twilio.org

# IVR & Virtual Agents for Healthcare

How healthcare organizations can use the power of Twilio Voice and AI to create personalized, self-serve patient experiences

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**Note on HIPAA:** Only the Twilio products included in **HIPAA Eligible Services** can be used by healthcare customers interested in using Twilio to support their HIPAA workflows. Customers using Twilio for HIPAA workflows must sign a Business Associate Agreement (BAA) with Twilio and adhere to **Architecting for HIPAA**. Please consult **Architecting for HIPAA** for guidelines on how customers can use these Twilio HIPAA Eligible Services to develop HIPAA eligible applications and workflows. It is also the customer's responsibility to understand the role of any third-party application / API being used in conjunction with Twilio and obtain a separate BAA with the third-party if necessary.

# Introduction

Virtual Agents are programmable, non-human assistants that interact with inbound callers and automate inbound voice workflows. In healthcare, these agents are often patients' first and primary point of contact, and can have a significant impact on patient engagement and satisfaction. When deployed strategically, Virtual Agents offer key operational benefits to healthcare organizations, including:

1. **Reduced spend** on human agent hours by containing more calls to non-human agents, allowing staff to focus more on direct patient care
2. **Faster resolution time** through automating common tasks such as appointment scheduling, prescription refills, and billing
3. **Improved patient satisfaction** via personalized and low-friction self-serve experiences in natural language

Virtual Agents can take multiple forms, and are rapidly evolving with the recent advances of Generative AI (GenAI) and Large Language Models (LLMs). Recent advances in AI are bringing us closer to a future where a Virtual Agent can provide service equal or superior to their human counterparts. This is made possible by a new level of artificial intelligence that can make Virtual Agents impressively conversational, adaptable, and context-aware. These new capabilities prompt healthcare organizations to re-evaluate their voice and contact center strategies to ensure they're prepared for the future.

At the same time, GenAI capabilities are still in their early stages of maturity, and healthcare organizations face ongoing challenges with their current voice infrastructure. Many are stuck with aging, traditional IVRs that are too rigid, increasingly costly, and lack key features. In addition, patients today are demanding more personalized, seamless experiences from their interactions, especially for urgent or sensitive medical inquiries. Outdated and inflexible automated voice systems may already be frustrating your patients and resulting in excess operational spend.

This is where Twilio's next-generation Voice API and software platform can make a transformative difference. By combining the latest AI advancements with a flexible, programmable platform, Twilio enables healthcare organizations to modernize their voice infrastructure, providing patients with the personalized, seamless experiences they expect. Whether it's integrating with existing systems or adopting new technologies like GenAI, Twilio's Voice solutions empower healthcare providers to meet patient needs with more agility and precision–all while reducing operational costs and improving efficiency. Now is the time to rethink your voice strategy and ensure you're ready for the future of patient engagement.

Chapter 02

# **Twilio Virtual Agent Solutions** to Meet You Where You Are

Voice interactions with patients are among the greatest sources of untapped ROI for today's healthcare organizations. Twilio Voice is a next-generation cloud communications platform that allows healthcare organizations to unlock that ROI through trusted, intelligent, and flexible voice experiences at scale.

## Why Twilio?

- **Meets you where you are:** Regardless of your current voice solution and maturity, you can choose from Twilio's available IVR & Virtual Agent offerings to fit best with your goals and priorities
- **Customizable and extensible:** Twilio's robust API platform and developer friendly tools enables you to bring customized voice solutions to market quickly that integrate with existing systems.
- **AI & personalization built-in:** Twilio integrates with leading conversational AI platforms to deliver high quality and performant voice virtual agents. In addition, Twilio allows you to personalize virtual agent interactions by passing along patient traits from third-party health systems.
- **Unparalleled scale:** The Super Network underpins Twilio Voice, streamlining telecom challenges with efficient carrier interconnection management, proactive quality control, and elastic, scalable cloud capacity.

