KHOMP Analytics Integration

Introduction:

By default Vicidial uses a very basic Answering Machine Detection (AMD) system. It is the stock AMD application that comes with Asterisk. This AMD application is not very good. It only averages between 70 and 80 percent accuracy. Couple this with the changes in Asterisk 13 with how it handles calls with no audio and you can see a major increase in the number of calls with Dead Air and Answering Machines getting through to your agents. To counter act this Vicidial has partnered with KHOMP to provide an advanced call classification capabilities. By placing calls to your carrier through a properly configured KHOMP gateway, Vicidial is able to query the KHOMP gateway about the call and take the appropriate actions for it.

How it works:

Vicidial sends a SIP Invite to the KHOMP Gateway. Vicidial adds an X-HEADER to this SIP Invite with a tracking field and id. The KHOMP Gateway then uses its own routing system to forward this SIP Invite onto your carrier(s). If the carrier returns a 200 OK, the KHOMP Gateway does not immediately the 200 OK to the Vicidial server. Instead it starts running audio analysis on the incoming audio from the carrier. If it determines that the call is worth routing to Vicidial it will send Vicidial the 200 OK for the call and redirect the audio stream to Vicidial. Upon receiving this 200 OK Vicidial will send the call into the outbound routing engine. The routing engine then issues an API call to the KHOMP Gateway. This API call returns all the data the KHOMP Gateway had collected about the call. It is specifically looking for the "Conclusion" the KHOMP Gateway came to and the "Pattern" it used to come to that conclusion. Vicidial looks up the "Conclusion" and "Pattern" and takes the appropriate action.

Installing the Vicidial-KHOMP Integration:

For use with VICIdial, you will need to be on **svn/trunk codebase revision 3524 or higher**. you will also need to copy some specialized versions of some of the back-end VICIdial "bin" scripts on every dialer in your cluster to be able to use KHOMP properly. Before you can use these alternate scripts, you will need to make sure there are CPAN perl modules installed that these scripts require to run on every dialer in your cluster. To do that, follow these instructions on the Linux command-line:

For VICIbox:
- yast (Software → Software Management)
- Search for "JSON::PP" install the only highlighted package

For other Linux:
- cpan
- install JSON::PP

For Both: Then, copy the following files on your system:

```
cp /usr/src/astguiclient/trunk/extras/KHOMP/KHOMP_updater.pl /usr/share/astguiclient/KHOMP_updater.pl
chmod 0777 /usr/share/astguiclient/KHOMP_updater.pl
cp /usr/src/astguiclient/trunk/extras/KHOMP/FastAGI_log.pl /usr/share/astguiclient/FastAGI_log.pl
cp /usr/src/astguiclient/trunk/extras/KHOMP/agi-VDAD_ALL_outbound.agi /var/lib/asterisk/agi-bin/agi-VDAD_ALL_outbound.agi
```

Notes on the above perl scripts: The 'FastAGI_log.pl' and 'agi-VDAD_ALL_outbound.agi' scripts have had the KHOMP code integrated into the main codebase scripts for easier maintainability, but since the KHOMP versions require Perl modules that are not included in most standard Linux installs, they have those sections of the code commented out in the main codebase with a '#UC#' in the code. The versions of these scripts in the 'extras/KHOMP/' directory have these comments already removed, so they are ready to go for KHOMP use.

On only one dialer on your system you will need to add the following crontab entry:

```
* * * * * /usr/share/astguiclient/KHOMP_updater.pl
```

Initial Configuration:

1. Make sure that the KHOMP gateway is properly setup with a valid SSL certificate from a valid certificate authority. The CURL application that Vicidial uses to communicate with the KHOMP API is very restrictive when it comes to SSL. It will refuse to connect to a Self Signed SSL Certificate or to a server where the SSL Certificate is not properly setup. Once the KHOMP gateway is configured for SSL, go to the Linux Command Line for one of your dialers and run the following command:

   ```
   dial1> /usr/bin/curl https://URL_FOR_KHOMP_SERVER
   ```

   Make sure to replace URL_FOR_KHOMP_SERVER with the fully qualified domain name for your KHOMP server. If this returns a bunch of HTML code then SSL is configured properly. If it returns an error though then something is wrong with the SSL certificate on the KHOMP gateway.

