

## How to Use Twilio in REDCap

Twilio is a third-party web service that integrates with REDCap, allowing users to send survey invitations and alerts/notifications to participants as SMS text messages or voice calls. It acts as a conduit between participants' mobile devices and your REDCap project. For example, a project that requires participants to take daily surveys could send automated survey invitations either by text message or email, depending on a participant's preference.

### Twilio Account Fees

Before requesting Twilio to be enabled on your project, you must have an active Twilio account with a payment method set up. There is a fee to buy a phone number, starting at \$1 per month, and additional fees for each text message or voice call sent and received, starting at \$0.0075 per message or minute. Costs vary depending on the type of phone number used (e.g., local, toll), frequency of messages, length of calls exchanged, and the recipients' carrier (e.g., AT&T, Verizon). Twilio also offers volume and committed-use discounts. For more detailed information on pricing or billing visit [Twilio Pricing](#) and [Twilio Billing](#). Please contact your departmental financial administrator with any questions about paying for Twilio.

Basic instructions on getting an account are listed below. For additional help setting up an account visit [Twilio's Help Center](#).

Note: The Illinois REDCap team is not responsible for managing Twilio accounts or the costs associated with them.

### Setting up a Twilio Account

1. Go to <https://www.twilio.com/try-twilio> to create an account. You must upgrade to a full account. *Free, trial accounts will not work.*
2. Set up your payment method (i.e., credit card). Contact your departmental financial administrator with any questions on setting up payment.
  - a. You will need the following information:
    - i. Service address (the location where you will use Twilio services, typically your office's address)
    - ii. Billing address associated with the p-card/credit card
    - iii. P-card/credit card information
    - iv. University business tax ID (available through [OBFS](#))
  - b. Once payment is added, you will be prompted to add funds to your Twilio account. The minimum amount is \$20.
3. Purchase a phone number. Numbers may be local or toll-free numbers. Fees start at \$1 per month for each number purchased.
  - a. There can only be one phone number per REDCap project. If multiple REDCap projects need Twilio, you must have a unique phone number for each project. Old numbers can only be re-used if the REDCap project previously using it has been deleted.

4. Disable the Request Inspector Feature. This feature is not HIPAA compliant and will store data on Twilio's servers. Twilio will not be enabled on a REDCap project if this is left as "Enabled".
  - a. From your Twilio Dashboard, go to the Programmable Voice Dashboard (the phone icon), then scroll down to Settings to go to the Voice Settings page:


The screenshot shows the Twilio Voice Settings page. On the left sidebar, the 'Settings' menu item is highlighted with a red box. The main content area shows the 'Request Inspector' section, which is currently set to 'ENABLED'. A red box highlights the 'ENABLED' toggle, and a red arrow points to it with the text 'Switch this to "Disabled"'. The 'Request Inspector' section includes a description: 'The Request Inspector is a tool to debug call flows. It logs the HTTP requests and responses made during the call, including headers, parameters, and body. These logs are stored for 90 days after the call is created.' Below this, there are three other settings: 'Enforce HTTP Auth on Media URLs' (set to 'DISABLED'), 'Calls Per Second' (set to '1'), and 'Usage' (set to 'General').

- b. Under the "Request Inspector" heading, change it to "Disabled."
- c. You will need to provide a screenshot of "Request Inspector" disabled before we will enable Twilio on a REDCap project. The screenshot **must** include the account holder name in the top, right-hand corner.

### Enabling Twilio on a REDCap Project

We recommend having Twilio enabled while the project is still in development to allow for thorough testing of its features without the risk of losing or affecting data. Furthermore, once Twilio is enabled in a project *and* in production mode, it cannot be disabled.

1. Complete an [Enable Twilio Request Form](#). You will need the following information from your Twilio account to complete it:
  - a. Account SID
  - b. Authorization Token
  - c. Twilio Phone Number (unique to each REDCap project)
2. Once Twilio has been enabled for your project, a new box will display on the Project Setup Page. Select "Configure Twilio Settings".



Not started

[I'm done!](#)

### Twilio SMS and Voice Call services

To begin utilizing the Twilio SMS and Voice Call services in this project, click the 'Configure' button below. Once you have the Twilio service enabled, the Configuration popup will allow you to enable Twilio for 1) Alerts & Notifications and/or 2) surveys and survey invitations. If using Twilio for surveys, you will need to first designate an instrument as a survey in this REDCap project, after which you may click the 'analyze surveys' button to run an analysis on all your surveys to determine if they can be used as an SMS survey or as a Voice Call survey.

