

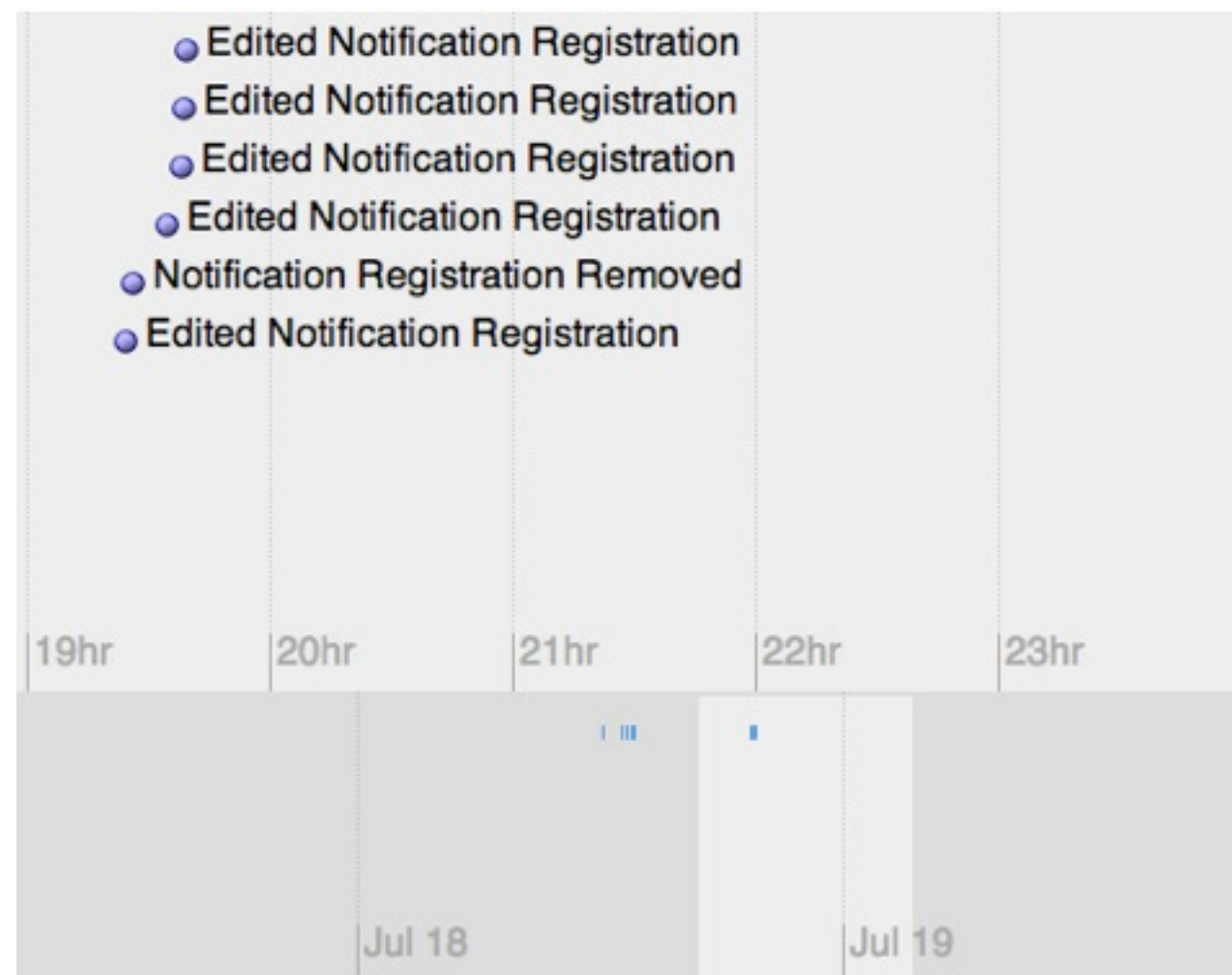
The Time Travelling Router

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Aims

Provide history and undo of configuration for home networks.

Network configuration includes the identification of the network, its security as well as the devices connected and how they can interact with each other. Configuration changes can be tracked to inform the user of what happened when.



Configuration Store

Store a copy of configuration in a CouchDB database

- Data stored as JSON documents
- One document for WiFi, one for each notification endpoint etc
- Documents selected using map/reduce queries.
- HTTP API

Example Notification Endpoint Document

```
{ "_id": "abb5c5b099ebbd3d877b60e380021c6",
  "_rev": "5-ecff7ef64fca0bd55e3f7314cbb272c",
  "name": "Rob",
  "service": "phone",
  "priority": 1,
  "user": "+447123456789",
  "setting_type": "notification" }
```

Configuration Changes and History

In CouchDB, when a document is changed, the new ID and revision number are added to a list of changes accessible from an API.

