WakeUp platform

Architecture

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WakeUp platform: Architecture

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Chapter 1. Introduction

Today, all mobile platforms has their own Push Notification platform used to deliver asynchronous messages to devices, trying to keep the minium of opened connections from the system and apps to third party servers and encapsulate all push information in one single channel.

All these platforms have a common denominator, all of them maintains a TCP socket opened all the time.

This socket kept opened by the system is used to deliver the notifications when it's needed. Some of the systems are really lightweight, meanwhile others carry a lot of payload, have signaling messages, priorities and other advanced features.

Current Internet solutions issues

Internet Push solutions are based on a public accessible server which handles all the notification acceptance and delivery from third party servers to the phones.

These solutions are not designed considering how mobile networks work and forces the handset to maintain an open socket with the server in order to deliver the notification as quick as possible.

This way of working increases the signaling in cellular networks and handsets battery usage. For more information about this, please refer to "Mobile network issues with current Push platforms" chapter.

Service Description

The WakeUp platform is aimed to wakeup mobile devices so external Push servers of any kind of operating system can avoid having an open socket all the time and sending pings to keep that connection alive.

The main objective of this service is to deliver wakeup packages based on some user information given by the Push platform. It's designed to work in cellular networks environments and have a small and simple integration with the OBs.

This server will provide a public API only for trusted partners which allow them to wakeup any mobile device inside mobile operator networks, thus removing the necessity of having an opened socket all the time.

What Push platforms will use this system?

Third party Push platform providers like Mozilla's FirefoxOS Push server should sign an agreement with mobile operators to have access to the wake up public APIs.

These third party clients will benefit from the battery savings of their devices and reduced network consumption on any cellular network.

After signing the agreement, the Operator will deliver a signed certificate (self-signed or verified by third parties CAs) which will identify in a unique way the wakeup platform users.

This certificate MUST be used to Authenticate and Authorize access to the WakeUp platform.

Chapter 2. Mobile network issues with current Push platforms

This chapter explains why current solutions are bad for the mobile networks and how we designed this server to solve these issues.

In order to understand the complete problem, we need to introduce how the mobile networks work at radio level and also how the carriers have their network infrastructure.

Mobile networks in a Private or Public LAN

Since on IPv4 the amount of free addresses is really low (it is usually 2^{24} IPs, or 16777216), cellular networks are divided into the ones with real IPv4 addresses (normally for 3G modems) and private addressing model for handsets, usually with NAT protocols.

In the case of private networks, it's obvious that it's not possible to directly notify the handset when the server has a notification for it (because it is behind a NAT), so smartphone manufacturers or mobile OS developers decided to maintain opened channels with their servers so it is possible to notify handsets asynchronously, and only when something happens on the server.

On the other hand, if the handset has a public address, or is using IPv6, it is theoretically possible to send the message directly making third party solutions not useful, however in order to protect users, carriers might deploy firewalls to avoid direct access from Internet to handsets.

Mobile Network. Circuit domain states

In the 3GPP TS 25.331 specification, we can query all the circuit domain statues of the RRC Layer (Radio Resource Control).

In order to simplify, we only list the third generation (3G) states:

- Cell_DCH (Dedicated Channel)
  When the handset is in this state is because it has a dedicated channel on the mobile network.

  Normally the network sets a handset into this state when it's transmitting a big amount of data.

  The inactivity time of this state is really short, known as T1 timer it should vary between 5 and 20 seconds. If T1 is fired, the handset will be changed to the Cell_FACH state.

- Cell_FACH
  In this state the handset is connected to the mobile network using a shared channel with other handsets.

  Normally, this state is assigned by the network when the handset is transmitting a small amount of data. So it's common to use it when sending keep-alive packages.

  The inactivity time of this state is a little longer (30 seconds) and is known as T2 timer. When T2 timer is shotted, the handset will be moved to Cell_PCH or URA_PCH (depending on the type of network)

- Cell_PCH or URA_PCH (PCH: Paging Channel) (URA: UTRAN Registration Area)
  In this state the handset is not able to send any data except signaling information in order to be able to localize the handset inside the cellular network.

In both states, the RRC connection is established and open, but it's rarely used.

In this state, the handset informs the network every time the device change from one sector to another so the network is able to known exactly the BTS which is offering service to the device.

