Direct filesystem lookup

Direct filesystem lookup is the most common form of firmware lookup performed by the kernel. The kernel looks for the firmware directly on the root filesystem in the paths documented in the section 'Firmware search paths'. The filesystem lookup is implemented in fw_get_filesystem_firmware(), it uses common core kernel file loader facility kernel_read_file_from_path(). The max path allowed is PATH_MAX -- currently this is 4096 characters.

It is recommended you keep /lib/firmware paths on your root filesystem, avoid having a separate partition for them in order to avoid possible races with lookups and avoid uses of the custom fallback mechanisms documented below.

Firmware and initramfs

Drivers which are built-in to the kernel should have the firmware integrated also as part of the initramfs used to boot the kernel given that otherwise a race is possible with loading the driver and the real rootfs not yet being available. Stuffing the firmware into initramfs resolves this race issue, however note that using initrd does not suffice to address the same race.

There are circumstances that justify not wanting to include firmware into initramfs, such as dealing with large firmware files for the remote-proc subsystem. For such cases using a userspace fallback mechanism is currently the only viable solution as only userspace can know for sure when the real rootfs is ready and mounted.