Go to ⚙️ Configure Twilio settings or 🔍 Analyze surveys for SMS & Voice Calls

3. Select the language and gender preferences for voice calls. Please note that there might be slight differences in how different voices will read text, even when the same language is selected.
4. Select the modules in which Twilio will be used: Surveys and survey invitations, alerts and notifications, or both.
  - a. *Surveys and survey invitations (default)* – Twilio features (e.g., text messaging) will be used for sending survey invitations, and in limited cases, collecting survey data (see Step 5.a). Some project design elements to keep in mind if using this option include:
    - i. Surveys must be enabled in the project
    - ii. Action tags do not function in Twilio when using voice or SMS text surveys
    - iii. Question language should be non-specific (i.e., do not refer to sensitive or confidential data) when using voice or SMS text distribution options
  - b. *Alerts & Notifications only* – Twilio features will only be used to send alerts.
    - i. If a participant replies to a Twilio text when this is enabled, they will receive the following message: *[Auto-Reply: This SMS phone number is not monitored]*. This text is hard-coded and cannot be customized.
  - c. *Surveys and survey invitations and Alerts & Notifications* – Twilio features will be used for sending survey invitations and alerts. The same project design elements mentioned above apply to this option.
5. Configure your survey-specific settings.

#### Survey-specific settings:

##### Choose survey invitation types to use

You may select several different ways for participants to be invited to take surveys and also the medium in which they will take the surveys

\* Only REDCap administrators are allowed to enable the Twilio option to initiate a survey as an SMS conversation. Much like email, SMS is not considered a secure form of communication, so you may not want to administer surveys as SMS conversations if the participant will be submitting identifying information (PHI or PII) unless you have been granted special permission from the participant to do so. Given such sensitive privacy issues, only your local REDCap administrator can enable the optional setting to use SMS surveys. Please notify your administrator about this if you wish to have this option enabled.

##### Survey as webpage

Send survey invitation with survey link via SMS

##### Survey as voice call

Initiate survey as voice call

Send survey invitation via SMS to take survey as voice call (respondent makes call)

Send survey invitation via SMS to take survey as voice call (respondent receives call when replying via SMS)

##### Survey as SMS conversation

Initiate survey as SMS conversation \*

- a. There are three survey invitation types to choose from:
  - i. *Survey as webpage*: Similar to an email invitation, this will send a link via SMS text messaging to the participant.
  - ii. *Survey as voice call*: Note that these options are limited to surveys that *only* contain questions in multiple-choice, single-answer format and/or number-validated text fields.

1. *Initiate as a voice call* – REDCap calls the participant and they take the survey via phone call using the number pad to answer (e.g., “Press 1 for yes and 0 for no”).
  2. *Send survey invitation* – REDCap texts the participant the project Twilio phone number. The participant calls the number when they are ready to take the survey via phone call.
  3. *Invite via SMS to take as voice call* – The REDCap user provides the participant with the project Twilio phone number. The participant then texts the number with a pre-defined message when they’re ready to start the survey, triggering REDCap to call the participant.
    - a. This option may be preferable since some phone carriers do not charge for incoming calls.
- iii. *Survey as SMS conversation:*
1. This option allows a survey to be administered via a SMS text message conversation. Limited to multiple-choice, single-answer format and text fields. **It is not HIPAA compliant and only allowable in certain circumstances (e.g., no PHI/PII requested).**
  - b. Choose the default invitation preference for new survey participants. This value is used as the pre-selected setting of the delivery preference on the “Participant List” page when adding new participants.
  - c. Control which field will establish a participant’s invitation preference moving forward. A participant’s invitation preference can be changed any time in the “Participant List” under “Survey Distribution Tools”.
    - i. Only radio or dropdown fields can be used.
    - ii. Each choice represents a survey invitation delivery method and must be coded as specified below. Only include the choices needed (e.g., if you are not using ‘Survey as SMS conversation’ do not include SMS\_INITIATE). An example of what a field set up to record participant preference is below:

#### Control each participant's invitation preference using a multiple choice field

If survey participants require using different methods (e.g., email, SMS w/ link, voice call survey) for receiving survey invitations and/or taking surveys, you can select a multiple choice field (radio and drop-down fields only) whose choices represent each survey invitation delivery method. After mapping the invitation preferences to a field, whenever the value of the field is added or modified, the participant's invitation preference will automatically be changed accordingly. **IMPORTANT:** The multiple choice codings for the selected field must be defined exactly as delineated on

preference "What is your preferred mode of contact?" ▾

#### Required choice codes with example choice labels:

**EMAIL**, Email invitation

**SMS\_INVITE\_WEB**, SMS invitation (contains survey link)

**SMS\_INITIATE**, SMS invitation (take survey via SMS)

**VOICE\_INITIATE**, Voice call (participant receives voice call)

**SMS\_INVITE\_MAKE\_CALL**, SMS invitation (contains phone number to call)

**SMS\_INVITE\_RECEIVE\_CALL**, SMS invitation (reply via SMS to receive voice call)

**Field Label**  Use the Rich Text Editor [?](#)

What is your preferred mode of contact?