The T3 timer defines the maximum time to be in a PCH state. This timer is longer than T1 and T2 and depends on each carrier. When it's fired the handset is moved to IDLE mode so if new data transmission is needed the handset will need near 2 seconds to reestablish the channel and a lot of signaling messages.

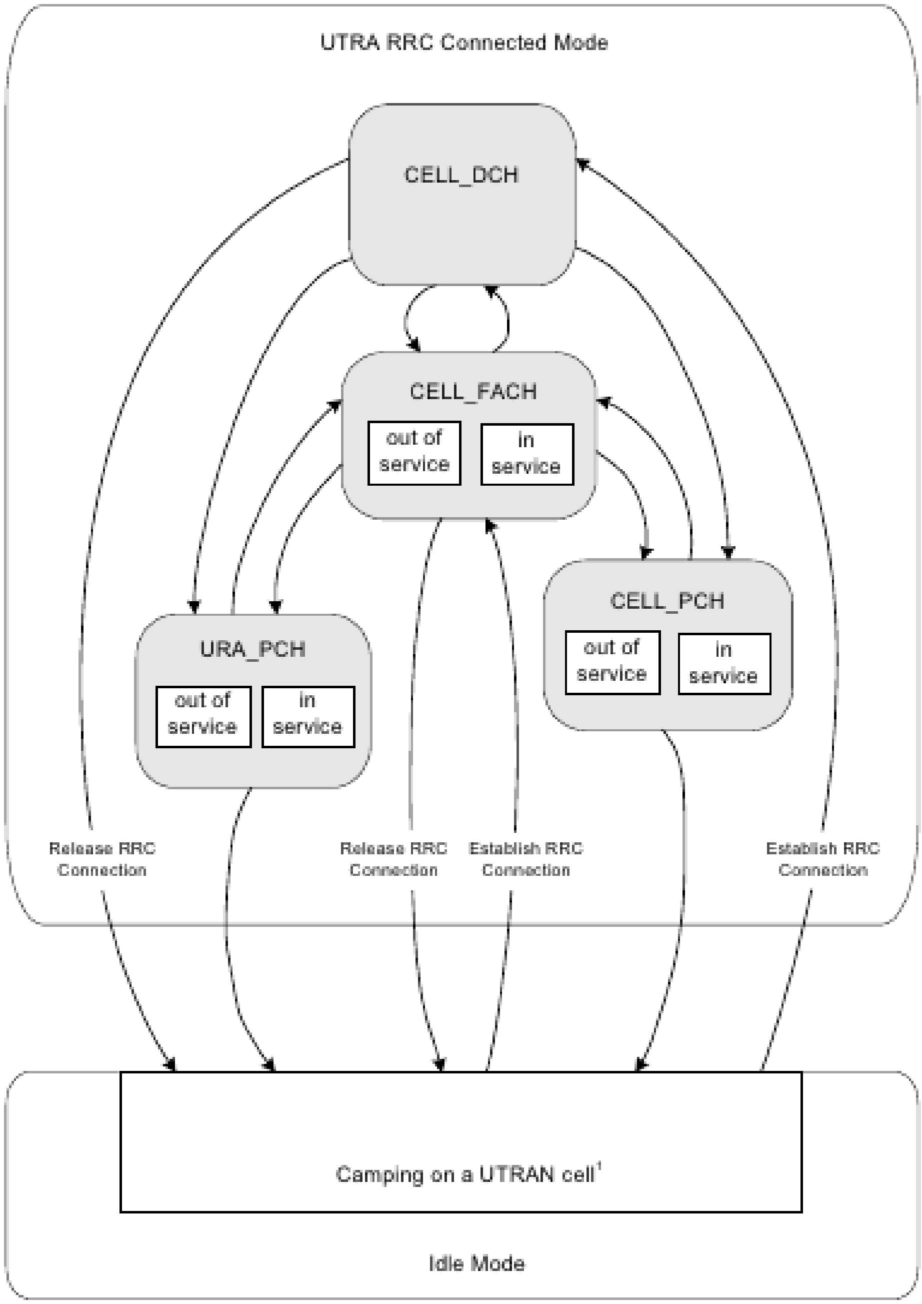
- RRC_IDLE
  This is the most economical state since the handset radio is practically stopped.

  In this state, the radio is only listening to radio messages querying the handset to "Wake Up" (paging messages).

  Also, the handset modem is listening the cell data so each time it detects that the user changed from one LAC (Localization Area Code - Group of multiple BTS) to another, the handset will change to the PCH state in order to inform the network.