## Virtual Agent Offerings

With Twilio, regardless of your current voice and contact center systems, you can get started with one of our Virtual Agent offerings to improve your voice front door. We call this our Virtual Agent Ladder:

1. **Programmable IVR [Foundational]:** Customizable touch-tone phone tree in the cloud built atop Twilio's scalable voice connectivity and drag-and-drop IVR builder. This is a great starting point for organizations looking to modernize a legacy IVR system and build a foundation for future progression to more advanced virtual agent solutions.

2. **Conversational Virtual Agent [Advanced]:** AI Agents that callers speak to with natural language. Preset conversation flows create guardrails around automating common tasks, with optional personalization enhancements. This solution is ideal for organizations ready to elevate their patient experience with seamless self-service interactions that effectively deflect calls from human agents.

3. **Generative AI Virtual Agent [Frontier]:** Advanced conversational AI Agents powered by LLMs, leveraging organizational knowledge and customer memory for freeform, context-aware interactions. Generally considered the next generation of virtual agents, its underlying technology is still relatively new and is currently best suited for organizations willing to experiment with advanced AI to stay ahead of the curve.

Depending on your goals and current level of IVR maturity, you can start with any of the three levels and advance to more sophisticated AI-driven interactions as your strategy evolves. Then, For instance, it may be that your organization has been stuck with an on-prem aging IVR solution and your priority is to replatform to save cost now, and unlock advanced capabilities down the road. This might point to starting with Programmable IVR, moving your legacy IVR to the cloud with Twilio. Or, you may already have a Twilio IVR in place and want to experiment with production-grade conversational agents. This may guide you to choose building your IVR with Twilio's Conversational Virtual Agent offering.

## Twilio Voice Virtual Agent Offerings

### FOUNDATIONAL

**Programmable IVR**

**What is it?**
Customizable touch-tone phone tree in the cloud built atop Twilio's scalable voice connectivity and drag-and-drop IVR builder.

**Who is this for?**
Organizations wanting to modernize their legacy IVR.

**Benefits:**
- Increased capacity and flexibility vs. legacy solutions
- Powerful add-ons to enhance IVR capabilities
- Build a foundation to adopt Virtual Agents in the future

### ADVANCED

**Conversational Virtual Agent**

**What is it?**
AI Agents that callers speak to with natural language. Preset conversation flows create guardrails, with optional personalization tools.

**Who is this for?**
Organizations wanting to offer self-service experiences and reduce human agent hours.

**Benefits:**
- Improved caller experience from touch-tone IVR
- Begin deflecting calls from human agents for basic tasks
- Personalize agent interactions with caller based on individual traits

### FRONTIER

**Generative AI Virtual Agent**

**What is it?**
Advanced Agents powered by LLMs, leveraging organizational knowledge and customer memory for purely freeform, context-aware conversations.

**Who is this for?**
Organizations wanting to innovate with autonomous virtual agents to create next-gen voice experiences.

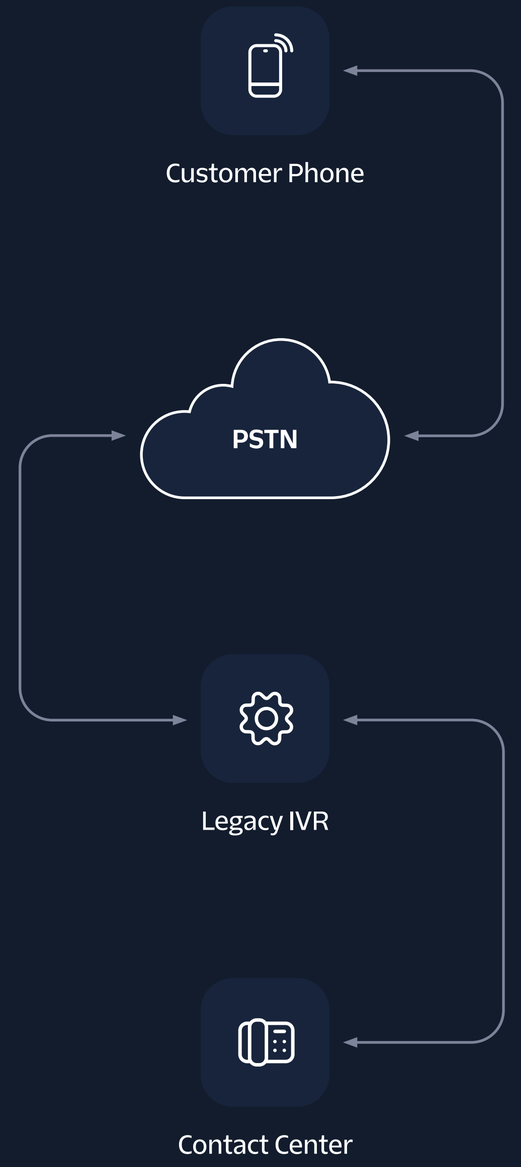
**Benefits:**
- Expanded agent capability to handle a broader set of tasks
- Higher potential containment rate of inbound calls
- Reduced toil associated with configuring agent behavior

