

EHR Integration Guide

Appointment Management with EHR Integration Quick Deploy App

This guide is intended to provide organizations that are exploring Twilio's Appointment Management with EHR Integration Quick Deploy App the technical specifications necessary for EHR integration. More information about how to implement the Quick Deploy App can be found in the [Implementation Guide](#).

This app is intended for prototyping and testing purposes only. Not for use in production environments!

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Overview

The Appointment Management with EHR Integration Quick Deploy App (shortened in this doc as EHR Appointment Management app) packages together the core components of a deployable prototype for basic, two-way SMS communication between the patient and provider using appointment information that is shared between the application and an Electronic Health Record (EHR). For the app to work, integration with the EHR is a necessary step. The EHR integration can be implemented using a variety of methods; whichever EHR integration method is used, the following criteria should be met:

- EHR triggered appointment-related events, such as booking of an appointment, should be available in near real-time or within the customer's desired timeframe as the app architecture is based on a near real-time patient notification and response.
- Integration method must be capable of converting the contents of the EHR appointment events into a Twilio REST API call (via HTTP request). Similarly, it must be capable of receiving a HTTP call back from Twilio and converting the contents of the call into appropriate events in the EHR.

Customers with that are subject to the Health Insurance Portability and Accountability Act (HIPAA) and intend to utilize Twilio's products and services to develop communication workflows containing protected health information (PHI) must execute a Business Associate Addendum (BAA) to [Twilio's Terms of Service](#). Twilio considers HIPAA compliance as a shared responsibility between the customer and Twilio. To learn more about how to build a HIPAA compliant workflow using Twilio's offerings, please refer to our guide on [Architecting for HIPAA on Twilio](#).

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EHR Integration Methods

Twilio's EHR Appointment Management app does not come with out-of-box EHR integration, but there are a number of ways in which the application can be integrated with the provider's EHR.

- **HL7 v2 messaging** remains arguably the most widely implemented standard for EHR data exchange. The HL7 SIU messages communicate information regarding changes to the appointment scheduling data. While Twilio cannot directly accept or send HL7 v2 messages, the provider can leverage HL7 interface engines to filter and configure appointment information to and from Twilio.
- **FHIR APIs** provide a common standard for external parties to interact with EHRs and use a more modern web-based suite of API technologies. Most healthcare providers have FHIR endpoints established, but the range of data available through FHIR APIs varies between organizations. If the appointment data components described below are available through a provider's FHIR APIs, Twilio's EHR Appointment Management app can be directly integrated through the available APIs.
- **EHR APIs** are endpoints that are specific to each EHR vendor that are made available to its customers (and oftentimes to third party vendors that are granted access). Each EHR system has its proprietary set of APIs and its capabilities can be highly dependent on the specific version of the EHR and its configured settings. The provider can work with their EHR support team to identify the appropriate set of APIs that could be leveraged to work with Twilio's EHR Appointment Management app.
- **Third-party integration-as-a-service** vendors aim to provide white-glove connectivity between the provider's EHR and external applications on a per-needed basis. These vendors can typically implement a connection using a variety of methods, depending on what is available and needed for the application. If a provider wants to leverage one of these external services, Twilio can work with the service provider to ensure that the application is configured appropriately.

Appointment Events

Twilio's EHR Appointment Management app comes with support for the following appointment events in Table A. In the Integration Direction column, the source indicates the system that initiates the event. Source events in the EHR are triggered when an EHR user (such as the scheduler) updates appointment data in the EHR, while Twilio source events are triggered by the patient response via SMS (for example, patient responding to an outgoing reminder to confirm or cancel).

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Table A. Appointment Events

Event Code	Integration Direction	Event Description	Notes
BOOKED	EHR → Twilio	Notification of Appointment Booked	Required
CANCEL	Twilio → EHR	Request Appointment Cancellation	Optional to allow patients to request cancellation via SMS response
CANCELED	EHR → Twilio	Notification of Appointment Cancellation	Optional to allow patients to be notified of cancelled appointments
CONFIRM	Twilio → EHR	Request Appointment Confirmation	Optional to allow patients to confirm via SMS response
CONFIRMED	EHR → Twilio	Notification of Appointment Confirmation	Optional to allow patients to be notified of confirmed appointments
MODIFIED	EHR → Twilio	Notification of Appointment Modified	Required. When there are changes to any appointment data element used by the app, excluding time change
NOSHOWED	EHR → Twilio	Notification of Appointment Noshow	Optional to allow patients to be notified of missed appointments
REMIND	–	Appointment Reminder	Event initiated by the appointment reminder solution per reminder schedule
RESCHEDULED	EHR → Twilio	Notification of Appointment Rescheduled	Required. When appointment time is changed from previous. Other data elements may also change

Integration from the EHR to Twilio

When an appointment event occurs in the EHR (e.g., appointment booked), the event must be communicated to Twilio in near real-time, or within a customer's desired timeframe. Such integration can typically be implemented using an HL7 interface engine as HL7 v2 messages are real-time push-based messages. If the customer chooses an alternative integration method, a reliable mechanism to push appointment events near real-time must be identified. The integration layer will need to receive appointment events from the EHR and convert the information into a Twilio REST API call (via HTTP POST request) with JSON parameters.

