MULTITECH®

Application Note

How to Properly Power Down a Cellular Radio

Shutting Down a Cellular Radio Properly

To avoid corrupting the cellular radio file system, we strongly recommend using a controlled power down or shut down before removing power. To do this, use the following sequence:

1. Issue the AT#SHDN command.
2. Delay 30 seconds.
3. Power off.

Background

Cellular technology is a collaboration between the carriers and chip vendors.

Carriers are requiring more and more control over the configuration and software of cellular devices that attach to their networks. These cellular devices consist of an RF radio and a main CPU with volatile and nonvolatile memory. They use a file system in the nonvolatile memory to keep track of all the cell software (radio stack).

This system also stores configuration and usage information that is updated frequently to stay in constant communication with the network. This means the CPU frequently writes to the flash memory so that next time it starts up it can quickly reconnect to the network or manage handoffs between towers, etc.

An uncontrolled power loss during one of these writes puts the file system at risk for corruption. While there are mechanisms in place to avoid such corruption, frequent power losses increase the chance that power will be removed during a write and corrupt the file system.

There have been reports of corruption caused by abrupt power loss on Qualcomm-based (CDMA/EV-DO) radios. The Qualcomm-based radios (C2 and EV3) tend to become unresponsive if corruption takes place. The H5, which are Intel based radios, have not shown this type of corruption issue but all radios have some risk because of the way carriers are trying to control the radios in the background. We have seen this Qualcomm based issue across multiple radio vendors and want to make sure our customers are aware of the risks with power loss.

We have many customers that follow the shutdown sequence and do not have corruption issues. Higher risk units are the MTD-EV3 models, which are USB powered devices used in applications where customers tend to pull the device from the USB host port and do not follow the shutdown sequence.

Recovering Devices with Corrupt File Systems

- USB EV3 models, if they come up in Qualcomm boot recovery mode, can be re-flashed using a Windows tool that we can provide. The USB modem appears as a Qualcomm device under device manager in Windows.
- Serial devices and USB devices that do not come up in boot recovery mode require factory repair.