  So when a handset is in this state, it can be Waked Up to a more active state and also the network knowns the LAC where the handset is moving, so if the network needs to inform the handset it should send a broadcast paging message through all the LAC BTS in order to locate the handset.

The following scheme represent the different radio states ordered by power consumption on the device:



Mobile Network. Package domain states

In the 3GPP TS 23.060 specification, we can analyze all the package domain states of the GMM Layer (GPRS Mobility Management).

The package domain states are simpler than radio ones (only 3 states):

- READY (2G) / PMM_CONNECTED (3G)
  The handset has a PDP context established and is able to send and receive data.

- STANDBY (2G) / PMM_IDLE (3G)

The handset isn't transmitting anything but the PDP context is not closed, so it maintains a valid IP address.

In this state the handset don't consume any resource but the network is maintaining his IP address as a valid one, so it's very important to try to maintain the handset in this state in order to be able to Wake Up it and change to a PMM_CONNECTED state in order to transmit/receive information.

- IDLE (2G) / PMM_DETACHED (3G)
  In this state, the handset hasn't a PDP context established so it hasn't a valid IP address.

Mobile Network. States relation

In this section we show the relation between RRC and GMM states.

In order to simplify this table, we only consider the handset is only using data channels, so no voice nor SMS (circuit domain) is being used.

Table 2.1. RCC - GMM relation

RCC State	GMM State (2G/3G)	Description
Cell_DCH	READY/PMM_CONNECTED	The handset is transmitting or receiving data information using a dedicated channel or a HSPA shared channel.
Cell_FACH	READY/PMM_CONNECTED	The handset had been transmitting or receiving data some seconds ago and due to inactivity had been moved to the Cell_FACH RCC state. Also it's possible that the handset is transmitting or receiving small amount of data like pings, keep-alives, cell updates,...
Cell_PCH/URA_PCH	READY/PMM_CONNECTED	The handset had been in Cell_FACH some seconds ago and due to inactivity had been moved to this less resource consume state. However, the signaling channel is available and is able to change to a data transmission state like FACH or DCH with a little amount of signaling.
Cell_PCH/URA_PCH	STANDBY/PMM_IDLE	The handset is not transmitting nor receiving any amount of data and also the signaling connection is closed.
RCC State	**GMM State (2G/3G)**	**Description**

RCC State	**GMM State (2G/3G)**	**Description**
		However the IP address is maintained by the network and associated to this handset. This is one of the most interesting states since the PDP context is not closed, the IP address is still valid and the handset is not consuming battery, network traffic,... As soon as the handset needs to reestablish the data channel the radio state will be changed to FACH or DCH.
RRC_IDLE	STANDBY/PMM_IDLE	This state is the same as the previous one since the radio state is IDLE.
RRC_IDLE	IDLE/PMM_DETACHED	The handset is not transmitting nor receiving anything and also it hasn't any PDP context established, so no IP address is available for this handset. Normally this state is after 24h of inactivity in the package domain.
RCC State	**GMM State (2G/3G)**	**Description**

Mobile Network. Signaling storms

This is a carrier well-know effect after the big adoption of smartphones around the word.

As we explained in previous sections, each time the network decides to move a handset from one state to another is needed to reestablish channels and starts a negotiation between the network and the handset with the signaling protocol.

Since nowadays handsets are sending keep-alives to maintain their connections opened, the effect is that the handsets is continuously changing from one state to another producing a lot of signaling in the network and also consumes a lot of battery resources.

Mobile Network. Battery consumption

The battery consumption depends on the Radio state. The following list represent the amount of battery needed on each state represented in relative units:

- RRC IDLE: 1 relative unit
- Cell_PCH: < 2 relative unit
- URA_PCH: < or equal than Cell_PCH
- Cell_FACH: 40 relative units

- Cell_DCH: 100 relative units

Chapter 3. Protocol

The protocol is designed to be as simple as possible (KISS philosophy).

Network identification

First of all, mobile device SHALL inform their Push platforms in which mobile network are they connected. To do this, two alternatives can be used:

- MCC - MNC (Mobile Country/Network Codes)
  This pair identifies each mobile network in a unique way.

  The ITU-T Recommendation E.212 defines mobile country codes as well as mobile network codes.