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Source

Applicable EHR appointment-related events are the triggering source. While appointment event types supported by this application are defined in **Table A** above, you will need to implement specific filters in your EHR (or in your integration layer) to limit the appointment events and/or patients per your preferred requirements. For example, you may want to restrict the events that trigger a call to Twilio only to include patients that have consented to receiving SMS reminders from the provider. Additional filter criteria may include service lines, appointment type, facility, etc..

Transformation

The integration layer must convert the EHR appointment-related events to JSON of parameters **per table B** below.

Table B. Appointment Reminder Data Elements

Twilio JSON Element	Type / Format	Description
event_type	Enumerated Text	BOOKED RESCHEDULED MODIFIED NOSHOWED CANCELED CONFIRMED
event_datetime_utc	ISO8601 (YYYY-MM-DDTHH:mm:ssZ)	Date/time of event occurrence in UTC
patient_id	Text	Unique patient identifier for customer
patient_first_name	Text	Patient first name
patient_last_name	Text	Patient last name
patient_phone	E.164 (+12223334444)	Patient's mobile phone number
provider_id	Text	Unique provider identifier for customer
provider_first_name	Text	Provider first name
provider_last_name	Text	Provider last name
provider_callback_phone	E.164 (+12223334444)	Provider's callback phone number
appointment_location	Text	Appointment location
appointment_id	Text	Unique appointment identifier for customer
appointment_datetime	ISO8601 (YYYY-MM-DDTHH:mm:ss)	Date/time of appointment in the local timezone of the patient. (e.g, 2021-07-01T15:00:00 indicates appointment at 3pm local time of the patient)
appointment_timezone	Offset (+###)	Timezone offset of appointment date/time at patient's location

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Destination

The integration layer must call the Twilio REST API (via HTTP POST) to initiate the SMS per appointment event.

HTTP POST to <https://studio.twilio.com/v1/Flows/FWxxxxxxxxxxxxxxxxxxxx/Executions> where FWxxxxxxxxxxxxxxxxxxxx is the Twilio Studio Flow SID of your deployed Twilio EHR Appointment Management app.

Basic authentication is used where

- username = Twilio account SID (e.g., ACxxxxxxxxxxxxxxx)
- password = Twilio account Auth Token

Parameters need to be sent as ‘application/x-www-form-urlencoded’

- To = patient’s mobile phone number
- From = Twilio phone number assigned to the Twilio Studio flow
- Parameters = JSON of data elements defined in table B

For more details, please refer to our help documentation on [Triggering a Twilio Studio Flow Execution via the REST API](#).

Sample CURL

```
curl -X POST
https://studio.twilio.com/v2/Flows/FWXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX/Executions \
--data-urlencode "To=+15558675310" \
--data-urlencode "From=+15017122661" \
--data-urlencode "Parameters={"p1": "v1", "p2": "v2"}" \
--user ACXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX:your auth token
```

Integration from Twilio to the EHR

When patients respond via SMS to a notification from the app (triggered by an EHR appointment-related event), the response comes back through Twilio Studio, and Studio will send that response back to the EHR integration layer. The integration layer will need to convert the incoming response to the necessary input for the EHR to process the event.

Source

When a patient sends an inbound SMS in response to an outgoing reminder, Twilio will communicate the response back to the EHR integration layer via HTTP POST. **Table C** below outlines the parameters as that will be included in the response as ‘application/JSON’.

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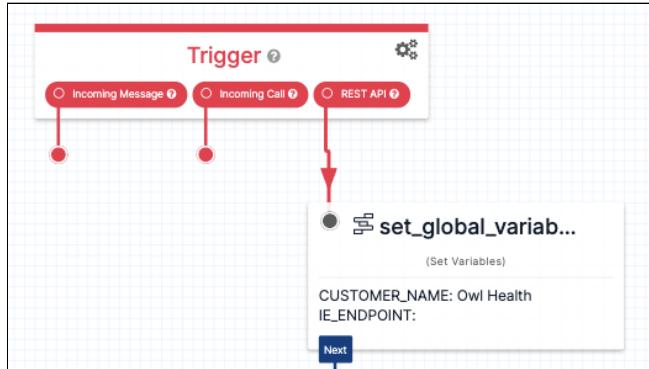
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Table C. Twilio Message Parameters

Parameter	Type / Format	Notes
flow_sid	Text	
event_type	Enumerated Text	CONFIRM CANCEL
appointment_id	Text	Unique appointment identifier for customer
patient_id	Text	Unique patient identifier for customer
provider_id	Text	Unique provider identifier for customer

Note that Twilio's Studio Flow communicates to your public EHR endpoint using the '[Make HTTP Request](#)' widget (see **confirm_remind**, **cancel_remind**, and **confirm_booked** widgets near the bottom of the Studio Flow). While most authentication is supported by configuration of the widget, if your particular authentication mechanism is not supported, we recommend implementing a custom Twilio service function and using the '[Run Function](#)' widget to call your function.