2. Have your database administrator run the KHOMP_settings.sql file against your database. This will create several statuses for you as well as two settings containers.

```
Free community-based ViciDial Support is available at :
  http://www.vicidial.org/VICIDIALforum

ViciBox installation manual is available for download at :
  http://download.vicidial.com/iso/vicibox/server/ViciBox_v9-install.pdf


- ViciBox v.9.0.0 190913-1108

dial1:~ # ls -l
total 64
-rw-------  1 root root   2745 Nov 27 11:26 .bash_history
drwx------  2 root root   4096 Oct 16 12:49 .cache
drwx------  2 root root   4096 Oct 16 12:58 .gnupg
-rw-------  1 root root     57 Nov 27 11:26 .mysql_history
drwxr-xr-x  2 root root   4096 Nov  5 10:44 .ssh
drwxr-xr-x  3 root root   4096 Sep 13 14:43 .subversion
-rw-------  1 root root   8306 Nov 27 11:24 .viminfo
-rw-r--r--  1 root root  20762 Nov 27 11:24 KHOMP_settings.sql
drwxr-xr-x  2 root root   4096 Mar 11  2019 bin
dial1:~ # mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 446725
Server version: 10.3.18-MariaDB-log openSUSE package

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use asterisk
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [asterisk]> \. KHOMP_settings.sql
```

3. On the KHOMP server create an API user (consult the KHOMP Documentation on how to do this).

4. In the Vicidial Admin Interface go to Admin → Setting Containers and go into the KHOMPSETTINGS setting container.
5. In the khomp_api_url setting change URL_FOR_KHOMP_SERVER to the fully qualified domain name of the KHOMP server:

6. In the khomp_api_login_url setting URL_FOR_KHOMP_SERVER to the fully qualified domain name of the KHOMP server:

VICIdial

ADMINISTRATION

- Reports
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  - Settings Containers

Settings Containers | Add A Settings Container

MODIFY SETTINGS CONTAINER: KHOMPSETTINGS

Container ID: **KHOMPSETTINGS**

Container Notes: Global Settings For KHOMP ⑦

Container Type: OTHER ⑦

Admin User Group: ---ALL--- ⑦

Container Entry:

```
#The URL for accessing the API
khomp_api_url => https://URL_FOR_KHOMP_SERVER/rpc/json.fcgi/kgateway

#Whether there is a proxy handling login to khomp
khomp_api_proxied => false

#The URL for logging in
khomp_api_login_url => https://URL_FOR_KHOMP_SERVER/rpc/json.fcgi/auth

#The API User
khomp_api_user => API_USER

#The API User's Password
khomp_api_pass => API_PASSWORD

# whether to verify the khomp devices SSL cert. 1 for yes. 0 for no.
khomp_api_check_ssl => 0

#The SIP Header Vicidial Will Set For Khomp To Track
khomp_header => KHOMP-Vicidial-ID

#The format for the value in the above SIP Header
khomp_id_format => CALLERCODE_CAMP_EXTERNIP

#The SIP Header Khomp can use to track sub-accounts
```

SUBMIT

DELETE THIS SETTINGS CONTAINER

Click here to see Admin changes to this settings container

7. In the khomp_api_user setting change API_USER to the username of the API user you created in KHOMP:

8. In the khomp_api_pass setting change API_PASSWORD to the password you used when creating the API user in KHOMP:

9. Submit the changes to the KHOMPSETTINGS setting container.
10. Go to Admin → Carriers and add a new carrier.
11. Set the Carrier ID to KHOMP.
12. Set the Carrier Name to KHOMP Gateway.

13. In the Account Entry section paste the following:

```
[khomp1]
type=peer
context=trunkinbound
usecallerid=yes
trustrpid=yes
sendrpid=yes
host=URL_FOR_KHOMP_SERVER
qualify=yes
insecure=port,invite
disallow=all
allow=ulaw
dtmfmode=RFC2833
```

Be sure to change URL_FOR_KHOMP_SERVER to the fully qualified domain name of the KHOMP server.

14. In the Dialplan Entry section paste the following:

```
exten => _381NXXNXXXXXX,1,AGI(agi://127.0.0.1:4577/call_log)
exten => _381NXXNXXXXXX,n,Dial(SIP/khomp1/${EXTEN:2},,To)
exten => _381NXXNXXXXXX,n,Hangup()
```

Keep in mind that this dialplan is setup for calling within NANPA (ie The United States, Canada, etc). If you are calling elsewhere in the world you will need to adjust the dialplan appropriately. Also this dialplan uses dial prefix 38. You can change this to whatever dial prefix you like as long as you make the appropriate changes to the dialplan entry.

15. Press the Submit button for this carrier.
16. Change Server IP to 0.0.0.0
17. Change Active to Y
18. Press the Submit button for this carrier again.
19. Go to the Detailed View of the campaign you want to use KHOMP Analytics on.

