

# How to install sngrep on your VoipNow server

sngrep is a tool for displaying SIP calls message flows from the terminal of your server. It can be used to display real-time SIP traffic and to process PCAP files (packet captures). Think of it as a specialized `tcpdump` tool designed for VoIP. It's open-source and it's available [here](#).

This knowledge base article assumes advanced knowledge of the Linux command line and familiarity with the SIP protocol.

## Step-by-step guide

Here are the steps to take if you want to install sngrep on your VoipNow server.

Please note that all commands listed in a code block need to be executed as root.

1. If VoipNow is not installed, perform the installation using the command line installer as instructed [here](#).
2. Install the required software packages so that you can download and compile sngrep by running:

```
# yum -y install git libpcap openssl-devel gnutls pcre-devel libpcap-devel ncurses-devel autoconf  
automake gcc make
```

3. Download the sngrep files.

```
# cd ~  
# git clone https://github.com/irontec/sngrep.git  
Cloning into 'sngrep'...  
remote: Counting objects: 4878, done.  
remote: Total 4878 (delta 0), reused 0 (delta 0), pack-reused 4878  
Receiving objects: 100% (4878/4878), 4.06 MiB | 1.98 MiB/s, done.  
Resolving deltas: 100% (3864/3864), done.  
Checking connectivity... done.
```

4. A new folder named sngrep containing the source code will be created. Go to that folder.

```
# cd sngrep
```

5. Run the bootstrap.sh script.

```
# ./bootstrap.sh  
Generating the configure script ...
```

6. Run the configure script.

```
./configure  
checking for a BSD-compatible install... /usr/bin/install -c  
checking whether build environment is sane... yes  
checking for a thread-safe mkdir -p... /usr/bin/mkdir -p  
checking for gawk... gawk  
checking whether make sets $(MAKE)... yes  
checking whether make supports nested variables... yes  
checking whether make supports nested variables... (cached) yes  
checking for style of include used by make... GNU  
checking for gcc... gcc  
checking whether the C compiler works... yes  
checking for C compiler default output file name... a.out  
checking for suffix of executables...  
checking whether we are cross compiling... no  
checking for suffix of object files... o  
checking whether we are using the GNU C compiler... yes  
checking whether gcc accepts -g... yes  
checking for gcc option to accept ISO C89... none needed  
checking dependency style of gcc... gcc3  
checking how to run the C preprocessor... gcc -E  
checking for grep that handles long lines and -e... /usr/bin/grep  
checking for egrep... /usr/bin/grep -E  
checking for ANSI C header files... yes
```

```

checking for sys/types.h... yes
checking for sys/stat.h... yes
checking for stdlib.h... yes
checking for string.h... yes
checking for memory.h... yes
checking for strings.h... yes
checking for inttypes.h... yes
checking for stdint.h... yes
checking for unistd.h... yes
checking minix/config.h usability... no
checking minix/config.h presence... no
checking for minix/config.h... no
checking whether it is safe to define __EXTENSIONS__... yes
checking for gcc... (cached) gcc
checking whether we are using the GNU C compiler... (cached) yes
checking whether gcc accepts -g... (cached) yes
checking for gcc option to accept ISO C89... (cached) none needed
checking dependency style of gcc... (cached) gcc3
checking for g++... no
checking for c++... no
checking for gpp... no
checking for aCC... no
checking for CC... no
checking for cxx... no
checking for cc++... no
checking for cl.exe... no
checking for FCC... no
checking for KCC... no
checking for RCC... no
checking for xlc_r... no
checking for xlc... no
checking whether we are using the GNU C++ compiler... no
checking whether g++ accepts -g... no
checking dependency style of g++... none
checking whether ln -s works... yes
checking for egrep... (cached) /usr/bin/grep -E
checking for pthread_create in -lpthread... yes
checking for pcap_open_offline in -lpcap... yes
checking pcap.h usability... yes
checking pcap.h presence... yes
checking for pcap.h... yes
checking ncurses.h usability... yes
checking ncurses.h presence... yes
checking for ncurses.h... yes
checking for initscr in -lncurses... yes
checking for new_panel in -lpanel... yes
checking for new_form in -lform... yes
checking for new_item in -lmenu... yes

