# VIRTUAL SIMs THE FUTURE OF TELEPHONY AS A SERVICE

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ZIMBABWE

# Introduction

***Omnia mutantur ,nos et mutantur in illis.***

**DESKTOP** **LAPTOP** **WEBTOP [1]**

# Introduction

Mobile Computing:

- communication in motion with a movable device.

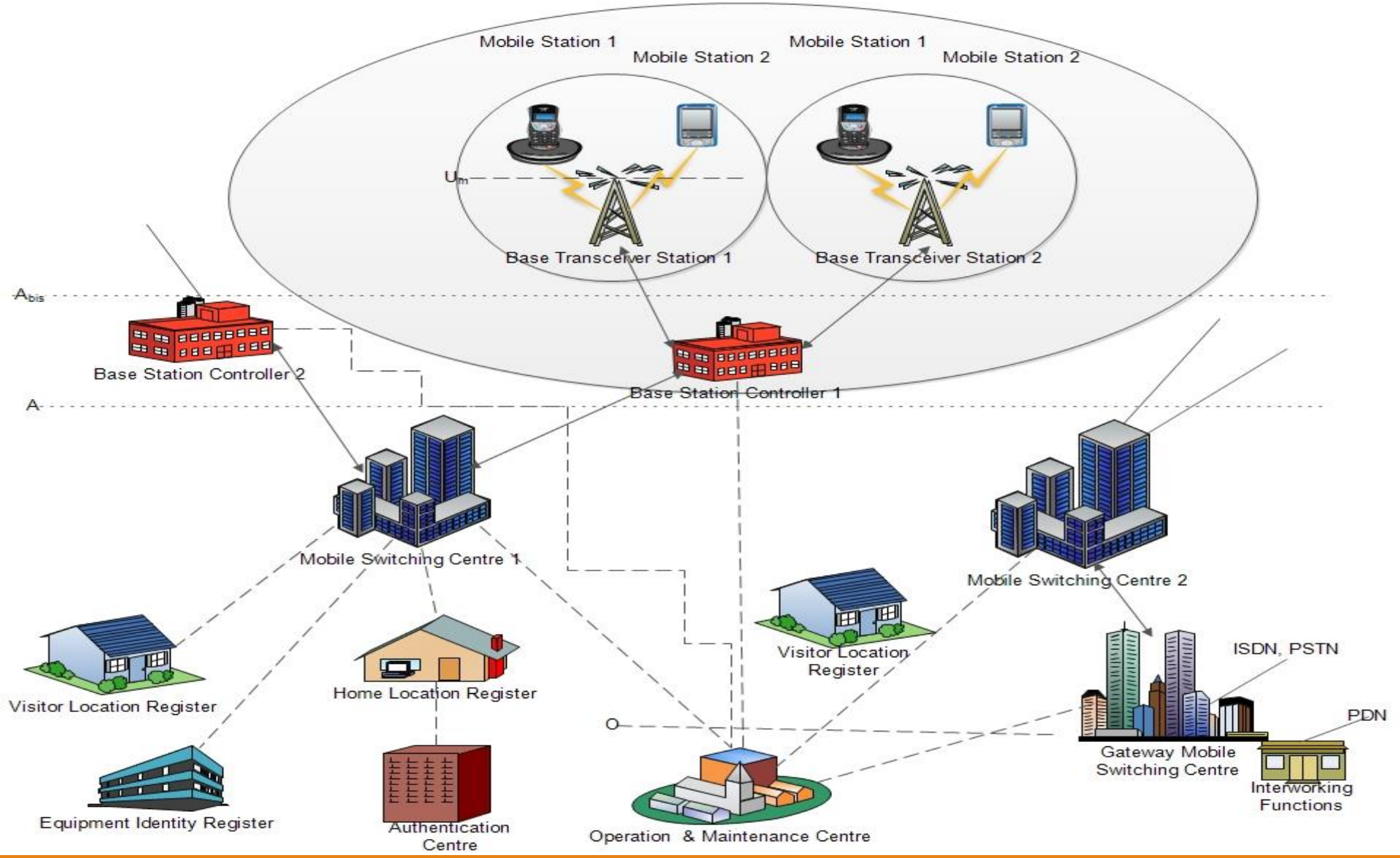
Cloud Computing:

- Communication as a Service (CaaS).

# Issues and Solutions

- Varying SIM technologies and card sizes.
- Carrying multiple SIM cards and phones.
- SIM Card Virtualization.