20. Change the Dial Prefix to 38 (or whatever you altered the dialplan in the KHOMP carrier to use):

Inbound No-Agents No-Dial Threshold:	0 *number only* ⑦
Auto Alt-Number Dialing:	NONE ▾ ⑦
Next Agent Call:	random ▾ ⑦
Local Call Time:	12pm-5pm - default 12pm to 5pm calling ▾ ⑦
	State rules defined for this call time: 0
Dial Timeout:	24 *in seconds* ⑦
Dial Prefix:	38 for 91NXXNXXXXXX value would be 9, for no dial prefix use X ⑦
Manual Dial Prefix:	⑦
Omit Phone Code:	N ▾ ⑦
Campaign CallerID:	8633939330 ⑦
Custom CallerID:	N ▾ ⑦

21. Change AMD Type to KHOMP Gateway and the KHOMP Settings to the settings container with the KHOMP settings you want to use one this campaign.

Answering Machine Message:	vm-goodbye audio chooser ⑦
Voicemail Message Daily Limit:	0 ⑦
WaitForSilence Options:	⑦
Manual VM Status Updates:	ENABLED ▾ ⑦
AM Message Wildcards:	Y ▾ ⑦ AM Message Wildcards Defined: 0
AMD Type:	KHOMP ▾ ⑦
AMD send to Action:	N ▾ ⑦
AMD Agent Route Options:	DISABLED ▾ ⑦
CPD AMD Action:	MESSAGE ▾ ⑦
CPD Unknown Action:	MESSAGE ▾ ⑦
AMD Inbound Group:	---NONE--- ▾ ⑦
AMD Call Menu:	---NONE--- ▾ ⑦
Khomp Settings:	KHOMPSETTINGS - Global Settings For KHOMP ▾ ⑦
VM Message Group:	---NONE--- ▾ ⑦
Leave VM No Dispo:	DISABLED ▾ ⑦

22. Scroll down and press the Submit button on the campaign.

Test call:

Now that KHOMP has had its initial configuration done we need to make sure it is working.
1. Go to Admin → System Settings and set Enable Campaign Test Calls to 1, then hit submit.
2. SSH to the dialer you will be testing with.
3. Run:

```
dial1> asterisk -r
```

to connect to the Asterisk Command Line interface.
4. In the Vicidial Admin interface go to the Detailed View of the campaign you configured in the previous section.
5. Scroll to the bottom. There should now be a section that says "Test Outbound Call"
6. Where it says code put your country code (for the US this is a 1).

7. Where it says phone number put the phone number you want to place the test call to.
8. Where it says server select the server IP of the server you are connected to Asterisk on in your SSH terminal.
9. Press "PLACE TEST CALL" and immediate switch to your SSH terminal and then answer the call.
10. You should see output similar to this in Asterisk:

```
= Manager 'sendcron' logged on from 127.0.0.1
-- Called 3818633939330@default
-- Executing [3818633939330@default:1] AGI("Local/3818633939330@default-00000000;2", "agi://127.0.0.1:4577/call_log") in new stack
-- AGI Script Executing Application: (EXEC) Options: (Set(_CAMPCUST=KHOMP))
-- AGI Script Executing Application: (EXEC) Options: (SIPAddHeader(X-KHOMP-Vicidial-ID: V2101150380000000031_KHOMP_208.38.155.254))
-- <Local/3818633939330@default-00000000;2>AGI Script agi://127.0.0.1:4577/call_log completed, returning 0
-- Executing [3818633939330@default:2] Dial("Local/3818633939330@default-00000000;2", "SIP/khomp1/18633939330,,To") in new stack
= Using SIP RTP CoS mark 5
-- Called SIP/khomp1/18633939330
   > 0x55a1a611e180 -- Strict RTP learning after remote address set to: 208.38.149.183:30042
-- SIP/khomp1-00000000 is ringing
-- Local/3818633939330@default-00000000;1 is ringing
-- SIP/khomp1-00000000 is making progress passing it to Local/3818633939330@default-00000000;2
-- Local/3818633939330@default-00000000;1 is making progress
   > 0x55a1a611e180 -- Strict RTP switching to RTP target address 208.38.149.183:30042 as source
-- SIP/khomp1-00000000 answered Local/3818633939330@default-00000000;2
-- Local/3818633939330@default-00000000;1 answered
-- Executing [138368@default:1] AGI("Local/3818633939330@default-00000000;1", "agi-VDAD_local_optimize.agi,V2101150380000000031") in new stack
-- Channel SIP/khomp1-00000000 joined 'simple_bridge' basic-bridge <c5251df1-23fc-4cb0-a3af-4608123fca62>
-- Channel Local/3818633939330@default-00000000;2 joined 'simple_bridge' basic-bridge <c5251df1-23fc-4cb0-a3af-4608123fca62>
-- Launched AGI Script /usr/share/asterisk/agi-bin/agi-VDAD_local_optimize.agi
```

The highlighted line shows where Asterisk attached the KHOMP SIP header you configured in the settings container.