```

```

configure:
configure: sngrep configure finished
configure: =====
configure: GnuTLS Support           : no
configure: OpenSSL Support         : no
configure: Unicode Support         : no
configure: Perl Expressions Support : no
configure: IPv6 Support            : no
configure: EEP Support             : no
configure: =====
configure:
checking that generated files are newer than configure... done
configure: creating ./config.status
config.status: creating Makefile
config.status: creating src/Makefile
config.status: creating config/Makefile
config.status: creating doc/Makefile

```

```
config.status: creating tests/Makefile
config.status: creating src/config.h
config.status: executing depfiles commands
```

#### 7. Compile sngrep with the make command.

```
# make
Making all in src
make[1]: Entering directory `/root/sngrep/src'
make all-am
make[2]: Entering directory `/root/sngrep/src'
CC      capture.o
CC      address.o
CC      packet.o
CC      sip.o
CC      sip_call.o
CC      sip_msg.o
CC      sip_attr.o
CC      main.o
CC      option.o
CC      group.o
CC      filter.o
CC      keybinding.o
CC      media.o
CC      setting.o
CC      rtp.o
CC      util.o
CC      vector.o
CC      ui_panel.o
CC      scrollbar.o
CC      ui_manager.o
CC      ui_call_list.o
CC      ui_call_flow.o
CC      ui_call_raw.o
CC      ui_stats.o
CC      ui_filter.o
CC      ui_save.o
CC      ui_msg_diff.o
CC      ui_column_select.o
CC      ui_settings.o
CCLD    sngrep
make[2]: Leaving directory `/root/sngrep/src'
make[1]: Leaving directory `/root/sngrep/src'
Making all in config
make[1]: Entering directory `/root/sngrep/config'
make[1]: Nothing to be done for `all'.
make[1]: Leaving directory `/root/sngrep/config'
Making all in doc
make[1]: Entering directory `/root/sngrep/doc'
make[1]: Nothing to be done for `all'.
make[1]: Leaving directory `/root/sngrep/doc'
Making all in tests
make[1]: Entering directory `/root/sngrep/tests'
make[1]: Nothing to be done for `all'.
make[1]: Leaving directory `/root/sngrep/tests'
make[1]: Entering directory `/root/sngrep'
make[1]: Nothing to be done for `all-am'.
make[1]: Leaving directory `/root/sngrep'
```

#### 8. Install sngrep with the make install command.

```
# make install
Making install in src
make[1]: Entering directory `/root/sngrep/src'
make[2]: Entering directory `/root/sngrep/src'
  /usr/bin/mkdir -p '/usr/local/bin'
  /usr/bin/install -c sngrep '/usr/local/bin'
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory `/root/sngrep/src'
make[1]: Leaving directory `/root/sngrep/src'
Making install in config
make[1]: Entering directory `/root/sngrep/config'
make[2]: Entering directory `/root/sngrep/config'
  /usr/bin/mkdir -p '/usr/local/etc'
  /usr/bin/install -c -m 644 sngrepc '/usr/local/etc'
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory `/root/sngrep/config'
make[1]: Leaving directory `/root/sngrep/config'
Making install in doc
make[1]: Entering directory `/root/sngrep/doc'
make[2]: Entering directory `/root/sngrep/doc'
make[2]: Nothing to be done for `install-exec-am'.
  /usr/bin/mkdir -p '/usr/local/share/man/man8'
  /usr/bin/install -c -m 644 sngrep.8 '/usr/local/share/man/man8'
make[2]: Leaving directory `/root/sngrep/doc'
make[1]: Leaving directory `/root/sngrep/doc'
Making install in tests
make[1]: Entering directory `/root/sngrep/tests'
make[2]: Entering directory `/root/sngrep/tests'
make[2]: Nothing to be done for `install-exec-am'.
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory `/root/sngrep/tests'
make[1]: Leaving directory `/root/sngrep/tests'
make[1]: Entering directory `/root/sngrep'
make[2]: Entering directory `/root/sngrep'
make[2]: Nothing to be done for `install-exec-am'.
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory `/root/sngrep'
make[1]: Leaving directory `/root/sngrep'
```