  Complete list of all MCC-MNC pairs [http://dvcs.w3.org/hg/Push/raw-file/default/index.html]

  This scheme is valid if the mobile network has only one segment assigned to the MCC-MCN pair.

- Network ID (DNS Based)
  Since some mobile operators have multiple network segments under the same MCC/MNC pair (because the high number of subscribers), an alternate identification method had been designed.

  This other method identifies each mobile network by a UNIQUE HASH (selected by the MNO) but any RANDOM and UNIQUE string is valid. An UUID is recommended.

  The mobile device SHALL inform his Network ID to the Push platform instead the MCC/MNC pair.

Recovering network identification

MNO will publish the Network ID in the DNS infrastructure so each mobile only need to resolve a simple DNS query to recover the Mobile Network ID

[TO-DO] DNS ENTRY FORMAT

APIs

API: Mobile device -> Push platform

The mobile device SHALL inform his own Push platform each time some network data is changed. (network change, IP change, ...).

The data sent to the Push platform SHALL contain:

- Mobile IP address
- TCP or UDP port in which the mobile agent is listening
- MCC-MNC or Network ID ("Network identification")

API: Push platform -> WakeUp platform (Global node)

This service exposes a REST API in which some resources are shared with other platform services (please refer to "Common REST API resources")

These servers listens in HTTP and not in HTTPS since SSL SHALL be terminated by software (nginx, for example) or hardware equipments

This means, that all HTTP queries to the WakeUp nodes shall contain these extra headers to inform about the client certificate. If these headers are not provided, WakeUp servers will answer with an error (Status code 400).

- X-Real-IP:
  This header will contain the IP address of the client.

  This will be used in log traces.

- X-Forwarded-For:
  This headers contains the different proxies IP addresses used between the client and the server.

- X-Client-Cert-DN:
  This will contain the client certificate DN string used to identify the client in all log traces.

  This will be used in log traces.

- X-Client-Cert-Verified:
  If SSL client verification is valid and SSL terminator rely on this. This header SHALL contain 'SUCCESS'.

  Any other value will be considered an invalid certificate and the connection will be rejected.

REST API: wakeup (global) resource

Resource path is: wakeup/v1

This resource is used to wake up a device. Only POST method is allowed.

POST

The HTTP payload is a parametrized string in "querystring" format:

```
param1=value1&param2=value2&param3=value3
```

- ip:
  IP Address of the client device

  Shall be a valid IPv4 address

- port:
  TCP or UDP port in which the client is waiting wakeup for notifications

  Shall be a number between 1 and 65535

- netid:
  Network ID ("Network identification")

  Shall be a string

- mcc:
  Mobile Country Code (if netid is not provided)

Shall be a number

- mnc:
  Mobile Network Code (if netid is not provided)

  Shall be a number

- proto:
  WakeUp protocol.

  This is optional. By default UDP

  Shall be one of these values:

  - tcp
  - udp

Multiple checks will be done before the client receives the final response.

These errors will inform about different issues:

- Mandatory parameters:
  If the mandatory parameters are not present a status code 400 will be responded.

  Mandatory parameters are: ip and port numbers and netid or MCC/MNC pair.

- Mobile device identification (IP and Port)
  Also the IP parameter will be validated as a valid IPv4 address. The Port shall be between 1 and 65535.

- Mobile network identification
  If the MCC/MNC pair or NetID suplied is not managed by the server (local node not found) a status code 404 (not found) is responded.

- Device in the network
  If the device IP is not inside the mobile network ranges, a status code 400 will be responded (No valid device IP)

- Mobile network status
  If the mobile network local server status is offline for any cause, a status code 503 is returned and should be retried later.

- Protocol accepted
  If the network configuration informs about the optional supported protocols parameter, the protocol queried by the client (proto parameter) will be validated and if the protocol is not accepted by the local node a status code 400 will be sent to the client.

In any other case a 200 OK status code will be responded. This means that the platform will try to deliver the message to the local node, anyway if any error is produced during this process the client won't be informed so it should retry again if the device is not waked up.

REST API: netinfo resource

Resource path is: netinfo/v1

This method informs about all supported networks by this server and the current status of each one.

GET

Only GET method is allowed. The response contains an array with all supported networks with the mcc-mnc of each one, the assigned network id (netid), the IP accepted range or ranges and the current status of the network (offline)

A list of supported protocols can be (it's optional) listed into the protocols array.

```
{"nets": [{"netid":"214-07","mccmnc":"214-07","range":"10.0.0.0/8",
```

Internal API: Local nodes

REST API: wakeup (local) resource

Resource path is: wakeup

This resource is used to wake up a device. POST and GET are supported. GET is supported for backwards compatibility but it's deprecated.