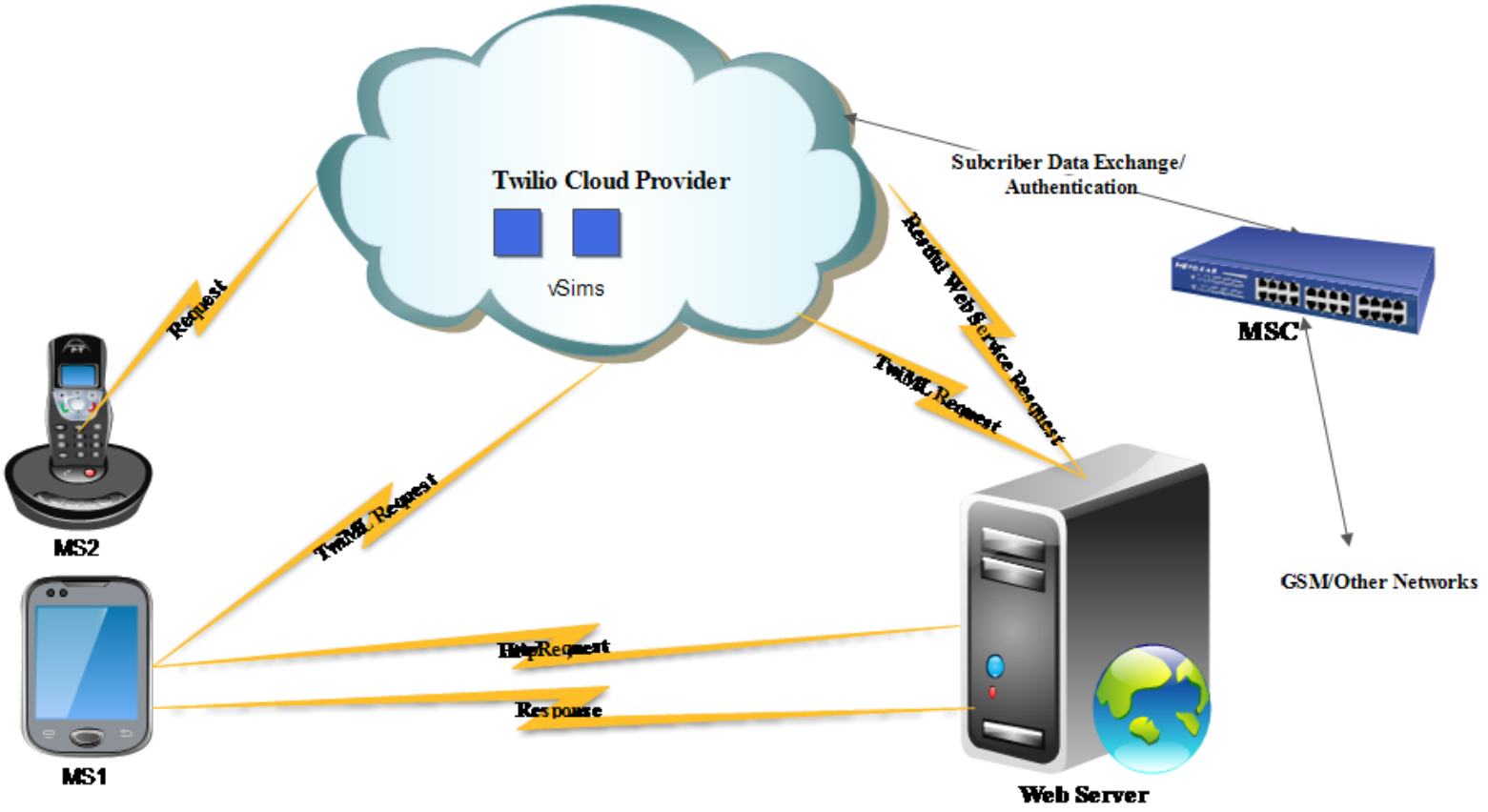
# Existing GSM Architecture



# SIM Virtualization Solutions

- Movirtu Many Me .
- Implementa Virtual SIM Platform.
- Apple’s Soft SIM.
- Simgo Virtual SIM Platform.

# Proposed Architecture



# Interface Design

## Calling View

# Implementation: Calling Module

| Using Twilio-android client APIs | Using Twilio java SDK |
|---|---|
| Step 1: Initialize Twilio Device Listener object.<br>Step 2: Make Http request to server to obtain capability token.<br>Step 3: Show error message if invalid request else Step 4.<br>Step 4: Return capability token.<br>Step 5: Create Twilio Soft Device.<br>Step 6: Enter phone number.<br>Step 7: Validate number according to E.164 standard.<br>Step 8: Initiate call to destination number.<br>Step 9: Leave message or end call. | Step 1: Create a new Twilio REST Client object.<br>Step 2: Make REST API call.<br>Step 3: Authenticate the client account and authentication token.<br>Step 4: Return account details else Step 5.<br>Step 5: Print Invalid message else proceed to Step 6.<br>Step 6: Make Call REST API.<br>Step 7: Pass call parameters.<br>Step 8: Validate parameters.<br>Step 9: Initiate call to destination number.<br>Step 10: Print success or failure message. |

# Messaging Module

- Step 1: Create a Twilio RESTful Client

- Step 2: Get account authentication using Account SID and Token ,if false print error message and go to Step 1.