9. sngrep is now installed into /usr/local/bin/sngrep which should be already in your path. You may launch it with the sngrep command:

```
# sngrep
```

After starting sngrep, you'll be presented with a text-mode, interactive interface which can be navigated with the arrow keys and quit with the Esc key.

## How to make the most of SNGREP

Initialize a softphone which registers to your VoipNow server, and the REGISTER and the SUBSCRIBE methods sent by the phone will appear in the console right away. You can clear the list of captured messages by pressing the F5 key, as indicated in the legend at the bottom of the screen.

sngrep - SIP messages flow viewer								
Current Mode: Online		Dialogs: 2						
Display Filter:								
	Seq	Method	SIP From	SIP To	Mags	Source	Destination	Call State
[ ]	1	REGISTER	0003*002@10.150.8.21:5060	0003*002@10.150.8.21:5060	4	192.168.3.189:56712	10.150.8.21:5060	
[ ]	2	SUBSCRIBE	0003*002@10.150.8.21:5060	0003*002@10.150.8.21:5060	4	192.168.3.189:56712	10.150.8.21:5060	

You can move the cursor between the displayed packets using the arrow keys. For details about a specific SIP method, press ENTER. You'll get a graphical flow of the packets exchanged between your phone and the VoipNow server. You may navigate through the flow using the same arrow keys - the selected message details will be displayed on the right of the window.

Call flow for NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. (Color by Request/Response)		
192.168.3.189:56712	10.150.8.21:5060	REGISTER sip:10.150.8.21:5060 SIP/2.0 Via: SIP/2.0/UDP 192.168.3.189:56712;branch=z9hG4bK-d8754z-b42c2d6ac977f91c-1---d8754z-;rport Max-Forwards: 70 Contact: <sip:0003*002@192.168.3.189:56712;rinstance=1c1bf515683da4b4> To: "4PSATEST"<sip:0003*002@10.150.8.21:5060> From: "4PSATEST"<sip:0003*002@10.150.8.21:5060>;tag=0a390a23 Call-ID: NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. CSeq: 1 REGISTER Expires: 120 Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REGISTER, SUBSCRIBE, NOTIFY, REFER, INFO, MESSAGE Supported: replaces User-Agent: 3CXPhone 6.0.26523.0 Content-Length: 0 X-Dc: PHNpcDowMDAzKjAwMkAxOTIuMTY4LjMuMTg5OjU2NzEyO3JpbmN0YW5jZT0xYzF1ZjUxNTY4M2RhNGI0Pg== X-Dv: U0lQLzIuMC9VRFAgMTkyLjE2OC4zLjE4OT0tNjc4MjIcmFuY2g9ej1cRzRiSylkODc1NH0tYjYyYzJkNmFjOTc3ZjxxYy0xLS0tZDg3NTR6LTtvcG9ydA==
12:34:16.463983	REGISTER	
+0.001068	401 Unauthorized	
12:34:16.465051	REGISTER	
+0.102470	200 OK	
12:34:16.567521	REGISTER	
+0.005218	200 OK	
12:34:16.572739	REGISTER	
+108.141789	401 Unauthorized	
12:36:04.714528	REGISTER	
+0.001707	200 OK	
12:36:04.716235	REGISTER	
+0.102391	200 OK	
12:36:04.819626	REGISTER	
+0.006869	200 OK	
12:36:04.826486	REGISTER	