**Choices (one choice per line)** [Copy existing choices](#)

EMAIL, Email survey link  
SMS\_INVITE\_WEB, Text survey link

- d. You can also set a designated phone number field, automatically append response instructions to questions, and set behavior for when SMS invitations for multiple surveys overlap.
  - i. *Auto-append response questions* – If multiple mediums will be used to collect responses (e.g., a participant can respond using phone call or take the survey online), we recommend setting this to “Yes” so that REDCap will display the survey appropriately for each medium.
6. If surveys will be administered via SMS text messaging and/or voice call, use the “Analyze surveys for SMS & Voice Calls” feature to determine if your surveys are appropriately set up to be delivered in these formats.
  - a. This feature can be reached on the “Designer” or “Project Setup” pages.
  - b. Once selected, a popup will appear displaying any issues that might be experienced when using the survey as a SMS or voice call. Fields that may have issues, unless fixed, will be skipped when a participant completes the survey. Select the “view” link to see what the issue is.

## Analyze surveys for SMS &amp; Voice Calls



The table below displays any issues that might be experienced if using a survey as a voice call survey or as an SMS survey. To see the details of any issue, click the 'view' link next to it, which will display the field with the issue, as well as a description of why this field would be problematic. NOTE: If a survey below is administered as a voice call survey or SMS survey, then **any field having an issue will be skipped** in the survey unless the issue described below is remedied by changing or removing the field.

Voice Call Survey Issues	SMS Survey Issues	Survey Title
3 <a href="#">view</a>	0	Landing Page
1 <a href="#">view</a>	0	Survey version 2
<b>Voice Call Survey Issues</b> <ul style="list-style-type: none"> <li>pet_type_v2 ("What kind(s) of pet(s) do you have?") <ul style="list-style-type: none"> <li><b>ISSUE:</b> Checkbox fields cannot be used in voice call surveys.</li> </ul> </li> </ul>		
12 <a href="#">view</a>	7 <a href="#">view</a>	Basic Demography Form

7. Go to "Survey Distribution Tools" on the left-hand panel to begin messaging participants or scheduling invitations.
  - a. The options you select in step 5.a. will affect the methods listed in the "Voice Calling and SMS options for the Public Survey" box. To immediately send survey invitations via phone, click "Invite participants via Voice Call or SMS". Selecting this will open a popup where you can enter phone numbers, select how participants will take the survey, and customize the SMS message that will send.

**Voice Calling and SMS options for the Public Survey**

You may invite participants to complete the public survey via voice call or SMS. If you wish to invite them directly \*right now\*, click the button below to open a popup for entering phone numbers to call or send an SMS text message to the participants.

1) Invite participants now: [Invite participants via Voice Call or SMS](#)

Alternatively, if you instead want the participants to initiate the survey themselves, then you may provide your participants with the instructions for one of the options below.

2) Participant makes voice call to initiate the survey  
Call the phone number [redacted] and enter the code [redacted]

3) Participant receives voice call after sending an SMS message to initiate the survey  
Send the code [redacted] as an SMS message to the phone number [redacted]

4) Participant initiates survey as SMS conversation  
Send the code [redacted] as an SMS message to the phone number [redacted]

- i. Sending a survey link immediately will be recorded in the project log (see "Logging" under "Applications"), but not the "Survey Invitation Log" nor will their information be saved in the "Participant List".

Time / Date	Username	Action	List of Data Changes OR Fields Exported
06-16-2021 7:55pm	██████████@illinois.edu	Manage/Design	Send public survey invitation to participants (via SMS) Recipients: ██████████

- b. Once Twilio is enabled, dropdown menus for selecting the invitation type are available under the “Add Participants” and “Compose Survey Invitations” menus.

**Add Emails or Phone Numbers to Participant List** ✕

Copy and paste your list of participant email addresses or phone numbers, **one per line**.

Specify the default invitation preference for survey invitations for these participants:

SMS invitation (contains survey link) ?

Each participant starting on a new line

**Example #1:** john.williams@hotmail.com, 615-123-4567  
**Example #2:** (270) 398-1111  
**Example #3:** putnamtr@gmail.com, 365 908 7283  
**Example #4:** +16158877747

NOTE: Each line must have either an email address or phone number (or both). If the participant has a phone number but no email address, you may begin the line with the phone number.

Add participants Cancel

✉ **Send a Survey Invitation to Participants**

**Info**

**Survey title:** Landing Page

**Invitation type** - How the participant is invited

Use participant's preference ?

- i. A participant’s preference can be changed anytime by selecting the icon under “Invitation preferences” in the record’s row on the “Participant List” tab.

