



USSD-*SGateway*

Installation and Configuration

Version control

Version	Date	Author	Comment
R0	2010/04/13	Juan Nin	Initial Version
V1.0	2010/06/16	Alejandro Leib	SC function added
V1.0b	2011/09/27	Alejandro Leib	SUGW.properties updated with new values
V1.0c	2012/05/02	Alejandro Leib	Num.plan added

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Introduction

The Unstructured Supplementary Service Data (USSD) is a UMTS/GSM Service that allows interactive communication between subscribers and application across a UMTS/GSM network.

It is primary used on real-time and instant messaging type phone services because there is no store-and-forward of messages typical of the short message services (SMS).

The response time of a USSD request is measured between 100 and 200ms compared to the 5-10 seconds of SMS.

The functionalities of USSD make it ideal for information queries like available balance, content downloading and any information services.

Capacity

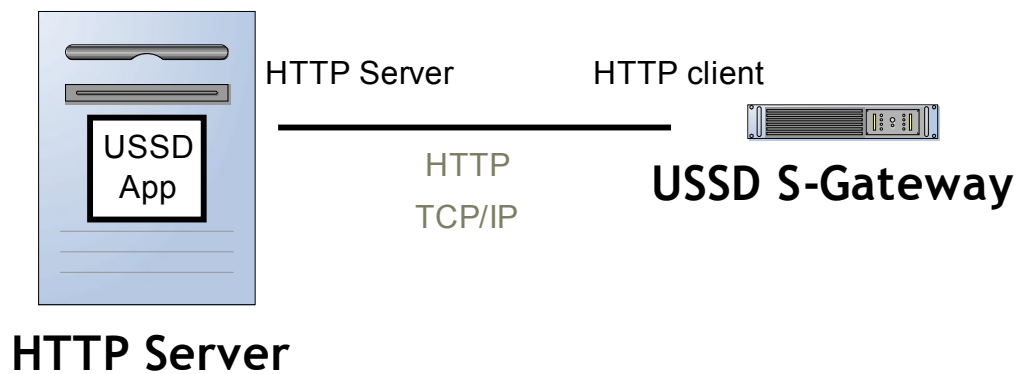
The current Sigtran USSD-Gateway version supports 65536 simultaneous incoming and outgoing transactions being processed at the same time.

On most deployments the Sigtran USSD-Gateway is limited by the SS7 Network resources or the Application/Database service load.

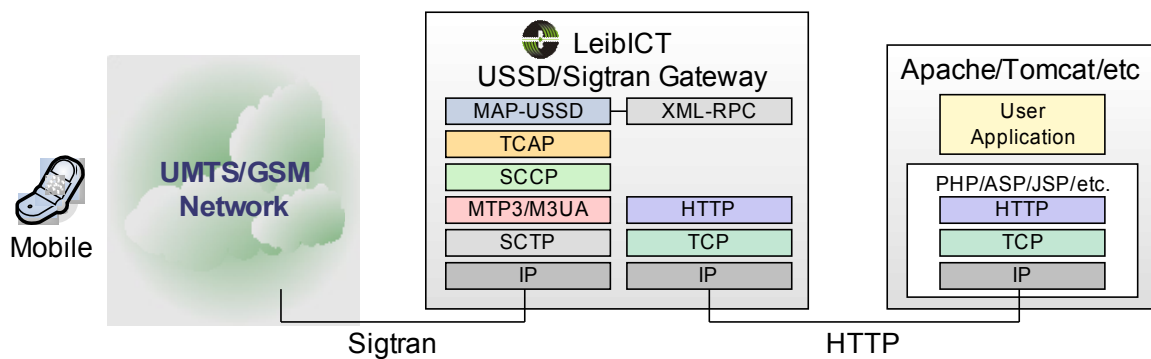
The modular architecture allows increasing system capacity as needed by adding more hardware.

Architecture

The next Implementation View shows the components of the Sigtran USSD Gateway based on a single server.

