

# I. Offsite Backup

## 1. Project Mission

§ 1.1.1. Provide a solution to automatically offsite-backup your local NAS backup.

## 2. Use Cases

§ 1.2.1. As a user, I want to simply backup my Mac to my local NAS with Time Machine, not more.

§ 1.2.2. As a user, I want an offsite backup of my Time Machine backup for disaster recovery (fire, water, theft, etc.).

§ 1.2.3. As a user, I want to use a second NAS at my dad's place as second tier backup location OR I want to use a virtual server in a data center as second tier backup location.

§ 1.2.4. As a user, I want a simple recovery of my data from the offsite backup in case I need it (because I probably care for other things in that situation as well...).

§ 1.2.5. As a user, I want to regularly backup all my photos and family videos (>1 TB, >150.000 files) to the remote location.

§ 1.2.6. As a user, I don't want my notebook to handle all this remote-backup stuff. I want my NAS to do all the work in the background.

§ 1.2.7. As an administrator, I want the backup to run automatically.

§ 1.2.8. As an administrator, I want automatic security updates for all involved systems.

§ 1.2.9. As relative, I want easy access to the backedup data in case of a fatal disaster.

## 3. Solution Design Requirements (in the order of their priority)

§ 1.3.1. Automatic

§ 1.3.2. Safe and Robust

§ 1.3.3. Performant and resource aware

§ 1.3.4. Platform independent

## 4. Design Decisions

§ 1.4.1. Interrupted transmissions shall not render the second tier backup inconsistent (Reading the system state shall be atomic)

§ 1.4.2. Changes on the first tier during backup to the second tier shall not render the backup on the second tier inconsistent (Writing the system state shall be atomic)

§ 1.4.3. Only deltas shall be transferred over WAN

§ 1.4.4. The solution shall be standards-based to the greatest possible extend.

§ 1.4.5. No need to patch the components

## 5. Runtime Environment Requirements (Assumptions/System Requirements/Restrictions)

§ 1.5.1. Solution can execute code on local NAS and remote storage (e.g. two Synology Diskstations with ssh-access)

§ 1.5.2. Local and remote storage can run rsync

§ 1.5.3. Local NAS provides file system based snapshot functionality (e.g. btrfs)

§ 1.5.4. Remote storage support hard-links

§ 1.5.5. The onsite backup can simply be replicated, no need to select/filter files or to provide version management. (This shall be provided by the first tier backup solution, e.g. Time Machine, if needed.)

§ 1.5.6. The backup process shall work starting from an effective 2 MBit WAN uplink connection.

## **6. System Design**

§ 1.6.1. bash script with standard tools (Linux-environment)

§ 1.6.2. simple and standard file structure of the second tier backup

§ 1.6.3. Automatic detection of activity in a target backup folder (e.g. is Time Machine currently running?)

§ 1.6.4. Local snapshot via btrfs before transmission (any alternatives?)

§ 1.6.5. rsync --link-dest for data transmission

§ 1.6.6. remove second tier backups after successful transmission

§ 1.6.7. remove local snapshot