

# Alarm Notifications from Geo SCADA

Demonstration code

Provided by Schneider Electric

Notify and Redirector source sample code not supported, please see Geo SCADA Support Forum to discuss

# What the demonstration can do?

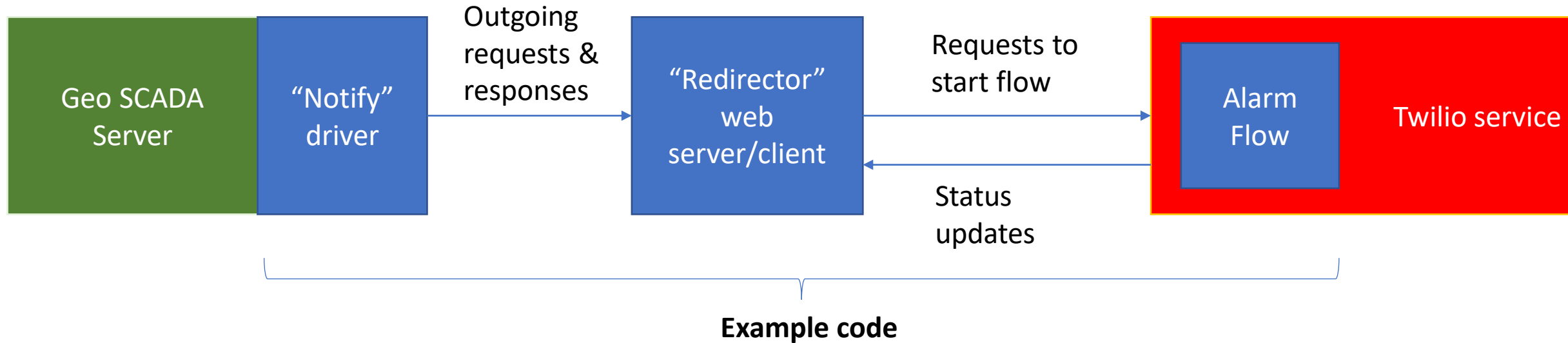
- Send SMS and Voice alarm notifications from Geo SCADA
- It uses the Twilio cloud service to manage notifications
  - Other services could be easily added
- An inexpensive subscription is required with Twilio
- Any text can be sent via voice or SMS messaging
- Notification of success or failure, and alarm acknowledgements are possible
- Notes:
  - Use of this demonstration will require you to build the code for your release of Geo SCADA. (It may be built for earlier ClearSCADA versions, but not take advantage of the new alarm redirection method to user's phone numbers).
  - You also need to deploy the Driver and Redirector securely, making any code changes you need for your application's security and reliability.
  - You can customise the application for your language and choice of services.

# Architecture

This driver can be installed on main/standby architectures

This server can be in a DMZ or the cloud

Cloud subscription



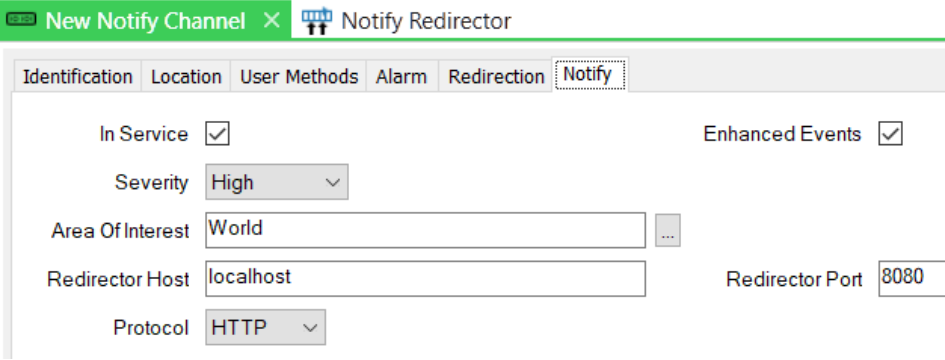
Web Client

Web Client &  
Web Server (http/s,  
configurable port)

Web Client &  
Web Server (https)