- Step 3: Call Message REST API.

- Step 4: Pass message parameters.
- Step 5: Validate parameters.
- Step 6: Send message.
- Step 7: Print success or failure message.

# Testing Results

- Bugs in Twilio Client Android SDK.

- Led to use of  Twilio java SDK for calling and messaging.

# Connection Disconnection Error

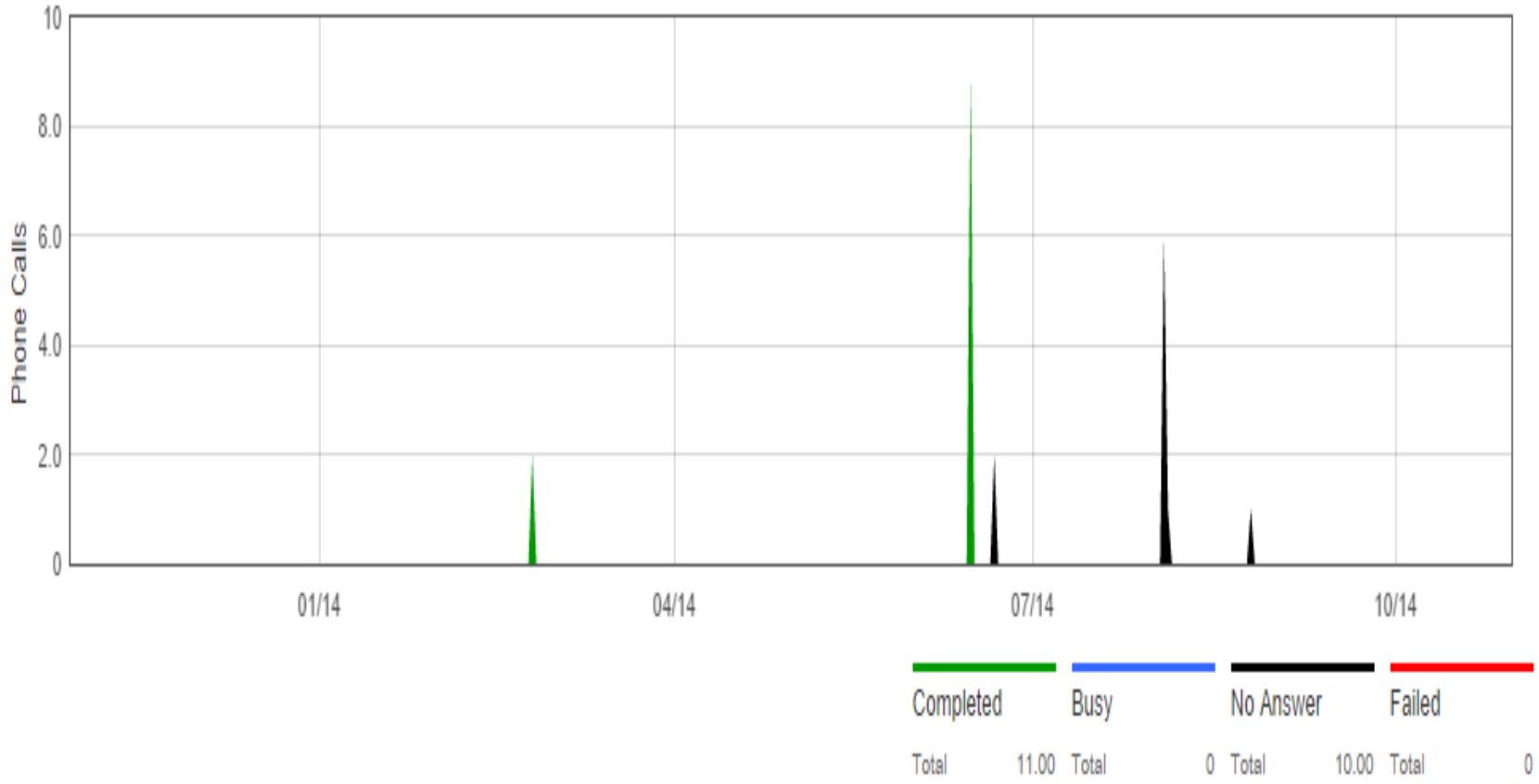
All messages (no filters) (653)
com.twilio.example.hellomonk
com.mytconnect (Session Filte