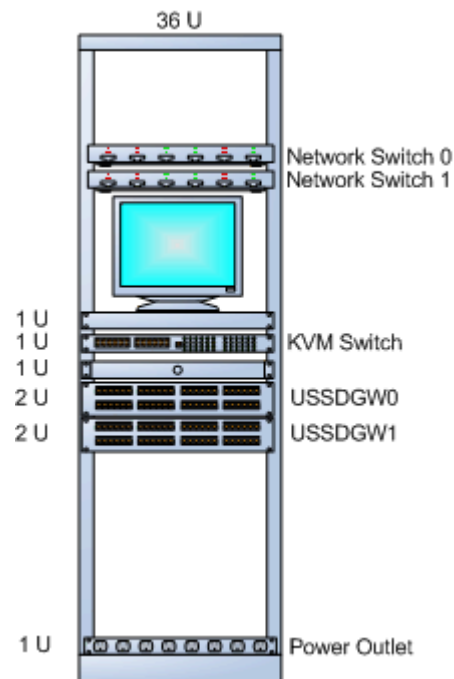


All the software components are Unix daemons that are started at boot time:



Hardware

The Sigtran USSD Gateway is based on standard x86 Servers from HP or Sun. The Operating System can be either Linux (RedHat or CentOS). The next picture shows a dual module configuration:



Typical HP/RedHat Solution is based on DL 380 with Intel Core 2 Quad and 4Gb of RAM. Hard disk space depends on customer needs of traffic logging storage. Up to 8Kb bytes are needed per transaction.

Installation

The Sigtran USSD Gateway is a software that runs over the Linux OS.

Follow the next steps in order to successfully install the software:

.1 Prerequisites

The next prerequisites must be addressed before begin the installation:

- RedHat 5.x or CentOS 5.x operating system must be installed on the server
- Complete Kernel Development Tools (kernel headers, gcc, etc) installed with the OS.
- the lksctp tools package
- the Sigtran USSD Gateway software package

.2 Install lksctp tools

In order to install the lksctp tools download the source code and run the next commands as root user:

wget http://downloads.sourceforge.net/lksctp/lksctp-tools-1.0.9.tar.gz?modtime=1217953750&big_mirror=0

a) Uninstall previous version:

```
rpm -e lksctp-tools
```

b) Copy the file [lksctp-tools-1.0.9.tar.gz](#) to the [/root](#) directory

c) Run:

```
cd /root
```

```
tar xvfz lksctp-tools-1.0.9.tar.gz
```

```
cd lksctp-tools-1.0.9
```

```
./configure
```

```
make
```

```
make install
```

.3 Configure the OS

d) Disable SELinux:

`vi /etc/selinux/config`

and match `SELINUX=disabled`

(restart linux if it was previously enabled)

e) Disable `iptables` (to accept client applications) or open the appropriate ports, usually 5404.

.4 Install de Sigtran USSD Gateway

a) Create `/sugw` directory

b) Copy all the sugw and uhgw files into the `/sugw` directory

c) Run `chmod +x /sugw/sugw; chmod +x /sugw/uhgw`

d) Run `./installInit.sh` to install init.d scripts.

.5 Activate the License

Contact LeibICT Support in order to get Global Title and Server keys to be writed in the files

`/sugw/sugw.gt`

`/sugw/sugw.ck`

.6 Run the Sigtran USSD Gateway (debug mode)

1) Run `/sugw/run.sh`

.7 Run the Sigtran USSD Gateway (production mode)

1) Run `/etc/init.d/usssdgateway-sugw start`

2) Run `/etc/init.d/usssdgateway-uhgw start`

Configuration

LeibICT Sigtran USSD Gateway has its configuration files deployed in a configurable directory. The default config directory is:

/sugw/

Its very important, that changing any configuration files requires a restart of the sugw and uhgw process to take effect.

The main configuration of the SS7 Stacks is implemented within a XML file.

```
<siggw name="LeibICT">
  <sctp id="0" addr="localhost" port="5400" name="sctp">
    <association id="0" server="0" name="asso0">
      <local id="0" addr="192.168.1.100" port="2905" name="local-ep"/>
      <remote id="0" addr="192.168.1.20" port="2905" name="remote-ep"/>
    </association>
  </sctp>
  <m3ua id="0" addr="localhost" port="5401" name="m3ua">
    <user id="0" opc="321" name="stack">
      <destination id="0"
        dpc="123"
        name="destination0">
        <route id="0" associationId="0" name="route0"/>
      </destination>
    </user>
    <sctp_module id="0"/>
  </m3ua>
  <sccp id="0" addr="localhost" port="5402" name="sccp">
    <user id="0"
      addressIndicator="18"
      pointCode="0"
      subsystemNumber="146"
      natureOfAddress="4"
      translationType="0"
      numberingPlan="1"
      encodingScheme="1"
      globalTitle="5001205280001"/>
    <translator id="0"
      prefix=""
      loadsharing="0">
      <mtp3_destination id="0"/>
    </translator>
    <mtp3_module id="0"/>
  </sccp>
```

```
<tcap id="0" addr="localhost" port="5403" name="tcap">  
  <sccp_module id="0"/>  
</tcap>  
</siggw>
```

The XML configuration file consists in four parts, each referring a single stack: SCTP, M3UA, SCCP and TCAP.

