Alcatel·Lucent Enterprise

Lithium-ion battery guidelines for mobile handsets

User Guide

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1 Introduction

The guidelines given in this document are intended to describe the best practices in terms of storage and usage in order to obtain the best performance of your Alcatel-Lucent Enterprise Lithium-ion battery over a long life.

Note that Lithium-ion batteries are consumable products with limited lifetime; their initial capacity and performance will decrease over time, whatever they are in use or not. In any case, a low capacity or degraded performance indicates the battery end of life and requires the battery to be replaced.

Battery life expectancy is stated in remaining capacity after a number of full charge-discharge cycles, typically 80% of initial capacity left after 400 full cycles. A full cycle means using all of the battery capacity. It may take several partial charges to complete a full cycle.

Note also that inappropriate storage and usage conditions will also reduce battery lifetime.

2 Scope

These guidelines are applicable to the Lithium-ion batteries delivered with Alcatel-Lucent Enterprise DECT, WIFI or Bluetooth handsets or as spare part (user-replaceable).

Specific battery model information may be found in the related handset user manuals.

3 Guidelines & Best practices

3.1 Storage

Storage will always cause batteries to age and capacity to decrease. Elevated temperature will accelerate the permanent capacity loss.

If a battery needs to be stored for more than 1 month, the following recommendations should be applied to slow down the aging effect:

- Best is to store battery half charged (3.7V to 3.8V).
- WARNING: Never store a battery fully charged or completely discharged! This will accelerate the capacity loss over time.
- Disconnect the battery from any device (handset or charger) and pack it in a clean insulated bag.
- Store the battery in dry and cool area (0°C to 25°C).
- Avoid possible freezing, especially for prolonged storage.

New batteries may be stored up to 1 year before first use, reference being the date code printed on the battery label. After this initial storage period, some charge-discharge cycles are recommended to keep battery half charged and extend storage time. But keep in mind that the longer the storage period, the shorter the battery lifetime in use.

3.2 First use

Important: *Always read the user manual before using the batteries.*

Lithium-ion is a very clean system that does not need special handling when new. The maximum capacity is available since the beginning.

Nevertheless, to allow storage in best conditions, the batteries are delivered half charged (see previous section). To show their full capacity, they need to be fully charged.

Note that after a prolonged period of storage, the maximum remaining capacity would be reached only after some charge-discharge cycles.

3.3 Usage

Caution: *Use only chargers (cradles) and power supplies listed in the user manual to charge the batteries.*

Keep batteries at room temperature; recommended usage environment is 0°C to 45°C:

- Batteries can be used within a handset below 0°C but their performance could be reduced (refer to handset operating temperature range)
- Exposing the battery to elevated temperature, such as under a window in direct sunlight, will damage the battery and shorten its life.

Best charging temperature is between 10°C and 30°C:

- When charging at higher temperature the battery capacity & lifetime is adversely affected.
- Never charge a Lithium-ion battery at freezing temperature (below 0°C) as this would definitively damage the battery.

Some best practices to get the best performance of a Lithium-ion battery:

- The battery does not need to be fully charged or fully discharged before recharge; a partial charge is better and the battery will last longer. Optimum is to keep charge level between 30% and 80%.
- The battery life is shortened when the battery is completely discharged. It is not recommended to completely discharging the battery (when the device switches itself off). Avoid frequent complete discharges. However, a periodic full discharge / charge cycle (eg. once a month) may be beneficial to recalibrate the battery and get an accurate charge level indication.
- If the device is not used for more than 1 month, it is not recommended to leave the device on its cradle or or connected to power source. It is better to disconnect the battery from the device and store it appropriately (see section 3.1 Storage).

Do NOT:

- Short circuit, over-charge or over-discharge the batteries itself.
- Attempt to disassemble or anatomize the batteries.
- Pierce the batteries with a sharp object.
- Immerse the batteries in water or get them wet.
- Strike, throw or subject the batteries to severe physical shocks.
- Direct solder on the contacts of the batteries.

3.4 Replacement

As explained in the previous sections, the initial capacity of the battery will gradually decrease over time, depending on the number of charge-discharge cycles, the depth of the discharge, the charging method, operating temperatures, storage time and conditions. As these parameters are use case dependent, it is very difficult to give a typical lifespan.

A battery should be replaced when it starts to show signs of weakness (compared to a new one in same conditions of use):

- Battery level indicator decreasing rapidly or battery not holding charge
- Battery service time much shorter
- Battery charging much faster

A battery shall also be replaced if damaged due to misuse, shock, impact or exposed to liquid or excessive temperature.

A Lithium based battery expands when gas is built up inside the air-tight pouch that holds the battery cell. For safety reasons, the gas is not let out, which results in an inflation of the battery. Batteries and related products are designed to absorb the normal inflation of the battery (10%) during its operation. But it can happen that a battery inflates more when it has reached its end of life. As soon as a battery shows any abnormal deformation and/or becomes difficult to insert in the handset or charger, it shall be no more used and replaced. Continuing to use such a battery could lead to damage mechanically the handset or the charger.

A battery showing an excessive overheating (above 50°C) shall also be no more used and be replaced. This overheating could be due to many reasons, generally when the battery has reached its end of life (high internal impedance) or when damaged / misused, in very rare case due to a manufacturing issue.

3.5 Disposal

Lithium-ion batteries contain metallic lithium that will interact with moisture unpredictably, so these batteries must be disposed appropriately. Spent batteries should be discharged fully prior to disposal for recycle. The purpose for recycling is to prevent hazardous materials from contaminating the environment. Please check with your local Rechargeable Battery Recycling Program.

> ***Caution:*** *Under no circumstances should batteries be incinerated, as fire can cause an explosion.*