You will need to change the global variable IE_ENDPOINT in the deployed Studio Flow's **set_global_variables** widget to point to your public EHR endpoint URL. After changing the IE_ENDPOINT variable, make sure to save and 'Publish' your changes.



Per [Architecting for HIPAA on Twilio](#), all calls made to and from Twilio should be [encrypted](#), as well as [validated](#) to ensure that the requests coming in from Twilio are indeed coming from Twilio, and not a malicious third party.

Transformation

The integration layer must convert the incoming data elements into the appropriate format dictated by the integration method. The specifics of this transformation will depend on the integration method leveraged by the provider and the EHR system.

Destination

The integration layer will send the transformed data to the EHR that will trigger the desired action in the EHR.

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Additional Information on HL7 v2 Standard

Twilio's EHR Appointment Management app events and integration data elements are largely derived from the HL7 v2.x standard's trigger events and message segments for Scheduling, respectively. Please reference this section if your interface engine will communicate with the EHR using HL7 v2 messages as opposed to other methods.

Mapping to Scheduling Trigger Events

In the context of Twilio's EHR Appointment Management app, your interface engine will receive appointment request events from the Twilio app via HTTP request, translate to HL7 v2 messages, and communicate to the EHR. When appointment changes occur in the EHR, the EHR will initiate unsolicited event messages to your interface engine to be translated to Twilio REST API calls.

Table D. Appointment Events mapping to HL7 Requests & Trigger Events¹

Event Code	Integration Direction	Appointment Event	HL7 Trigger Event
BOOKED	EHR → Twilio	Notification of Appointment Booked	SIU^S12 - Notification of New Appointment Booking
CANCEL	Twilio → EHR	Request Appointment Cancellation	SRM^04 - Request Appointment Cancellation
CANCELED	EHR → Twilio	Notification of Appointment Cancellation	SIU^S15 - Notification of Appointment Cancellation
CONFIRM	Twilio → EHR	Request Appointment Confirmation	SRM^03 - Request Appointment Modification
CONFIRMED	EHR → Twilio	Notification of Appointment Confirmation	SIU^S14 - Notification of Appointment Modification
MODIFIED	EHR → Twilio	Notification of Appointment Modified	SIU^S14 - Notification of Appointment Modification
NOSHOWED	EHR → Twilio	Notification of Appointment Noshow	SIU^S26 - Notification That Patient Did Not Show Up for Scheduled Appointment
REMIND	—	Appointment Reminder	—
RESCHEDULED	EHR → Twilio	Notification of Appointment Rescheduling	SIU^S13 - Notification of Appointment Rescheduled

¹ Reference HL7 message / event based on HL7 specifications. Each EHR vendor / implementation may vary.

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Mapping to Scheduling Message Segment Elements

Table E illustrates the recommended mapping of Twilio's EHR Appointment Management app data elements to HL7 v2.x segments. Note that specific HL7 elements available from the EHR may differ significantly per EHR vendor / implementation.

Table E. Appointment Data Elements mapped to HL7 Segment Elements

Twilio JSON Element	Type / Format	Description	Reference HL7 Element
event_type	Enumerated Text	BOOKED RESCHEDULED MODIFIED NOSHOWED CANCELED CONFIRMED	SCH.25.1
event_datetime_utc	ISO8601 (YYYY-MM-DDTHH:mm:ssZ)	Date/time of event occurrence in UTC	MSH.7.1
patient_id	Text	Unique patient identifier for customer	PID.3.1
patient_first_name	Text	Patient first name	PID.5.2
patient_last_name	Text	Patient last name	PID.5.1
patient_phone	E.164 (+12223334444)	Patient's mobile phone number	PID.13.1
provider_id	Text	Unique provider identifier for customer	SCH.12.1
provider_first_name	Text	Provider first name	SCH.12.3
provider_last_name	Text	Provider last name	SCH.12.2
provider_callback_phone	E.164 (+12223334444)	Provider's callback phone number	SCH.12.1
appointment_location	Text	Appointment location	AIL.3.1
appointment_id	Text	Unique appointment identifier for customer	SCH.11.1
appointment_datetime	ISO8601 (YYYY-MM-DDTHH:mm:ss)	Date/time of appointment in the local timezone of the patient. (e.g, 2021-07-01T15:00:00 indicates appointment at 3pm local time of the patient)	SCH.11.4
appointment_timezone	Offset (±####)	Timezone offset of appointment date/time at patient's location	-



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CHANGE LOG

7/22/2021	First Release: EHR Appointment Management_EHR Integration Guide
8/10/2021	Updates to Integration from Twilio to EHR section for new IE_ENDPOINT information



Twilio powers the future of business communications, enabling phones, VoIP, and messaging to be embedded into web, desktop, and mobile software. We take care of the messy telecom hardware and expose a globally available cloud API that developers can interact with to build intelligent and complex communications systems.