# How it works – the Driver

- The Notify Driver is written in C#
- It has two objects
  - A 'channel' to set the parameters for communicating with the Redirector
  - A Redirector 'scanner' to set some parameters for the Twilio service
  - (You could extend this to add further services as 'scanners')
- The Driver presents database Methods on the Scanner object
  - These accept parameters and send requests to the Redirector
  - They can be referenced by the new Alarm Redirection object
  - Requests are sent as http or https messages, outgoing only
    - Message URL is fixed, so can be easily restricted by a firewall



New Notify Channel × Notify Redirector

Identification Location User Methods Alarm Redirection **Notify**

In Service ☒ Enhanced Events ☒

Severity High

Area Of Interest World

Redirector Host localhost Redirector Port 8080

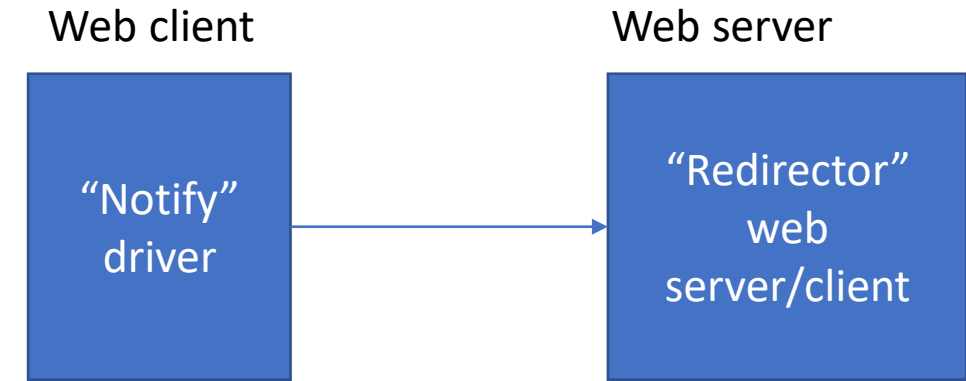
Protocol HTTP

Name	Display Name	Description	Privilege	Arguments
NotifyAlarmVoice	Voice Notify Alarm	Send alarm text alarm to redirector service.		1. Message (String) 2. UserVoicemailNumber (String) 3. Cookie (Long Long)
NotifyMessageSMS	SMS Notify Message	Send simple text message to redirector service.		1. Message (String) 2. UserVoicemailNumber (String)
NotifyMessageVoice	Voice Notify Message	Send simple text message to redirector service.		1. Message (String) 2. UserVoicemailNumber (String)

# How it works – the Redirector

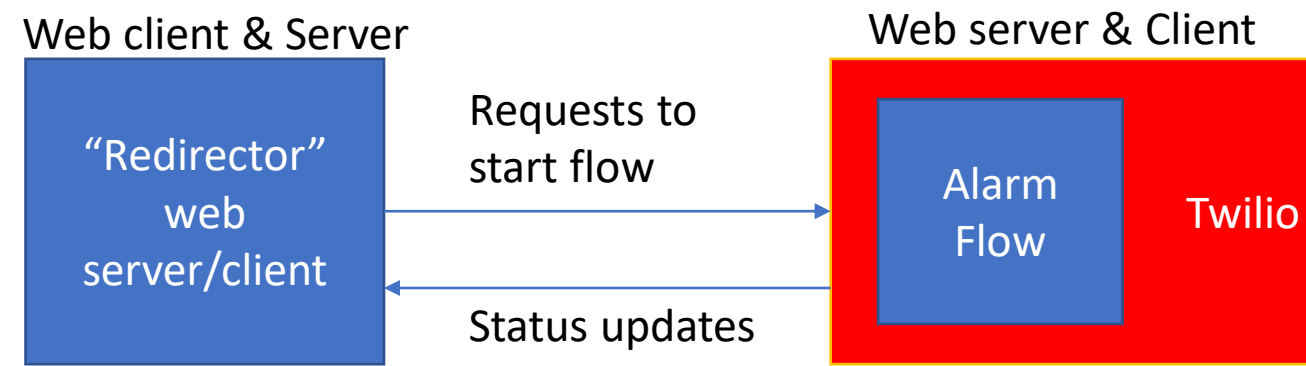
- The Redirector is a .exe file which sets up a simple web server to receive requests from the Driver
- The Redirector makes requests to the Twilio service using the parameters passed from the Driver
- The Redirector also receives web service requests from Twilio with details such as message success/failure and alarm acknowledgement requests from users
  - These are passed back in polls made by the Driver to the Redirector
  - While data back to Geo SCADA is delayed somewhat, this is much more secure than providing an open port on the Driver

