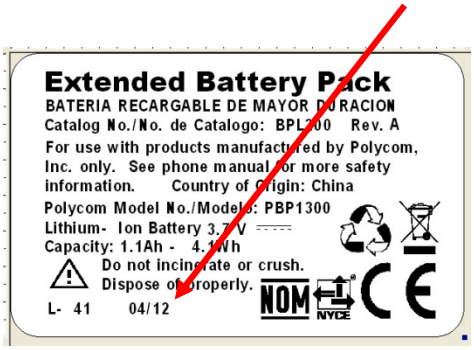
If handsets no longer deliver talk or standby time that they used to, in almost every case, batteries are past their useful life, and usually because customers don't recall how long the batteries have been in service. To help prevent this type of dissatisfaction, customers can use a battery replacement or battery management strategy.

Battery performance (e.g. talk-time and/or standby time) is clear indicator of whether a battery is past its useful life. With a large number of handsets tracking each battery's performance can be tedious for an administrator and battery management becomes a reactive process, making it harder to budget and manage replacement inventory.

A proactive battery replacement program defines a duration that a customer expects batteries to deliver acceptable performance based on usage and charge patterns, e.g. lifespan of 12-18 months. Some customers will simply replace all their batteries periodically based on this timeframe. Another approach, useful if system expansion has occurred and batteries are not all of the same age, is to write the date each battery first enters service on the battery label, and then periodically review the batteries, replacing those batteries approaching end of the expected life based on the planned lifespan. Alternatively customers can use the printed date code on the label, rather than manually writing the date, but this is not quite as accurate.

Locating the Battery Date Code

The date code on the battery label indicates the start date of the battery warranty, not the manufacture date, and provides a rough indication of when a battery may have entered service (assuming it was not stored unused for long period). During battery manufacture the printed date code is set in advance of the current date to accommodate typical transit delay as the battery passes through production and distribution. The date code has an "XX/YY" format, where XX is the month, and YY is the year. The battery label shown below has date code 04/12 i.e. April 2012. If there is any issue with a battery, Spectralink will typically ask for this date-code to verify the battery is eligible for warranty replacement.



Battery Management & Replacement Recommendations

With a large number of handsets, tracking each battery's actual performance can be tedious for an administrator and battery management becomes a reactive process, making it harder to budget and manage replacement inventory. A better methodology is to plan periodic replacements (based on usage and charge patterns, e.g. lifespan of 12-18 months) from when batteries entered service. The easiest approach is to replace all the batteries periodically. But if system expansion has occurred and/or batteries are not all of the same age, another option is to write the date each battery first enters service on the battery label, and then periodically review the batteries, replacing those batteries approaching end of the expected life based on the planned lifespan.

Typically a battery will have experienced some delay through sales distribution before getting to the customer however.

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