.1 Sctp

The Sctp layer is a wrapper of the OS Sctp Stack, thus it only contains the operative configuration.

The Sctp Layer has the next parameters:

Field	Description	Example
id	Identification Number of the Stack	"0"
addr	DN or IP Address of the machine where the Stack runs	"localhost"
port	TCP Port where the Stack listen	"5400"
name	Name of the Stack	"sctp0"
association	Sctp Association (s)	

The Association field has the next parameters:

Field	Description	Example
id	Identification Number of the Association	"0"
server	Indicates if the host acts as Server or Client	"0"
name	Name of the Association	"asso0"
local	Local End Point (s) of the Association	*
remote	Remote End Point (s) of the Association	*

The Local and Remote fields has the next parameters:

Field	Description	Example
id	Identification Number of the End Point	"0"
addr	DN or IP Address of the machine where the	"localhost"
port	Sctp Port of the End Point	"2905"
name	Name of the End Point	*

.2 M3UA

The M3UA Stack implements the M3UA Protocol and State Machines:

The M3UA Layer has the next parameters:

Field	Description	Example
id	Identification Number of the Stack	"0"
addr	DN or IP Address of the machine where the Stack runs	"localhost"
port	TCP Port where the Stack listen	"5401"
name	Name of the Stack	"m3ua0"
user	M3UA User (s)	*

The M3UA User field has the next parameters:

Field	Description	Example
id	Identification Number of the User	"0"
opc	Originating Point Code	"321"
name	Name of the User	"user0"
destination	M3UA Destination (s)	*

The M3UA Destination field has the next parameters:

Field	Description	Example
id	Identification Number of the Destination	"0"
dpc	Destination Point Code	"123"
name	Name of the User	"dest0"
route	M3UA Route (s)	*

The M3UA Route field has the next parameters:

Field	Description	Example
id	Identification Number of the Route	"0"
associationId	Identification Number of the Association	"0"
name	Name of the Route	"route0"

.3 SCCP

The SCCP Stack implements the SCCP Protocol and State Machines:

The SCCP Layer has the next parameters:

Field	Description	Example
id	Identification Number of the Stack	"0"
addr	DN or IP Address of the machine where the Stack runs	"localhost"
port	TCP Port where the Stack listen	"5402"
name	Name of the Stack	"sccp0"
user	SCCP User (s)	*
translator	SCCP Translator (s)	*

The SCCP User field has the next parameters:

Field	Description	Example
id	Identification Number of the User	"0"
addressIndicator	ITUT Q.713 SCCP Address parameters	"18"
pointCode		"0"
subsystemNumber		"146"
NatureOfAddress		"4"
translationType		"0"
numberingPlan		"1"
encodingScheme		"1"
globalTitle		"205280001"

The SCCP Translator field has the next parameters:

Field	Description	Example
id	Identification Number of the Translator	"0"
prefix	Prefix of the Global Title to be translated	"205"
loadsharing	Enable load sharing between entities	"0"
mtp3_destination	M3UA Destination (s)	*

The M3UA Destination field has the next parameters:

Field	Description	Example
id	Identification Number of the M3UA Destination	"0"

.4 TCAP

The TCAP Stack implements the TCAP Protocol and State Machines:

The TCAP Layer has the next parameters:

Field	Description	Example
id	Identification Number of the Stack	"0"
addr	DN or IP Address of the machine where the Stack runs	"localhost"
port	TCP Port where the Stack listen	"5403"
name	Name of the Stack	"tcap0"