# Driver to Redirector



- Web service hosted on /NotifyRequest/
  - Data sent in query string parameters
  - If type is 'SMS' or 'VOICE' this is a request to make a call or message
    - key is the Twilio service key, phone message and cookie are used to make the call
  - If type is 'STATUS' this is used to request feedback from Twilio, such as call failure – the responses are buffered (see next page) and fed back as lines in the response body
  - If type is 'STATUS' and alarm acknowledgements are set up in Twilio, and the #define feature 'FEATURE\_ALARM\_ACK' is enabled then the request message sends alarm acknowledgement status messages to the Redirector

# Redirector to Twilio



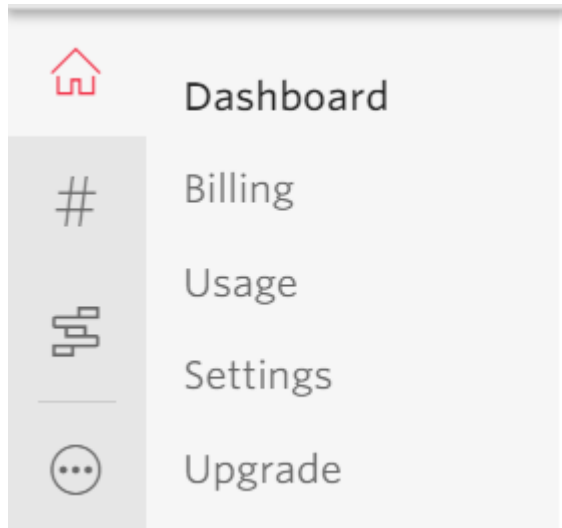
- Web client uses API key and parameters to request calls/SMS as a flow
- Web service hosted on /TwilioRequest/
  - Data sent in query string parameters
  - The Redirector receives and adds these parameters to a list, for forwarding back in responses to the Driver
  - If type is 'ACKCHECK' and alarm acknowledgements are set up in Twilio, and the #define feature 'FEATURE\_ALARM\_ACK' is enabled then the request message sends alarm acknowledgement status messages to the Twilio Flow

# Setting up Twilio

- Twilio is a simple web-based subscription service
  - Messages are costed individually or in packages, making it economic for alarm redirection
- You will need to lease a phone number which Twilio uses to send out messages, you can select this on Twilio based on a suitable location
- Our demonstration uses the Twilio 'Flow' facility which makes it easy to design step-by-step processes for call interaction
  - We show you how to create a flow with the parameters needed






# Twilio – Set up an account



PROJECT NAME      <Your email address>

ACCOUNT SID      <Account ID>

AUTH TOKEN      [view](#)


 Owner       1 [manage](#)       2FA Disabled [edit](#)

Your Account ID needs to be compiled into the Redirector code.


The Auth token here needs to be entered onto the Geo SCADA 'Notify Redirector' object properties.

# Twilio – Buy a Number – for the outgoing calls


Select your country and click 'Search'. Add further search parameters if you are looking for a particular number sequence or letter codes (e.g. 1-123-SCADA !)




Phone Numbers




Manage Numbers



Buy a Number



Verified Caller IDs



Port & Host

Regulatory Compliance



Tools

Usage

Getting Started

## Buy a Number

COUNTRY

 **Netherlands** (+31) 


Can't find the country you need?  
[Please let us know.](#)


NUMBER

Search by digits or phrases (Optional)

Search by area code, prefix, or characters you want in your phone number.