POST

The HTTP payload is a parametrized string in "querystring" format:

```
param1=value1&param2=value2&param3=value3
```

GET

The URL contains a parametrized string in "querystring" format:

```
param1=value1&param2=value2&param3=value3
```

Common querystring for GET and POST methods

- ip:
  IP Address of the client device

  Shall be a valid IPv4 address

- port:
  TCP or UDP port in which the client is waiting wakeup for notifications

  Shall be a number between 1 and 65535

- proto:
  WakeUp protocol.

  This is optional. By default UDP

  Shall be one of these values:

- tcp
- udp

Common REST API resources

REST API: about resource

Resource path is: about

Also, this is the default path, if no other path is defined.

GET

No parameters needed. Returns a HTML information page

REST API: status resource

Resource path is: status

This method is used to check server availability. If, for any reason, it's needed to avoid traffic through one server, this method can set the service as offline.

Can be used by load balancers and by the global checker service

GET

No parameters needed. Returns a 200 OK or 503 Service Unavailable.

POST

Changes the status of the service.

The HTTP payload is a parametrized string in "querystring" format:

```
param1=value1&param2=value2&param3=value3
```

with only one value:

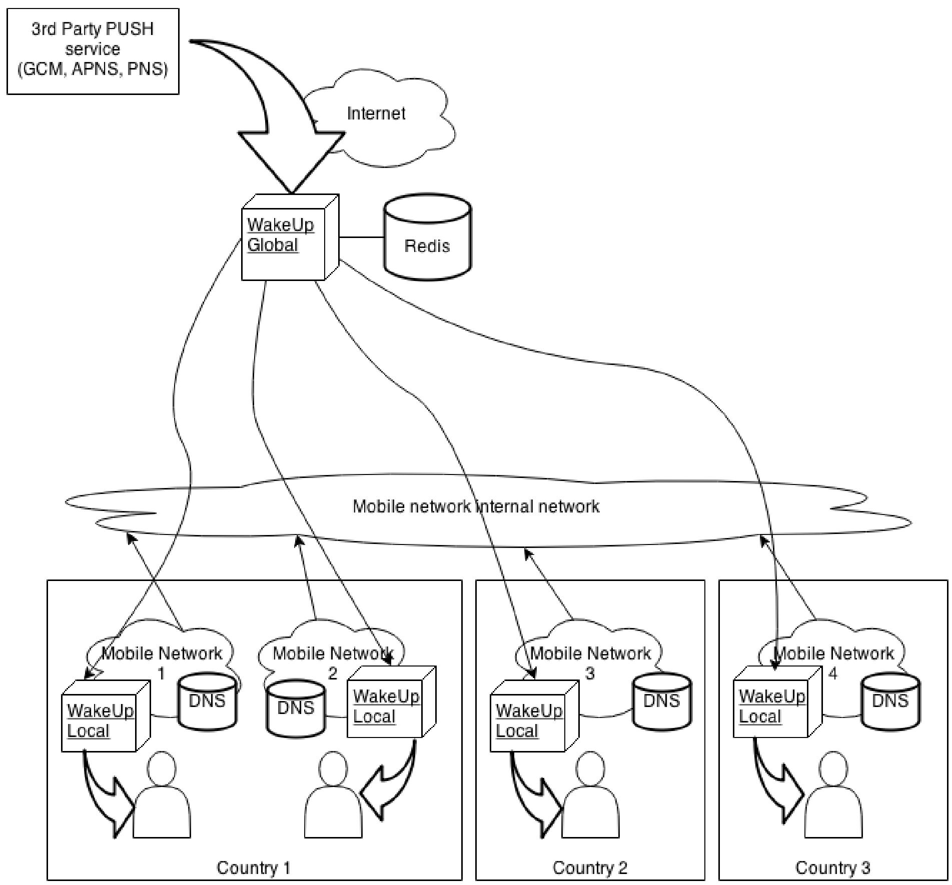
enable = [true | false]

To enable or disable, you can use this simple curl calls:

```
curl -d 'enable=true' -k --key test_ca/TEST_CERTIFICATES/client.key --cert test_ca
curl -d 'enable=false' -k --key test_ca/TEST_CERTIFICATES/client.key --cert test_c
```

Chapter 4. Installation and Configuration

This chapter explains the requirements, to install and configure the wakeup platform correctly



Local nodes

This server shall be installed inside mobile networks so it has a network interface into the same IP segment as mobile phones.