Pressing ENTER again will show the packet in raw mode.

```

2016/05/13 12:34:16.463983 192.168.3.189:56712 -> 10.150.8.21:5060
REGISTER sip:10.150.8.21:5060 SIP/2.0
Via: SIP/2.0/UDP 192.168.3.189:56712;branch=z9hG4bK-d8754z-b42c2d6ac977f91c-1---d8754z-;rport
Max-Forwards: 70
Contact: <sip:0003*002@192.168.3.189:56712;rinstance=1c1bf515683da4b4>
To: "4PSATEST"<sip:0003*002@10.150.8.21:5060>
From: "4PSATEST"<sip:0003*002@10.150.8.21:5060>;tag=0a390a23
Call-ID: NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE.
CSeq: 1 REGISTER
Expires: 120
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REGISTER, SUBSCRIBE, NOTIFY, REFER, INFO, MESSAGE
Supported: replaces
User-Agent: 3CXPhone 6.0.26523.0
Content-Length: 0
X-Dc: PHNpcDowMDAzKjAwMkAxOTIuMTY4LjMuMTg5OjU2NzEyO3JpbmN0YW5jZT0xYzF1ZjUxNTY4M2RhNGI0Pg==
X-Dv: U0lQLzIuMC9VRFAgMTkyLjE2OC4zLjE4OT0tNjc4MjIcmFuY2g9ej1cRzRiSylkODc1NH0tYjYyYzJkNmFjOTc3ZjxxYy0xLS0tZDg3NTR6LTtvcG9ydA==

```

Here are the 4 stages of a SIP registration:

1. The initial REGISTER sent by the phone (informing the server of his presence).

Call flow for NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. (Color by Request/Response)		
192.168.3.189:56712	10.150.8.21:5060	REGISTER sip:10.150.8.21:5060 SIP/2.0 Via: SIP/2.0/UDP 192.168.3.189:56712;branch=z9hG4bK-d8754z-7233e2a4b5472d-1---d8754z-;rport Max-Forwards: 70 Contact: <sip:0003*002@192.168.3.189:56712;rinstance=1c1bf515683da4b4> To: "4PSATEST"<sip:0003*002@10.150.8.21:5060> From: "4PSATEST"<sip:0003*002@10.150.8.21:5060>;tag=0a390a23 Call-ID: NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. CSeq: 2 REGISTER Expires: 120 Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REGISTER, SUBSCRIBE, NOTIFY, REFER, INFO, MESSAGE Supported: replaces User-Agent: 3CXPhone 6.0.26523.0 Content-Length: 0 X-Dc: PHNpcDowMDAzKjAwMkAxOTIuMTY4LjMuMTg5OjU2NzEyO3JpbmN0YW5jZT0xYzF1ZjUxNTY4M2RhNGI0Pg== X-Dv: U0lQLzIuMC9VRFAgMTkyLjE2OC4zLjE4OT0tNjc4MjIcmFuY2g9ej1cRzRiSylkODc1NH0tYjYyYzJkNmFjOTc3ZjxxYy0xLS0tZDg3NTR6LTtvcG9ydA==
12:34:16.463983	REGISTER	
+0.001068	401 Unauthorized	
12:34:16.465051	REGISTER	
+0.102470	200 OK	
12:34:16.567521	REGISTER	
+0.005218	200 OK	
12:34:16.572739	REGISTER	
+108.141789	401 Unauthorized	
12:36:04.714528	REGISTER	
+0.001707	200 OK	
12:36:04.716235	REGISTER	
+0.102391	200 OK	
12:36:04.819626	REGISTER	
+0.006869	200 OK	
12:36:04.826486	REGISTER	
+108.141789	401 Unauthorized	
12:37:52.994899	REGISTER	
+0.002763	401 Unauthorized	
12:37:52.997662	REGISTER	
+0.102674	200 OK	
12:37:53.102336	REGISTER	
+0.002714	200 OK	
12:37:53.109050	REGISTER	
+108.141789	401 Unauthorized	