MATCH TO

First part of number 



CAPABILITIES

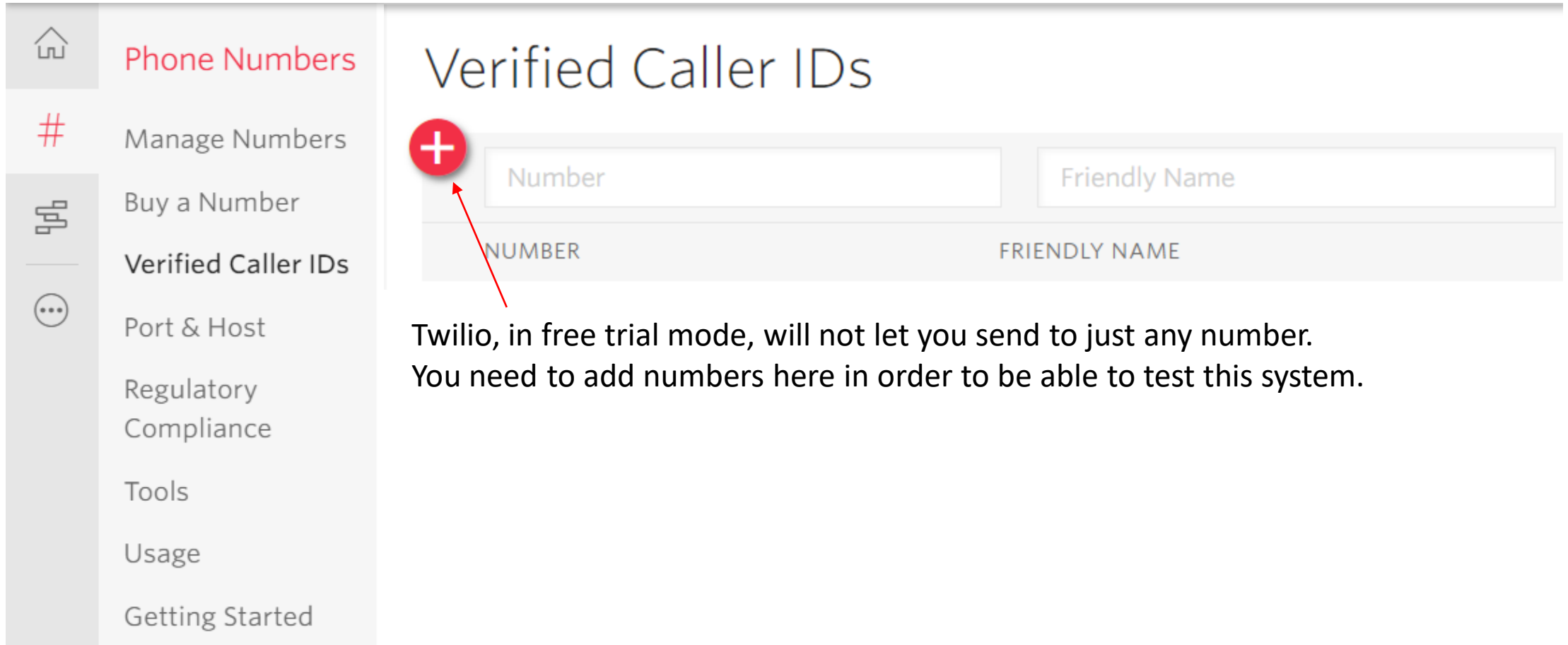
☒ ANY | ☐ Voice | ☐ Fax | ☐ SMS | ☐ MMS

Different numbers have different communications capabilities. Select the ones your phone number needs.