Also it needs a second network interface which connects this nodes to the global one (through operator dedicated networks, VPNs, ...)

Local node will receive HTTP queries to three resources (about, status and wakeup), so any other HTTP query can be securelly filtered.

Finally, this server will send TCP and/or UDP queries to the mobile network.

Global node

This server should be installed in an Internet accesible network but with a SSL Terminator as a frontend.

Global node will receive HTTP(s) queries to three resources (about, status and wakeup/v1), so any other HTTP query can be securelly filtered.

Mobile networks configuration file

Instead a common database, a simple configuration file is used to manage the different local networks.

The networks.json configuration field shall be a well formed JSON file.

The contents shall follow this scheme:

```
{
  "<netidname>": {
    "host": "<local host URL>",
    "range": "<IP Range or ranges allowed in this network>",
    "network": "<MCC-MNC pair>",
    "offline": <true|false>
  },
  ...
}
```

Example:

```
{
  "214-07": {
    "host": "http://localhost:9000",
    "range": "10.0.0.0/8",
    "network": "214-07",
    "offline": true
  }
}
```

See the network collection info here: Networks collection

SSL Terminator

The service is designed to work with a SSL Terminator / SSL Offloader as a frontend, in other words, all connections SHALL be verified with a HTTP SSL Server (Hardware terminators, Apache, NGINX, ...)

These servers will verify client and pass the SSL verification result to the Wakeup servers with these HTTP extended HEADERS:

- X-Real-IP:
  This header will contain the IP address of the client.
- X-Forwarded-For:
  This headers contains the different proxies IP addresses used between the client and the server.
- X-Client-Cert-DN:
  This will contain the client certificate DN string used to identify the client in all log traces.

- X-Client-Cert-Verified:
  If SSL client verification is valid and SSL terminator rely on this. To consider a succesful check this header SHALL be 'SUCCESS'.

  Any other value will be cosidered an invalid certificate and the connection will be rejected.

NGINX example setup

If you decide to use NGINX as a software terminator [http://wiki.nginx.org/SSL-Offloader] , you can use this configuration file as a template.

Into the utils/test_ca folder of main wakeup_platform project (wakeup_platform) you will locate this sample configuration that can be used as a simple reference:

```
# See http://wiki.nginx.org/HttpSslModule
# and http://wiki.nginx.org/HttpProxyModule

server {
    listen        443;
    ssl on;
    server_name example.com;

    ssl_certificate /TEST_CERTIFICATES/server.crt;
    ssl_certificate_key /TEST_CERTIFICATES/server.key;
    ssl_client_certificate /TEST_CERTIFICATES/ca.crt;
    ssl_verify_client on;

    location /global/ {
      proxy_set_header X-Real-IP $remote_addr;
      proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
      proxy_set_header Host $http_host;
      proxy_set_header X-NginX-Proxy true;

      proxy_set_header X-Client-Cert-DN $ssl_client_s_dn;
      proxy_set_header X-Client-Cert-Verified $ssl_client_verify;

      proxy_pass http://localhost:8000/;
      proxy_redirect off;
    }

    location /local/ {
      proxy_set_header X-Real-IP $remote_addr;
      proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
      proxy_set_header Host $http_host;
      proxy_set_header X-NginX-Proxy true;

      proxy_set_header X-Client-Cert-DN $ssl_client_s_dn;
      proxy_set_header X-Client-Cert-Verified $ssl_client_verify;

      proxy_pass http://localhost:9000/;
      proxy_redirect off;
    }
```

```
}
```