This means when a document change occurs, the update can be applied to the appropriate network configuration

Configuration Files are stored in Git, and successful changes are tagged with the corresponding CouchDB document revision

The document revision allows any version of a CouchDB document to be accessed, providing an automatic history

Changes are also added to another CouchDB document that is formatted in a form suitable for conversion to display as a timeline display to the user

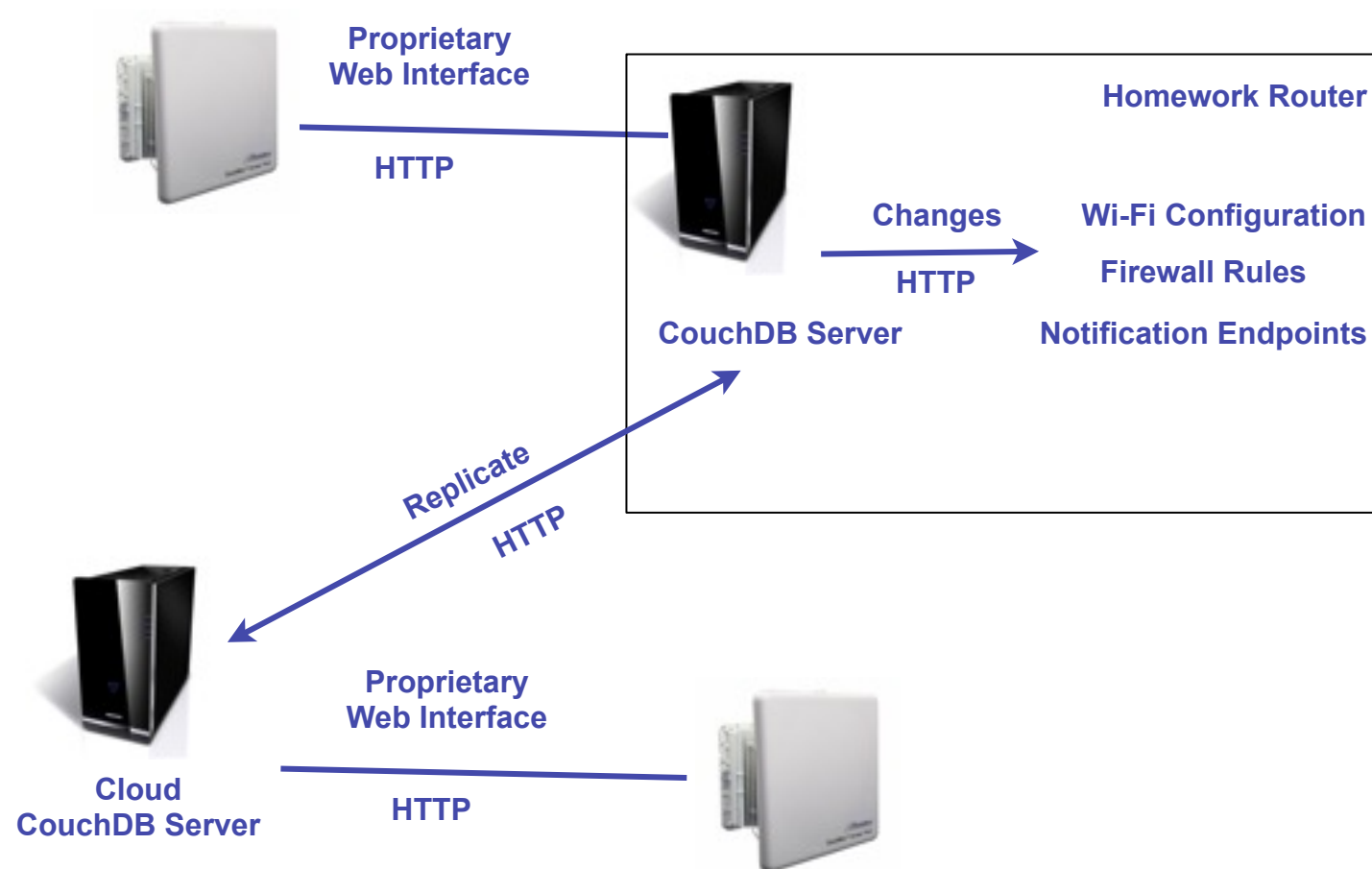
Example History for Timeline

```
{
  "_id": "config_history_file",
  "_rev": "268-ba9dbb155cd440c562837cd2bb5bb726",
  "events": [
    {
      "start": "2012-07-18T12:10:37.955Z",
      "title": "Registered New Notification",
      "description": "Added \\t\\tTwitter Username\\n\\t for rob with value rjspencer1989 with priority 1\\nModified By Rob",
      "durationEvent": false,
      "start": "2012-07-18T12:10:44.746Z",
      "title": "Notification Registration Removed",
      "description": "Removed Notification registration\\nModified By Rob",
      "durationEvent": false
    }
  ]
}
```

System overview

Use a database to store a copy of configuration with a log of changes

- SSID, Encryption, Firewall Rules, etc.
- HTTP API to make changes
- Store change list in database in form suitable for presentation
- Make changes by reacting to changes in the database
- Cloud backup and modification of some configuration options



System Architecture

Related application

Routers used are configured to be fully working routers as used by the Homework Project. This means easier extension because routers are Asus Eee PCs, and have a full Ubuntu server install

Homework provides a number of UIs but most configuration must be supplied in configuration files or databases.

Can start from scratch and not worry about compatibility with existing UI

Future Work

Local trial will be used to obtain feedback on current work

Some questions that this work has raised:

Homework provides interesting data, can this be used?

Can configuration changes be suggested or applied based on network usage?

Community based troubleshooting / configuration update

Agent analysis of history