Tuning Khomp:

KHOMP Analytics works fairly well on a fresh install, but it works far better if it has been tuned to the region you are calling. In order to tune it you need to coordinate with a KHOMP technician. They will put the system into a mode where it records the first few seconds of your calls. You then need to place several thousand calls through the gateway. The KHOMP technician will then have the system analyze the recordings and build new classification patterns for them.

Configuring Vicidial For New Patterns:

Vicidial can only handle calls from KHOMP Analytics that it knows the patterns for. If you have it tuned you will need to add the new patterns to Vicidial. To do so you will need to use the Vicidial KHOMP Admin tool. You will want to use this tool several times after KHOMP has tuned your gateway as some patterns might only show up very rarely.
1. Go into Reports → Admin Utilities and click on the Vicidial KHOMP Admin Tool

2. You will be presented with a tool that looks like this:

This tool will put the KHOMP Patterns that have not been classified by Vicidial on the top.

3. Click the Modify button next to one of the unclassified patterns and you will see a dialog box like this open:

4. Next to where it says Action there is a drop down box. Choose the action you want Vicidial to take when it encounters a call where KHOMP Analytics has returned this Conclusion and Pattern. Your choices are amdaction, cpdunknown, route, and status. Setting the action to amdaction will make Vicidial take the AMD Action you have configured in your campaign. Setting the action to cpdunknown will make Vicidial take the CPD Unknown Action you have defined in your campaign. Setting the action to route will make Vicidial route the call to your agents. Setting the action to status will make Vicidial end the call and status it as the Status you are about to define.

5. Next where it says Status put the status you want this call to end up as. It is important to always put a status here even if you have the action set to amdaction, cpdunknown, or route. There are rare cases where the action will not complete and this status will be used.

6. Next where it says Dial Status choose an appropriate dial status for the call. This is used for reporting purposes and is quite important.

7. Next click the UPDATE button.

8. Repeat steps 3 through 7 for all of the unclassified patterns.

Running multiple different KHOMP servers on one cluster:

If you need to run calls through multiple KHOMP servers from the same cluster for some reason it is necessary to create multiple settings containers for the various KHOMP servers.

1. In the Vicidial Admin Interface go to Admin → Setting Containers and go into the KHOMPSETTINGS setting container.
2. Highlight the contents of the settings container and copy it.
3. Up at the top click on Add A Settings Container
4. Give the new container a unique Container ID that indicates which KHOMP server this container is for.
5. Give the new container a description.
6. Select "KHOMP_SETTINGS" in the Container Type drop down.
7. Click Submit.
8. In the Container Entry section paste the contents from the KHOMPSETTINGS containers.
9. Change the khomp_api_url, the khomp_api_login_url, the khomp_api_user, and the khomp_api_pass to match the values for your additional KHOMP server.
10. If it is not already set to 0 change the khomp_api_token_expire to 0.
11. Click submit.
12. Then go to the campaign you want to use this KHOMP server on change the KHOMP Settings field to the new settings container you just created.

High volume KHOMP setups:

If you are running just a few dialers through a KHOMP server this section probably does not apply to you. If however you have over a dozen dialers through a KHOMP server there are a few things you can do to improve overall performance.

Normally when the KHOMP API token expires the various processes that need to make an API call will realize and each one will attempt to renew the token. This normally does not cause a problem on a smaller KHOMP setup as there might only be a dozen processes attempting to renew the token and the token is only renewed once an hour. However on a larger setup there could be several thousand processes attempting to renew the token at once. This can overload the KHOMP servers authentication system causing significant delay.

To get around this we added a script to Vicidial that can be run from the crontab on a single dialer every thirty minute to renew the token. This way there is only one process renewing the token. To set this up just add this to your crontab:

```
*/30 * * * * /usr/share/astguiclient/AST_KHOMP_auth_updater.pl
```

If you have multiple KHOMP servers you will want to run this script multiple times in your crontab for each KHOMP server. On each instance of the script you will want to specify the –khomp-container argument and have it set to the servers settings container.

More KHOMP/VICIdial resources:

- For troubleshooting and some other more detailed information:
http://vicidial.org/docs/KHOMP_CPD_INTEGRATION.txt

- For paid support from the VICIdial Group with KHOMP integrations:
email <support@vicidial.com>

- For sales information on acquiring a KHOMP server:
https://www.khomp.com