Invitation preference	Responded?	Invitation Scheduled?	Invitation Sent?	Link	Survey Access Code and QR Code
<span style="border: 2px solid red; padding: 2px;">✉</span>	●	✉	✉	🔗	QR Code

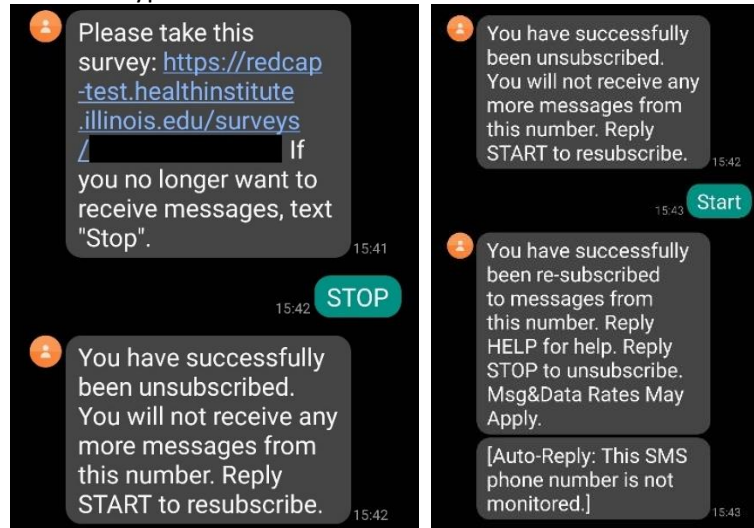
- ii. Invitation preferences can also be selected in the “Automated Survey Invitations” and “Alerts & Notification” menus.

- c. In the “Survey Invitation Log”, you can view past invitations to check if there were any errors in sending invitations. Your Twilio account may have more information on why messages are not being sent (e.g., no funds).

The screenshot shows the 'Survey Invitation Log' interface. At the top, there are filters for 'Begin time' and 'End time' (06-17-2021 13:49). Below that, there are dropdown menus for 'Display' (All invitation types) and 'All response statuses'. There are also buttons for 'View past invitations', 'View future invitations', 'Apply filters', 'Reset', and 'Download log (as seen below)'. A table below shows a list of invitations. The first row is highlighted, showing an invitation sent at 05-26-2021 6:23pm. The 'Errors (if any)' column for this row contains the text 'ERROR SENDING SMS', which is highlighted with a red box.

Invitation send time	View Invite	Participant Email	Participant Phone	Record	Participant Identifier	Survey	Survey Link	Responded?	Errors (if any)
05-26-2021 6:23pm		[No email listed]	[Redacted]			[Redacted]			ERROR SENDING SMS

8. It is highly recommended to include “*Stop Logic*” in any automated survey invitation or alert/notification. This can be achieved by using a combination of fields or creating a “kill switch” field (e.g., “Do you want to opt out of text notifications? 1= Yes, 0 = No”) that can be used in conditional logic (e.g., [opt\_out] <> ‘1’]) for sending invitations or alerts/notifications.
- In Step 3 of an Automated Survey Invitation (or Step 1 in Alerts & Notifications), place conditional logic needed to send the alert and check the “Ensure logic is still true” box.
  - Participant-driven opt-out can be achieved by the participant responding with “Stop” to the SMS survey invite. *REDCap does not automatically include instructions for opting out in survey invitations.* Once a participant responds “Stop” via text message, all future invites will be halted from reaching the participants’ device until the participant chooses to “re-subscribe”. The image below is an example of how this appears for a participant with a Samsung S9 phone using Verizon. Note that it does not matter how “Stop” or “Start” is typed.



### Other Tips

- When composing an invitation that will be sent via SMS text message, keep the message brief (< 160 characters, including smart variable names within brackets, such as [survey-url]) to ensure it



is not broken into multiple, smaller texts. Detailed instructions should be included in the “Survey Instructions” modifiable in “Survey Settings”.

- If the invitation is a voice call, the computer will say the information listed in “Survey Instructions” and the field labels for each question. The setting “*Auto-append response questions*” will automatically add “Press 1, press 2...etc.” to the end of answer options.
- Some mobile carriers will block repeated texts and phone calls from unsaved numbers. Having participants save your project Twilio number into their contacts may help prevent this.
- Some mobile carriers block SMS text messages containing the word “COVID”. For more information on why messages may be blocked visit [Twilio.com](https://www.twilio.com).
- Thoroughly test your project with different cell phone types (e.g., Samsung Galaxy S9, iPhone 12) and carriers (e.g., Verizon, T-Mobile).

## References

- Twilio Guide for Vanderbilt/Meharry End Users, REDCap version 10.0.0, updated 28 May 2020. [https://rocket.app.vumc.org/index.php?doc\\_id=10909&action=download&file\\_id=1040178](https://rocket.app.vumc.org/index.php?doc_id=10909&action=download&file_id=1040178)