Search

[Show Advanced Search](#)

# Twilio – Verified Caller IDs



Verified Caller IDs

+

Number

Friendly Name

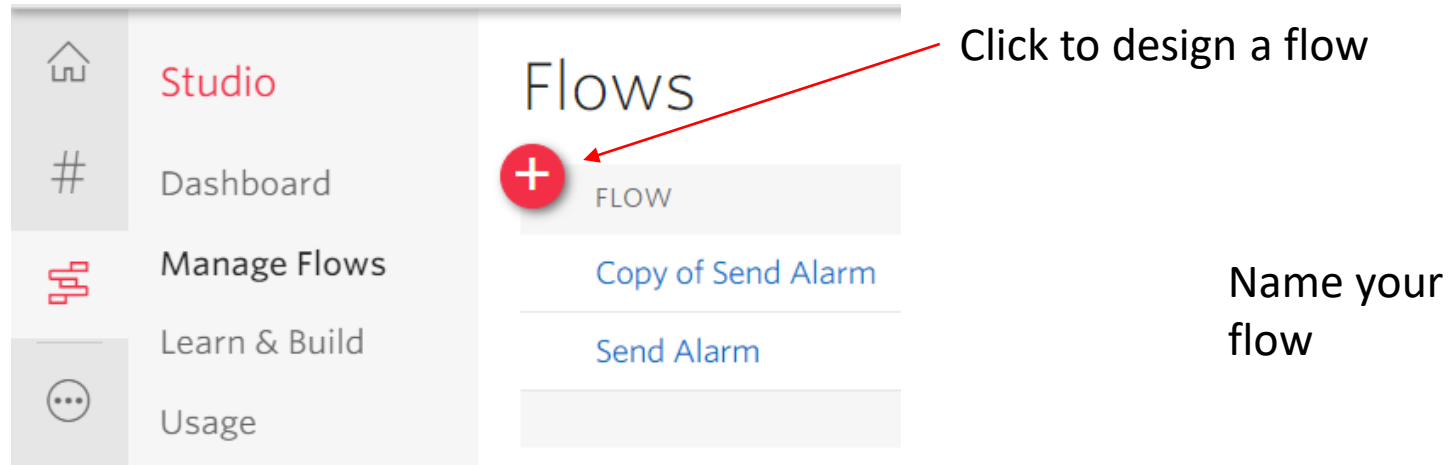
NUMBER

FRIENDLY NAME

Twilio, in free trial mode, will not let you send to just any number. You need to add numbers here in order to be able to test this system.

# Twilio – Creating a Flow

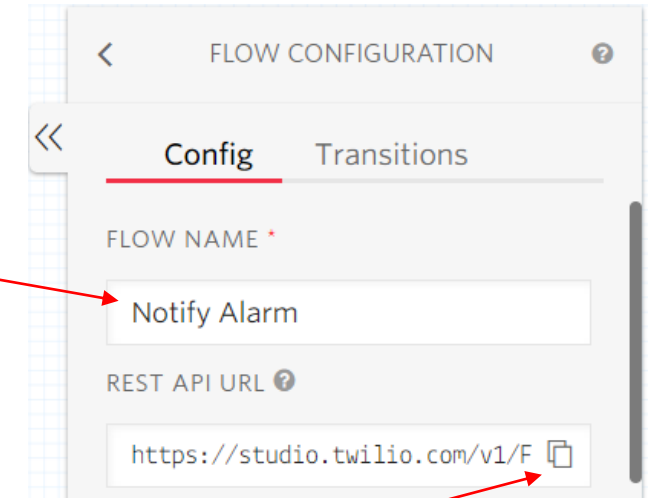
A full flow has been produced for this. See the JSON representation of the flow within the repo – file 'DemoTwilioFlowV1.json' You can paste this into Twilio.