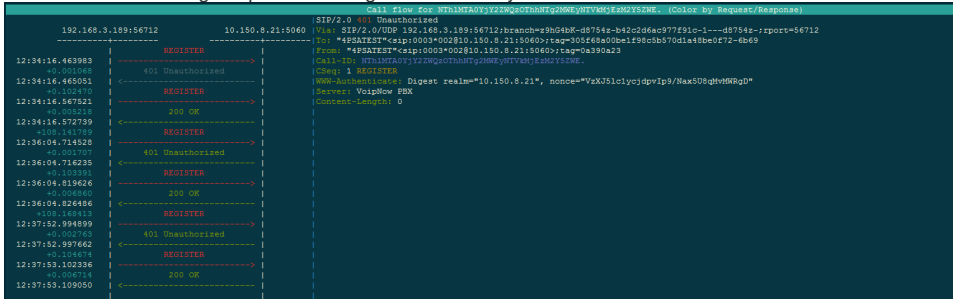
2. The 401 Unauthorized sent by the server to the phone (containing the challenge to which the phone has to reply).

Call flow for NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. (Color by Request/Response)		
192.168.3.189:56712	10.150.8.21:5060	SIP/2.0 OK Via: SIP/2.0/UDP 192.168.3.189:56712;branch=z9hG4bK-d8754z-7233e2a4b5472d-1---d8754z-;rport=56712 From: "4PSATEST"<sip:0003*002@10.150.8.21:5060>;tag=0a390a23 To: "4PSATEST"<sip:0003*002@10.150.8.21:5060> Call-ID: NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. CSeq: 2 REGISTER Server: VoIPNow PBX Content-Length: 0
12:34:16.463983	REGISTER	
+0.001068	401 Unauthorized	
12:34:16.465051	REGISTER	
+0.102470	200 OK	
12:34:16.567521	REGISTER	
+0.005218	200 OK	
12:34:16.572739	REGISTER	
+108.141789	401 Unauthorized	
12:36:04.714528	REGISTER	
+0.001707	200 OK	
12:36:04.716235	REGISTER	
+0.102391	200 OK	
12:36:04.819626	REGISTER	
+0.006869	200 OK	
12:36:04.826486	REGISTER	
+108.141789	401 Unauthorized	
12:37:52.994899	REGISTER	
+0.002763	401 Unauthorized	
12:37:52.997662	REGISTER	
+0.102674	200 OK	
12:37:53.102336	REGISTER	
+0.002714	200 OK	
12:37:53.109050	REGISTER	
+108.141789	401 Unauthorized	

