

Data Formats for the qwdirect Program

This text is a highly preliminary draft. The information in it is incomplete and will be gradually expanded.

The qwdirect program is used to write data from input files to the flash memory in various formats. This document describes the formats of the input files and the formats for writing to the flash memory.

Input files consist of a sequence of page images that are sequentially written to the flash memory. A page image consists of two fields: the data field and the OOB (Out-Of-Band) field. The data field size is defined as follows:

$$\text{datasize} = 512 * \text{spp}$$

Here, 512 represents the number of bytes in a sector (other sector sizes are rarely encountered), and spp represents the number of sectors per page, which depends on the type of flash memory. Typically, this is either 4 or 8 sectors per page, resulting in a page size of either 2048 or 4096 bytes.

The OOB field size (oobsize) also depends on the type of flash memory. Typically, for flash memory with 2K pages, oobsize = 64, and for flash memory with 4K pages, oobsize = 224. This parameter is determined during the initialization of the NAND controller as follows:

$$\text{oobsize} = (8 \ll ((\text{devcfg} \gg 2) \& 0x1)) * (\text{pagesize} \gg 9);$$

The OOB field size in the input file must precisely match the auto-detected OOB size. If this is not the case, you can forcefully set the OOB field size of the input file using the -z flag. It is also possible to use input files that contain only the data fields of a page (oobsize=0). In this case, the OOB content will be automatically calculated during writing.

Data on the flash memory can be organized in two formats: standard and Linux. They differ in the layout of data on the page.

Standard format: Each sector has a size of 512 bytes, followed immediately by a 16-byte OOB field. This format is defined by the flash memory manufacturer and is used for all partitions except the YAFFS2 file system.

Linux format: All sectors on a page, except the last one, have a size of 516 bytes, followed by a 12-byte OOB field. The last sector on a page has a size of $512 - (4 * (\text{spp} - 1))$, and the OOB field following it has a size of $\text{oobsize} - 12 * (\text{spp} - 1)$. The extra 4 bytes in each sector contain pieces of the YAFFS2 tag. This way, the entire YAFFS2 tag is included in the flash memory's data field and is protected by ECC (Error-Correcting Code) just like the data itself.

Key	Input Format	Input OOB Fields	Fields for Writing Flash	Format
-fs	std	нет	data	std
-fl	linux	нет	data	linux
-fy	std	есть	data+oob	linux
-fi	std	есть	data+oob	Any
-fo	std	нет	data	linux