Flows start with a trigger, our trigger is the REST API

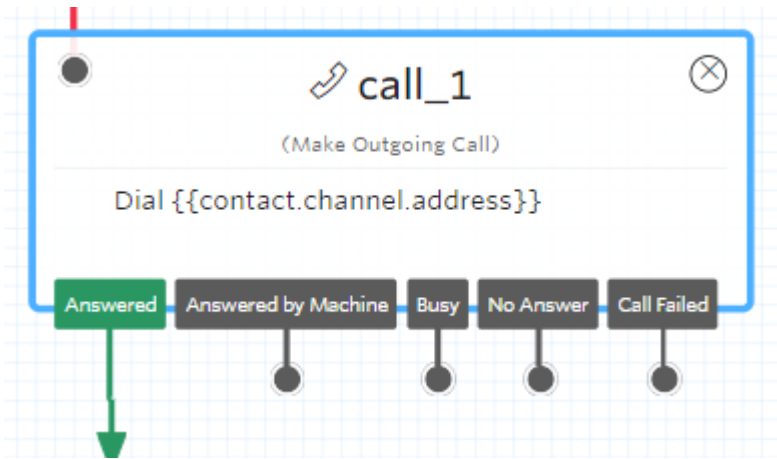


## Trigger properties



Copy and paste this URL (ending .../Executions) into the code of the Redirector.

# Twilio – Add a call

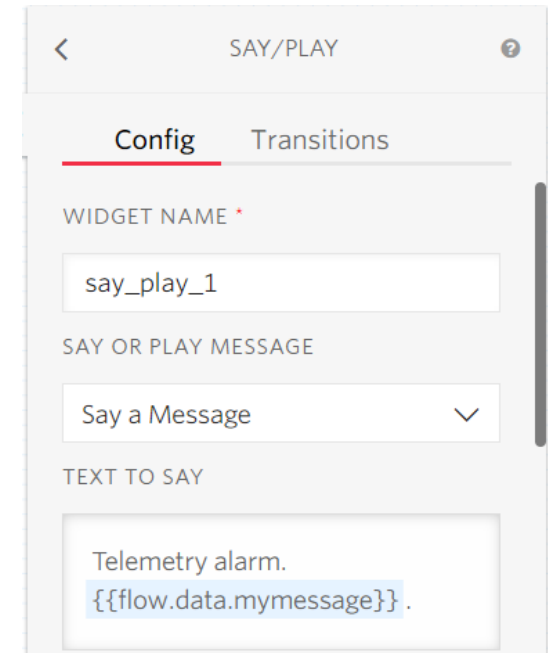
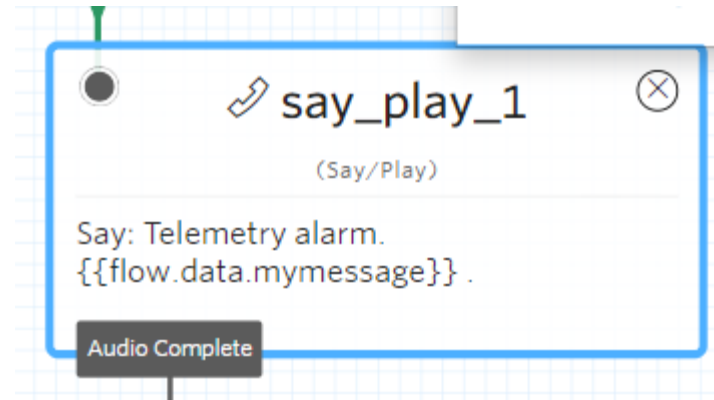


- Connect up to API call
- Set properties

The screenshot shows the 'MAKE OUTGOING CALL' configuration interface. It has two tabs: 'Config' (selected) and 'Transitions'. The 'Config' tab contains the following fields:

- WIDGET NAME \***: A text input field containing 'call\_1'.
- NUMBER TO CALL**: A text input field containing '{{contact.channel.address}}'.
- NUMBER TO MAKE CALL FROM**: A text input field containing '{{flow.channel.address}}'.

# Twilio – Add ‘Say’



- Text to say has your choice of introductory text followed by the message parameter:
  - Telemetry alarm. {{flow.data.mymessage}} .