3. The second REGISTER message sent by the phone (with the valid credentials, user ID and password).

Call flow for NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. (Color by Request/Response)		
192.168.3.189:56712	10.150.8.21:5060	REGISTER sip:10.150.8.21:5060 SIP/2.0 Via: SIP/2.0/UDP 192.168.3.189:56712;branch=z9hG4bK-d8754z-b42c2d6ac977f91c-1---d8754z-;rport Max-Forwards: 70 Contact: <sip:0003*002@192.168.3.189:56712;rinstance=1c1bf515683da4b4> To: "4PSATEST"<sip:0003*002@10.150.8.21:5060> From: "4PSATEST"<sip:0003*002@10.150.8.21:5060>;tag=0a390a23 Call-ID: NTHlMTA0YjY2ZWQzOThhNTg2MWEyNTVhMjEzY2Y5ZWE. CSeq: 3 REGISTER Expires: 120 Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REGISTER, SUBSCRIBE, NOTIFY, REFER, INFO, MESSAGE Supported: replaces User-Agent: 3CXPhone 6.0.26523.0 X-Dc: PHNpcDowMDAzKjAwMkAxOTIuMTY4LjMuMTg5OjU2NzEyO3JpbmN0YW5jZT0xYzF1ZjUxNTY4M2RhNGI0Pg== X-Dv: U0lQLzIuMC9VRFAgMTkyLjE2OC4zLjE4OT0tNjc4MjIcmFuY2g9ej1cRzRiSylkODc1NH0tYjYyYzJkNmFjOTc3ZjxxYy0xLS0tZDg3NTR6LTtvcG9ydA==
12:34:16.463983	REGISTER	
+0.001068	401 Unauthorized	
12:34:16.465051	REGISTER	
+0.102470	200 OK	
12:34:16.567521	REGISTER	
+0.005218	200 OK	
12:34:16.572739	REGISTER	
+108.141789	401 Unauthorized	
12:36:04.714528	REGISTER	
+0.001707	200 OK	
12:36:04.716235	REGISTER	
+0.102391	200 OK	
12:36:04.819626	REGISTER	
+0.006869	200 OK	
12:36:04.826486	REGISTER	
+108.141789	401 Unauthorized	
12:37:52.994899	REGISTER	
+0.002763	401 Unauthorized	
12:37:52.997662	REGISTER	
+0.102674	200 OK	
12:37:53.102336	REGISTER	
+0.002714	200 OK	
12:37:53.109050	REGISTER	

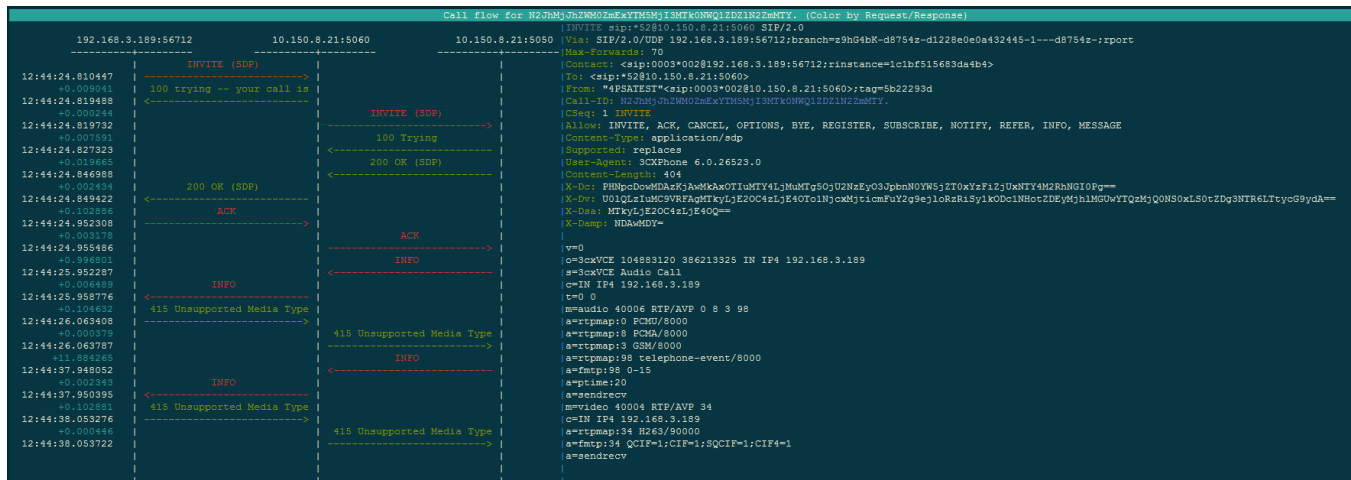
4. The 200 OK confirming the phone has registered correctly with the server.



Place a call to \*52 (the echo test) and you'll see the call appear in the list.