Create your own Certification Authority

Using OpenSSL you can create your own CA for testing or deploying purposes

Into the utils/test_ca folder of main wakeup_platform project (wakeup_platform) you will locate this sample script can be used as a simple reference:

```
echo "Generating a test client/server certificates for wakeup platform ..."

CA_SUBJECT='/C=SP/ST=DummyState/L=DummyLocation/O=WakeUpPlatformOrg/CN=wakeupCA'
SERVER_SUBJECT='/C=SP/ST=DummyState/L=DummyLocation/O=WakeUpPlatformOrg/CN=wakeup.
CLIENT_SUBJECT='/C=SP/ST=DummyState/L=DummyLocation/O=WakeUpPlatformOrg/CN=client_

DEST='TEST_CERTIFICATES'
rm -rf $DEST
mkdir $DEST
cd $DEST

echo "Creating CA private key ..."
openssl genrsa -des3 -out ca.key 4096
echo "Creating CA certificate ..."
openssl req -new -x509 -days 365 -key ca.key -out ca.crt -subj $CA_SUBJECT

echo "Creating Server private key ..."
openssl genrsa -des3 -out server.key 1024
echo "Creating Server CSR ..."
openssl req -new -key server.key -out server.csr -subj $SERVER_SUBJECT
echo "Signing Server CSR and creating certificate ..."
openssl x509 -req -days 365 -in server.csr -CA ca.crt -CAkey ca.key -CAcreateseria

echo "Creating Client private key ..."
openssl genrsa -des3 -out client.key 1024
echo "Creating Client CSR ..."
openssl req -new -key client.key -out client.csr -subj $CLIENT_SUBJECT
echo "Signing Client CSR and creating certificate ..."
openssl x509 -req -days 365 -in client.csr -CA ca.crt -CAkey ca.key -out client.cr

echo "Removing server key password ..."
mv server.key server.key.org
openssl rsa -in server.key.org -out server.key

echo "Removing client key password ..."
mv client.key client.key.org
openssl rsa -in client.key.org -out client.key

echo "Generating a PKCS#12 for client certificate"
openssl pkcs12 -export -in client.crt -inkey client.key -out client.p12

cd ..
```

Chapter 5. Operations and administration

This chapter explains how to proceed in case of troubles

Local nodes

If no parameter is passed, the config.default.json file will be used.

If it's desired to use another configuration file, it can be passed through command line or WAKEUP_CONFIG environment variable.

Global node

If no parameter is passed, the config.default.json file will be used.

If it's desired to use another configuration file, it can be passed through command line or WAKEUP_CONFIG environment variable.

Enable/Disable service

Both, local and global nodes, exposes an API which lets operators disable the service so load balancers will not send queries to these ones.

This is based on the status API method (see REST API: status resource section)

If the operator needs to work on a machine, he first should disable the service sending the correct command to the service:

```
curl -d 'enable=false' -k --key test_ca/TEST_CERTIFICATES/client.key --cert test_c
```

After maintainment is finished, the operator will reenable the service again with this other command:

```
curl -d 'enable=true' -k --key test_ca/TEST_CERTIFICATES/client.key --cert test_ca
```

Load balancers will check the response of the GET query to the status URL (https://[SERVER]/status/). If the HTTP status is 200 (OK) the service is enabled. If the response is 503 (Under maintanance) the service is disabled

Data Storage

No additional data storage is used. Only configuration files are needed

Chapter 6. Source Code

This chapter explains how the source code and GIT repositories are organized

If you want to collaborate you should read this chapter.

How it's implemented

This project is implemented using JavaScript on the server (Node.JS)

External dependencies

All node dependecies will be downloaded automatically using NPM

The global node depends in these other projects and versions:

- Node.JS
  Used as the basic framework
- Node.JS log4js Version 0.6.x
  Used as logging library
- Node.JS request Version 2.27.x
  Needed to create new HTTP requests to the different servers
- Node.JS range_check Version 0.0.x
  Used to check if the received IPs are in the same IP range managed by the different local servers

The local node depends in these other projects and versions:

- Node.JS
  Used as the basic framework
- Node.JS log4js Version 0.6.x
  Used as logging library

For development only these libraries and needed too:

- Node.JS
  Used as the basic framework
- Node.JS vows Version 0.7.x
  Used as unit test framework
- Node.JS complexity-report Version 1.0.x
  Used to generate cyclomatic complexity reports
- Node.JS async Version 0.2.x
  Needed to have a more clear code

Database structure

The mobile_networks.js library is used to talk with the database store.

The database store is a simple JSON file called "networks.json"

Networks collection

This collection is the most important one since this hosts each local server information (IP address, IP range of his managed network, current status, ...)

This collection will be queried allways, if the client give us the MCC-MNC pair, the server will generate a generic network id with the MCC MNC pair splitted by a dash. After that, the service will query this collection to find that network.