# Twilio – reporting back status

- Add external REST calls back to the Redirector
- Use parameters referenced in the function ProcessResponse in DriverNotify.cs
- E.g. These can cause events such as noting that a call was not answered
- Or they can cause an alarm to be acknowledged via a user's ID and PIN

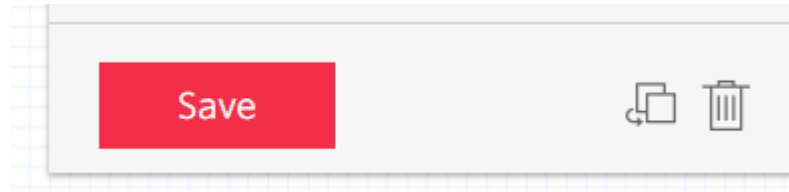
# Twilio Full Flow Details

- See the JSON representation of the flow within the repo – file 'DemoTwilioFlowV1.json'
- You can use this to work out what widgets and flow configuration are needed, or import directly
- To import, create a new flow, add a name then scroll to the end of the list to see 'Import JSON'
- Flow has been edited, and items within << >> need to be adjusted for your environment, e.g. your web service endpoint URL

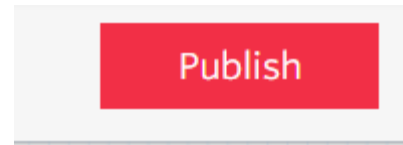


# Twilio – Save and Publish

- Click to save any flows:

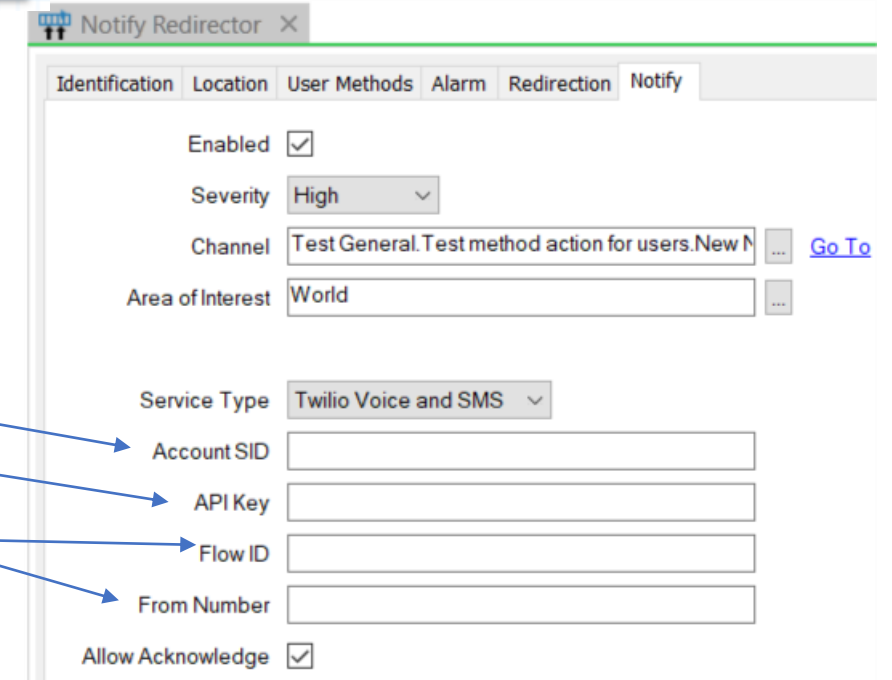


- Click to publish and make 'live':



- On the Studio Dashboard copy the 'SID' (a long string) into the database object of the Redirector

- Also your Account SID and Outgoing number (formatted as E.164 phone number format, e.g. +1xxxxxxxxxx) and Flow ID