| ID | TID | Application | Tag | Text |
|---|---|---|---|---|
| 67 | 267 | com.mytconnect | dalvikvm | Trying to load lib /data/data/com.mytconnect/lib/libtwilio-native.so 0x45f3d940 |
| 67 | 267 | com.mytconnect | dalvikvm | Added shared lib /data/data/com.mytconnect/lib/libtwilio-native.so 0x45f3d940 |
| 67 | 277 | com.mytconnect | Twilio | Failed to load sound with ID 0: AssetFileDescriptor null or length <= 0 |
| 67 | 277 | com.mytconnect | Twilio | Failed to load sound with ID 0: AssetFileDescriptor null or length <= 0 |
| 67 | 277 | com.mytconnect | Twilio | Failed to load sound with ID 0: AssetFileDescriptor null or length <= 0 |
| 67 | 267 | com.mytconnect | MonkeyPhone | Twilio SDK is ready |
| 67 | 278 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 3228 objects / 213304 bytes in 72ms |
| 67 | 267 | com.mytconnect | CapabilityTokenParser | HEADER: {"typ":"JWT","alg":"HS256"} |
| 67 | 267 | com.mytconnect | CapabilityTokenParser | PAYLOAD: {"scope":"scope:client:incoming?clientName=monkey scope:client:outgoing?appSid=APf7b36f2ceecc5fdfb3ab2c91cc7f0b16&appParams=&clientName=monkey","iss":"AC25bae3948d8cfe034545c4056e49d848","exp":1405944226} |
| 67 | 267 | com.mytconnect | CapabilityTokenParser | SIGNATURE: ↳↤*◆◆┐◆)◆l◆◆┘◆% B◆a◆◆y◆Z▭◆'◆⌈◆↧ |
| 67 | 280 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 6650 objects / 266072 bytes in 71ms |
| 67 | 280 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 12076 objects / 503864 bytes in 81ms |
| 67 | 280 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 9811 objects / 464728 bytes in 82ms |
| 67 | 280 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 6848 objects / 398208 bytes in 81ms |
| 67 | 280 | com.mytconnect | dalvikvm | GC_FOR_MALLOC freed 8326 objects / 520384 bytes in 75ms |
| 67 | 280 | com.mytconnect | global | Default buffer size used in BufferedReader constructor. It would be better to be explicit if an 8k-char buffer is required. |
| 67 | 275 | com.mytconnect | Connection | Connection disconnected successfully. |

# Invalid Number Exception

```
<terminated> makeTCall (1) [Java Application] C:\Program Files\Java\jre8\bin\javaw.exe (Aug 3, 2014 4:57:30 PM)
Exception in thread "main" com.twilio.sdk.TwilioRestException: The phone number you are attempting to call, 123456, is not valid.
        at com.twilio.sdk.TwilioRestException.parseResponse(TwilioRestException.java:74)
        at com.twilio.sdk.TwilioRestClient.safeRequest(TwilioRestClient.java:583)
        at com.twilio.sdk.TwilioRestClient.safeRequest(TwilioRestClient.java:558)
        at com.twilio.sdk.resource.list.CallList.create(CallList.java:70)
        at makeTCall.takeParam(makeTCall.java:41)
        at makeTCall.main(makeTCall.java:33)
```

# Call Status Graph



# Comparison of GSM and virtual SIMs

| GSM SIM card | Virtual SIM(vSIM) |
|---|---|
| Speed of call connection request is between 300-400ms depends on network congestion | Speed of call connection is between 300-400ms |
| Can use 2G, 3G and 4G facilities | Require internet access like Wi-Fi |
| Roaming charges are expensive | Roaming charges are cheaper |
| Messages can be sent any time depends on network congestion. Rate of sending is many at a time from one mobile number. | Messaging timing services between 9am-9pm in India but anytime outside. Rate of sending is one at a time from one mobile number. |
| One SIM for each phone | Multi SIMs for each phone |
| Longer purchasing process sometimes huge delays like one week. | Easy purchasing process which can be done in a few minutes at the comfort of one's home online. |
| Security check is faster as the SIM card already stores the authentication key and TMSI. | Security checking process is slower as there is double checking at the web server and at the cloud center. |
| Tele services reports for each client take time to extract. | Easy for client to monitor their own tele service usage with graphical representation. |
| Conference calls not supported fully | Conference calls can be supported fully |
| If SIM card is lost data retrieval process takes time depends on the CSP. | vSIM can be released and bought again while data retrieval is faster. |
| Uses up phone memory to store SIM details | Uses up less memory on phone while more SIM data is stored on a cloud. |
| Can be implemented on GSM enabled phones | Is implementable on all android devices and extendable to the browser and iOS phones. |

# Conclusion

*“Camel trips do not begin or end, they merely change form”, said Robyn Davidson.*

- GSM model is a robust foundation.
- Twilio integrates various technologies using RESTful Web Services.
- Multiple vSims on one device are achievable.

# Recommendations & Future Works

- More analysis and experimentation with the various Open APIs.
- Applications in educational and business real time scenarios.
- Full smartphone virtualization the on the cloud.

# References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Any Questions??

Fill Free to ask