If networkId is provided in the query, resolution will be faster since only one query to this collection is needed.

Each register is a JSON formatted string with the following attributes:

- host:
  URL to send HTTP queries to local nodes.

  Shall follow the standard URI scheme: http(s)://host:port

- range:
  IP range or ranges accepted into this network.

  Shall follow the standard CIDR scheme: a.b.c.d/n

  An array of ranges is also allowed: ["a.b.c.d/n", "a.b.c.d/n"]

- nework:
  MCC-MNC of this network

  This MCC-MNC can be shared by multiple networks.

- protocols:
  This is an optional parameter.

  It's an array with all supported wakeup protocols. By default tcp and udp should be declared.

  If this data is declared, will be sent to the clients on the netinfo/v1 query and will be used to validate the proto parameter of wakeup/v1 API.

- offline:
  Used by the local server checker to inform about a fail in the local nodes

  If this attribute is not available, it's considered as if the local server is working normally.

  Valid values are allways boolean (true or false)

Some examples:

Local host with issues:

```
"networkLocal": {
  "host": "http://127.0.0.1:9000",
  "range": "10.0.0.0/8",
  "network": "214-07",
  "offline": true
```

```
}
```

Local wakeup without any issue:

```
"networkBTest": {
  "host": "http://127.0.0.1:9000",
  "range": "10.95.0.0/16",
  "network": "002-01",
  "offline": false
}
```

Local wakeup without any issue (or unknown satus):

```
"networkCTest": {
 "host": "http://127.0.0.1:9000",
 "range": "10.0.0.0/8",
 "network": "214-07"
}
```

Repositories and submodules

The project is splitted into several GIT repositories hosted in GITHub:

wakeup_platform

Main repository (for develop teams) which have some testing utils and refers to all other repositories as submodules.

Sources on: https://github.com/telefonicaid/wakeup_platform

wakeup_platform_documentation

This repository hosts the project documentation (this document).

Sources on: https://github.com/telefonicaid/wakeup_platform_documentation

wakeup_platform_global

This repository hosts the Global servers (the one that exposes the public API and the local node status checker)

This repository also dependes (as submodule) on the common one commented bellow.

Sources on: https://github.com/telefonicaid/wakeup_platform_global

wakeup_platform_local

This repository hosts the Local servers (the one that can wakeup devices and shall be deployed in each local OB)

Since this server will be deployed in a critical operator network, we decided to avoid external dependencies so we can manage all the life cycle of the server and improve security.

This repository also dependes (as submodule) on the common one commented bellow.

Sources on: https://github.com/telefonicaid/wakeup_platform_local

wakeup_platform_common

This repository hosts the common libraries used by global and local nodes.

Sources on: https://github.com/telefonicaid/wakeup_platform_common

Chapter 7. Notification Server Architecture

This chapter explains how is the server designed to be able to process millions of messages per second.

Technologies used

The server infrastructure had been build using high performance languages and also high performance database and message queuing systems.

Node.JS

Types of servers

In order to be able to scale horizontally and vertically with no limits all the server platform infrastructure had been splitted in several boxes one of them dedicated to a particular task and also independent of the rest so it can be scalled independently of the rest ones.

The names of each box follows this scheme: WU-<type_of_client>

WU-Global-Server

The WU-Global-Server server is the responsible to intermediate between the central Notification Server infrastructure (3rd party) and each WU-Local-Server deployed in each OB.

This server exposes a public API through Internet which only trusted partners can consume (see Security chapter).

WU-Local-Server

The WU-Local-Server server is a proxy between the global WU servers and the client equipment (device). This service will receive petitions through a standard HTTP port and will send UDP datagrams or TCP packets (for pinging purposes) inside the OB private network to the private IP of the client equipment. This server must be placed inside the OB private network or in a zone that must see that private IPs.

This server is responsible to ping to the correct client inside each OB (using UDP datagrams). It must be placed inside the OB or in a zone that can see the devices inside that private network.

This server will receive the ping orders through a standard HTTP port which will be connected to InterNodo network to receive the data from the VDC inside operator network.

The following scheme shows who the notification is sent with a wakeup server:

Chapter 8. Security

This chapter explains all security topics related with the notification server

The security is managed with Client certificates and only clients with signed key can consume these APIs.

Identify the client

[TBD]

Possible attacks and how to mitigate it

- [TBD]

Chapter 9. License

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Version 3, 19 November 2007

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