RELIANCE EDGE NAND

Flash file system for decision-quality data in high-reliability devices

Reliance™ EdgeNAND is one of the few fully integrated flash file system designed to capture and preserve data on SPI NAND and other software-managed raw NAND flash media. With an integrated flash translation layer that protects your critical system and user data from corruption, Reliance EdgeNAND is specifically designed for maximum reliability – overcoming power losses and keeping your data safe.

Fast boot times and consistent fail-safety

Outlast power failures with Reliance EdgeNAND. Power interruptions for NAND flash media can be devastating, resulting in costly device returns. Unlike other flash file systems, Reliance EdgeNAND is designed to quickly recover from interrupted program and erase operations at the lowest level, while protecting file system operations at the highest level. Forget replaying a journal or performing any other file system checks – Reliance EdgeNAND ensures your decision-quality data is safe and mount times kept minimal.

The flash translation layer within Reliance EdgeNAND contains error correction and error management software. These together with CRCs provide excellent handling of read disturb and data retention issues.

Stable and adaptable user experience

Lack of reliability can have consequences ranging from a failed mission due to lost or corrupted data, to warranty returns due to program corruption, or a frustrating user experience. Dynamic Transaction Point™ technology designed into Reliance EdgeNAND ensures rock-solid reliability as the file system maintains complete metadata and file data integrity, while providing an optimal user experience.

This true transactional architecture also gives developers complete compile-time and run-time control. Customize power profiles for the best balance of performance and data-at-risk – change, suspend, and resume transaction profiles at runtime all through a simple API.

FEATURES

Metadata reliable across power cycles	•
File data reliable across power cycles	•
Manages bad blocks, read disturb, scrubbing	•
Reliability method	Transactional
Requires fsck or journal replay	No
Reliance Edge released	2014
Frequent updates	Yes
Original environment	Any RTOS
Patented elements	Yes
Effective lines of code (eLOC)	8693
Average cyclomatic complexity	7.21
Atomic data write	•
Atomic metadata write	•
File system functionality	Partial POSIX
CRC32	All

REQUIREMENTS

Target configuration	Typically a 32-bit microcontroller; with or without an RTOS; as little as 4 KB RAM
Supported media	Single, dual or quad SPI NAND
Maximum volume size	7.3 GB at 512 byte block size to 256 TB (terabytes) at 64 KB block size

Flash File System Performance in kb/sec

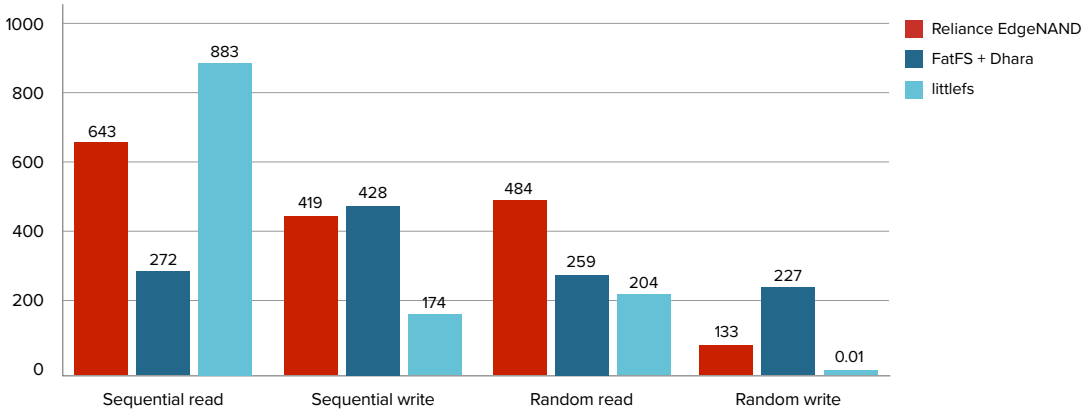

Figure 1. Test conditions: Nucleo-F767ZI with SPI NAND daughtercard, Toshiba TC58CVG1S3HRAIG 2Gbit SPI NAND, FreeRTOS

Extended flash lifetime

Reliance EdgeNAND keeps your flash memory sharp through wear leveling, a set of algorithms that attempt to maximize the lifetime of flash memory by evenly distributing wear across flash blocks. When modified data is written into a new block, dynamic wear leveling selects the new block based on wear leveling considerations.

Reliance EdgeNAND isn't just efficient, it's also sensitive to your data's needs. Dynamic wear leveling alone is insufficient – it's ineffective with data that's written infrequently, known as static data. Wear leveling blocks that store static data requires proactively moving that data to a new block, a process known as static wear leveling. Reliance EdgeNAND implements both dynamic wear-leveling and static wear-leveling as needed.

Uncompromising performance

Reliance EdgeNAND provides substantially faster performance compared to its alternatives. Our file system I/O testing showed Reliance EdgeNAND to have a significantly more stable and consistent random and sequential I/O. Our FSIOTest measures a variety of file I/O types, working with virtually any file system, and is included with Reliance EdgeNAND.

In addition to read and write, this test performs an operation where 1000 files are created, opened, and then deleted. The time to perform this operation demonstrates the file system's latency.

Create, open, and delete 1000 files in seconds

	Create	Open	Delete
Reliance EdgeNAND	55.7	5.8	23.2
FatFS + Dhara	171.4	85.3	117.9
littlefs	3184.6	1692.2	502.3

Figure 2. Test conditions: Nucleo-F767ZI with SPI NAND daughtercard, Toshiba TC58CVG1S3HRAIG 2Gbit SPI NAND, FreeRTOS

Award-winning technical support

Our team of file system experts will support you all the way from evaluation to implementation, going above and beyond to ensure your project performs flawlessly and on schedule. Our annual support subscriptions are available with a choice of service level options, so you can select the right degree of support that suits your needs.

Simpler architecture, faster implementation

The Reliance EdgeNAND RTOS services API is designed to be easy to implement for any RTOS, or even a simple scheduler loop. Our comprehensive developer documentation provides a searchable reference to every library function and configuration option, leaving the system designer free to concentrate on other applications for building a superior customer experience. It's far quicker to use the fully-tested Reliance EdgeNAND flash file system than to write custom data storage routines that are both power fail-safe and well tested.

Software development kit and licensing

In addition to full source code, our commercially licensed kits include a comprehensive Developer's Guide, API reference, and validation utilities. We offer licenses for runtime distribution per product, processor family, or product line.

The highest level of flash file speed and reliability

Reliance family file systems have shipped in hundreds of millions of devices worldwide across a variety of industries, and benefit from our award-winning technical support.

Reliance EdgeNAND can be configured to meet your flash file data storage needs, by reducing complexity, optimizing resource use, and maximizing performance. Whether your application requires a single log file or ultimate flexibility to modify file hierarchy during runtime – we'll tailor Reliance EdgeNAND to handle your specific requirements.

Let us ensure your embedded storage remains responsive and stable.
Get in touch with us at sales@tuxera.com

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