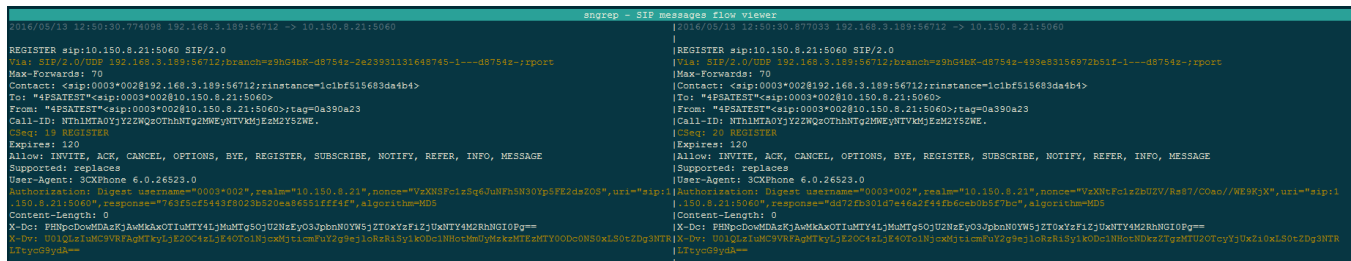
Pressing ENTER will open a call flow diagram illustrating the communication between the phone and the SIP/PBX components of VoipNow.

sngrep - SIP messages flow viewer							
Current Mode: Online		Dialogs: 1					
Display Filter:							
Seq	Method	SIP From	SIP To	Mags	Source	Destination	Call State
[ ] 1	INVITE	0003*002@10.150.8.21:5060	*52@10.150.8.21:5060	16	192.168.3.189:56712	10.150.8.21:5060	IN CALL



## More great SNGREP features

For example, you can compare two SIP packets by checking them with the Space key. Once the second packet is checked, the differences between the two packets will be automatically shown in a separate window.



If you press F2 and F3 in a call flow, you will be able to see SDP and RTP information.

```

Call flow for nullVmqoTg4Wkx0k0w2z2WUwJl0w9v9HmEka0G13HTU. (color by Request/Response)
192.168.3.189:16712      192.168.2.150:60      192.168.8.21:5050
[INFO] INVITE sip:192.168.3.189
[INFO] audio 40012 (g711a)
[INFO] video 40011 (h263)
12:49:37.124992      192.168.2.150:60
[INFO] 100 Trying on your call
12:49:37.131203      192.168.3.189
[INFO] INVITE sip:192.168.3.189
[INFO] audio 40012 (g711a)
[INFO] video 40011 (h263)
12:49:37.131337      192.168.2.150:60
[INFO] 100 Trying
12:49:37.137241      192.168.3.189
[INFO] 200 (10-150-8-21)
[INFO] audio 16019 (g711a)
[INFO] video 0 (h263)
12:49:37.153736      192.168.2.150:60
[INFO] 200 (10-150-8-21)
[INFO] audio 16018 (g711a)
[INFO] video 0 (h263)
12:49:37.162176      192.168.3.189
[INFO] RTT (g711a) 295
12:49:37.190028      40012
[INFO] ACK
12:49:37.248414      192.168.2.150:60
[INFO] RTT (g711a) 249
12:49:37.246340      40012
[INFO] INFO
12:49:38.285246      192.168.2.150:60
[INFO] 415 Unsupported Media Type
12:49:38.357425      192.168.3.189
[INFO] 415 Unsupported Media Type
12:49:38.355796      192.168.2.150:60
[INFO] BYE
12:49:45.171913      192.168.3.189
[INFO] BYE
12:49:45.174045      192.168.2.150:60
[INFO] 200 OK
12:49:45.174624      192.168.3.189
[INFO] 200 OK
12:49:45.179326      192.168.2.150:60
[INFO] 200 OK

```

There are more options and features in `sngrep`, so feel free to explore further. While a bit more cumbersome to use than Wireshark, `sngrep` can help you quickly debug SIP problems on your server.

## Related articles

- How to install sngrep on your VoipNow server
- Primary and secondary server setup for 4PSA DNS Manager
- How to interact with RabbitMQ
- How to Allow 4PSA Access to the Server
- How to do a data migration between two DNSManager servers