.5 SUGW.properties

Field	Description	Example
logDir	Log Directory	/sugw/logs/
log	Enable or Disable standard log	1
logDebug	Enable or Disable debug log	0
logFileName	Standard and Debug log file name	sugw.log
logTrafficFileName	Traffic log file Name	sugwTraffic.log
logTraffic	Enable or Disable traffic log	1
logErrorsFileName	Error log file Name	sugwErrors.log
userPort	Signalling Gateway User Application Port	5404
tcapPort	TCAP User Application Port	5403
sccpPort	SCCP User Application Port	5402
m3uaPort	M3UA User Application Port	5401
sctpPort	SCTP User Application Port	5400
configFileName	Main SS7/XML Configuration File	/sugw/sugw.xml
ussdStringFirst	Indicates if the HLR sends the USSD String as the first parameter of the USSD MAP operations.	0
dialog_inactivity_timeout	Timeout, in milliseconds, of inactivity on a TCAP dialog.	60000
allowAllSST	Indicates if reply to all SST with SSA without evaluation of the SSN	1
allowAllSSN	Indicates if process all SCCP messages without evaluation of the SSN value	1
activationFile	Licence Key File path	/sugw/sugw.gt
aspMode	Indicates if the Signalling Role is ASP or SGW	1
sendDava	Indicates if send DAVA once the M3UA route is active	0
sendDaud	Indicates if send DAUD once the M3UA route is active	0
routingContext	Configures the M3UA Routing Context, 0 indicates automatic	0
trafficModeType	Configures the M3UA Traffic Mode Type	2
networkIndicator	Configures the M3UA Network Indicator	2
singleExchange	Indicates if the M3UA handshake is done with "single exchange" mode.	0
logStatisticsFileName	Statistics log file name	sugwStatistics.log
logStatistics	Enable or Disable statistics log	1

dropLinksOnNoUsers	Indicates if drop all links if no user connected to the Singalling Gateway	0
allowAllAI	Indicates if process all SCCP messages without evaluation of the AI value	1
ansi_sccp	Indicates if SSCP is ANSI	0
maxM3UAErrors	Configures maximum number of M3UA Errors allowed	20
sendNetworkAppearance	Indicates if NetworkAppearance is sent on M3UA packages.	1

.6 UHW.properties

Field	Description	Example
logDir	Log Directory	/sugw/logs/
log	Enable or Disable standard log	1
logDebug	Enable or Disable debug log	0
logFileName	Standard and Debug log file name	uhgw.log
logTrafficFileName	Traffic log file Name	uhgwTraffic.log
logTraffic	Enable or Disable traffic log	1
logErrorsFileName	Error log file Name	uhgwErrors.log
siggw_addr	Signalling Gateway IP address	localhost
siggw_port	Signalling Gateway user port	5404
numberingPlan	Numbering plan file path	/sugw/num.plan
countryCode	Country Code	598
globalTitle	Platform Global Title	5989999991
msisdnAsOriginatingNumber	Indicates if the MSISDN is sent as the MAP originating number	0
msisdnIdx	Indicates the index of the MAP open parameters where the HLR sends the MSISDN	1
httpurl	Default HTTP URL	http://127.0.0.1/ussd.php
numberingPlanCC	Indicates if Numbering Plan has Country Code	0
msisdnAsSCCPDestination	Indicates if the MSISDN can be used as SCCP Destination Address	0
originationNai	Nature of Address of MAP Origination Address	1
originationNpi	Numbering Plan Indication of MAP Origination Address	1
connectionCount	Max sockets to HTTP applications	100
timeout	Timeout, in seconds, waiting for HTTP response	5
httpServerPort	Listening HTTP server port for MT applications	8080
httpErrorMessage	Message sent back to the subscriber in case of HTTP timeout.	HTTP is down!
shortCodePatternX (*)	Short Code Pattern for HTTP selection	123
shortCodeUrlX (*)	HTTP URL for the X Short Code Pattern	http://127.0.0.1/ussd for X.php

(*) Note: shortCodePattern and shortCodeUrl are read from 0...X without steps.

.7 num.plan

The numbering plan file is used by the *uhgw* process to direct Mobile Terminated traffic (ussd push) to the correct HLR.

Each line of the file defines a range and a HLR Global Title in the next format:

<start of range prefix>,<end of range prefix>,<hlr global title>,<new line+carrier return>

Example:

598990,598999,59899000001

That means that any number starting with 59899 will match that rule.

The file num.plan is usually located in the /sugw/ directory and it has a “DOS format”, this means that any change of the file must be followed by issuing the next command:

unix2dos /sugw/num.plan

Logs Files

All the process modules have a standard, debug and error logs. All the logs are generated in a configurable directory. The default log directory is:

/sugw/logs

Debug logs are disabled by default, enabling them may cause a performance decrease.

Scalability Plan

The scalability of the solution can be performed by increasing the hardware modules in multiple ways: sharing the same SS7 network addresses (SCCP and MTP) or not and sharing the same TCP/IP network address or not.

By sharing the same SS7 network addresses, up to four nodes can be paired.

Beyond four nodes, more SS7 network addresses must be defined.