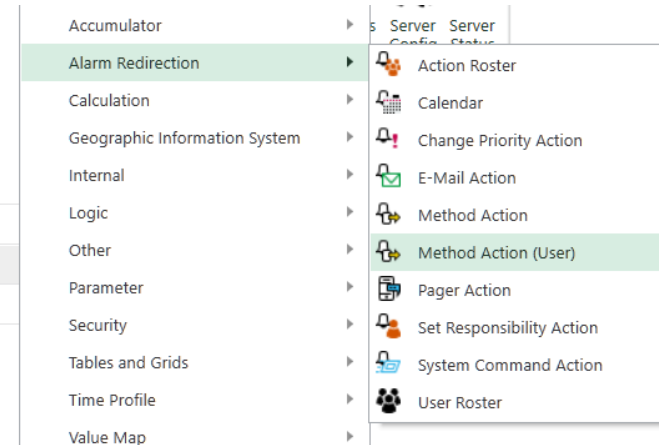
A screenshot of the Twilio Studio 'Notify Redirector' configuration form. The form has tabs for Identification, Location, User Methods, Alarm, Redirection, and Notify. The 'Notify' tab is selected. The form contains the following fields: 'Enabled' (checkbox, checked), 'Severity' (dropdown, 'High'), 'Channel' (text input, 'Test General. Test method action for users. New N'), 'Area of Interest' (text input, 'World'), 'Service Type' (dropdown, 'Twilio Voice and SMS'), 'Account SID' (text input), 'API Key' (text input), 'Flow ID' (text input), 'From Number' (text input), and 'Allow Acknowledge' (checkbox, checked). Blue arrows from the text in the previous block point to the 'Account SID', 'API Key', 'Flow ID', and 'From Number' fields.

# Making it Work

1. Modify and build the driver
  1. Build and copy the driver .exe and .dll to the Geo SCADA server
  2. import the registry file from the code sample to make Geo SCADA run the driver.
2. Modify and build the redirector
  1. Build the installer for the redirector, copy the .msi to the target and run it
  2. Set up/change .config for https, port numbers, firewall restrictions etc.
3. Arrange for the Twilio account to be set up.
4. Configure the Geo SCADA Alarm Redirection parameters:

# Configure Redirection

The new object is found in the Create New ...  
Alarm Redirection context menu:



create a user to target the redirection

A screenshot of the 'steveo' user configuration form. The 'Access Type' section has checkboxes for 'ViewX', 'WebX', and 'Phone'. The 'Phone' checkbox is circled in red. Below this, the 'Voicemail' section has fields for 'Voicemail Number' (07972 036988), 'User ID' (99), and 'PIN' (a masked field).

The phone number must be formatted as E.164 (e.g. +1xxxxxxxxxx)

Create one of the new Method Actions for users

A screenshot of the 'Method Action (User)' configuration form. The 'Inhibit Action' is set to 'Never'. The 'Redirection Scheme' is 'User, Group or Roster'. The 'Region' is empty, with a 'Go To' link. The 'Send To' is 'Test method action for users.steveo', with a 'Go To' link. The 'Find In Region' section has an 'If Not Found' checkbox and a 'Send To' field with a 'Go To' link. The 'Method Object' is 'Test method action for users.Handle Alarm Logic', with a 'Go To' link. The 'Method' is 'Execute('%ACookie%', '%ASeverity%', '%ASourc', with a 'Go To' link.

Add here a link to the Notify Redirector object.

Add method name and parameters here.  
(See next page)

Add this new alarm redirection to the group/folder containing alarms to be redirected.

A screenshot of the 'Test method action for users\*' configuration form. The 'Enabled' checkbox is checked. The 'Trigger Type' is 'Auto', 'Trigger State' is 'Unacknowledged Uncleared', and 'Action' is 'Test method action for users.Method Action (Use', with a 'Go To' link. The 'Low Severity' is 'Low' and 'High Severity' is 'Critical'.

# Sample alarm text

- This contains many possible fields. You may wish to omit many of them.
- For NotifyMessageVoice, omit the last 'cookie' parameter.

```
NotifyAlarmVoice( 'Severity %ASeverity%. Source %ASource%. Message %AMessage%.  
Category %ACategory%. Condition %ACondName%. Sub-condition %ASubCondName%.  
Active time %ASubCondActiveDateTime%. From server %N To user %rUserId.Name%.',  
'%rUserId.ContactConfig.VoicemailNumber%', 'VOICE', '%ACookie%' )
```

# Thank-you

- Please go to the Telemetry Forum to discuss this example
- <https://community.exchange.se.com/t5/Geo-SCADA-Expert-Forum/bd-p/ecostruxure-geo-scada-expert-forum>