Chapter 03

# Programmable IVR [Foundational]

For organizations that are looking to take the first step to modernizing a legacy phone-tree system, Twilio's **Programmable IVR** offering may be the ideal starting point. Many organizations are finding that their legacy on-premises IVR systems are not meeting their needs. Capacity is limited. Complexity and costs are high. Changes and upgrades take too long and require outside services. Modern cloud-based IVRs offer more flexibility and functionality, and can be administered by in-house employees.

In a basic legacy IVR, The customer's call is connected through the public switched telephone network (PSTN) and received by the IVR.  The IVR's proprietary, often hard-to-access logic answers the call and routes it according to the configured business rules.



Twilio's cloud-based approach to IVR makes it easy to augment or replace your traditional IVR with one that offers cloud scalability and easy customization. The diagram shows how Twilio's cloud-based IVR can replace your legacy IVR system, while retaining key components like your phone number and contact center for a seamless transition.

Twilio's Programmable IVR platform includes three main components:

1. **Phone Numbers** for connectivity built atop Twilio's Super Network of carriers
2. **Voice** for API-based call control and a full suite of call handling features
3. **Studio** for designing and editing call flows using a drag-and-drop visual interface.

With Twilio, the customer's call is connected through the PSTN to a **Twilio Phone Number**. You can port your existing number to Twilio, or acquire new phone numbers from Twilio's Super Network. The Super Network is a robust, flexible network of global carriers that lets you manage and scale your connectivity as your organization's requirements change. With intelligent route monitoring, automated routing changes, and many other software-based innovations, Twilio Super Network lets you focus on building dependable, unique communication experiences instead of dealing with the complexity of traditional telecommunication.

Once a call is received, your cloud-based IVR built on **Twilio Voice** will handle it according to your needs. Twilio will look up the set of instructions configured for that phone number (using TwiML, or the Twilio Markup Language), and take appropriate action such as prompting the caller to press digits on the keypad, play a message, or securely accepting a credit card payment. Because Twilio Programmable IVR is built on software, you can modify or update it easily and on your own schedule. When ready, you can also easily extend the power of your IVR with Programmable Voice's full suite of features, including:

- Call recording and transcription
- PCI compliant payments (Twilio <Pay>)
- Real-time call audio access (Media Streams)
- Speech recognition and text-to-speech
- Call routing & transfers

**Twilio Studio** is a visual environment that lets you build Programmable IVRs with low or no code. With Twilio Studio, you can drag-and-drop widgets to build phone menus, call flows, and other features of your IVR. This IVR logic also includes the ability to seamlessly handoff to human agents, regardless of if you're using Twilio Flex or another contact center solution. Studio makes it easy to modify your existing call flows, or stand up new ones. This lets you reconfigure menu systems whenever needed, on the fly.

In aggregate, when compared to legacy IVRs, Programmable IVR can save your organization significant time, money, and complexity. What's more, switching to a cloud-based IVR with Twilio gives you the right foundation for continued innovation in your client-facing voice experiences. In particular, you'll have a path to adopt more sophisticated voice Virtual Agents, discussed in detail in the next sections.

Chapter 04

# Conversational Virtual Agent [Advanced]

Whereas IVRs rely on phone trees (e.g., ‘press 1 for scheduling, press 2 for billing’), Twilio’s **Conversational Virtual Agents** enable callers to interact with your digital assistant using natural language.

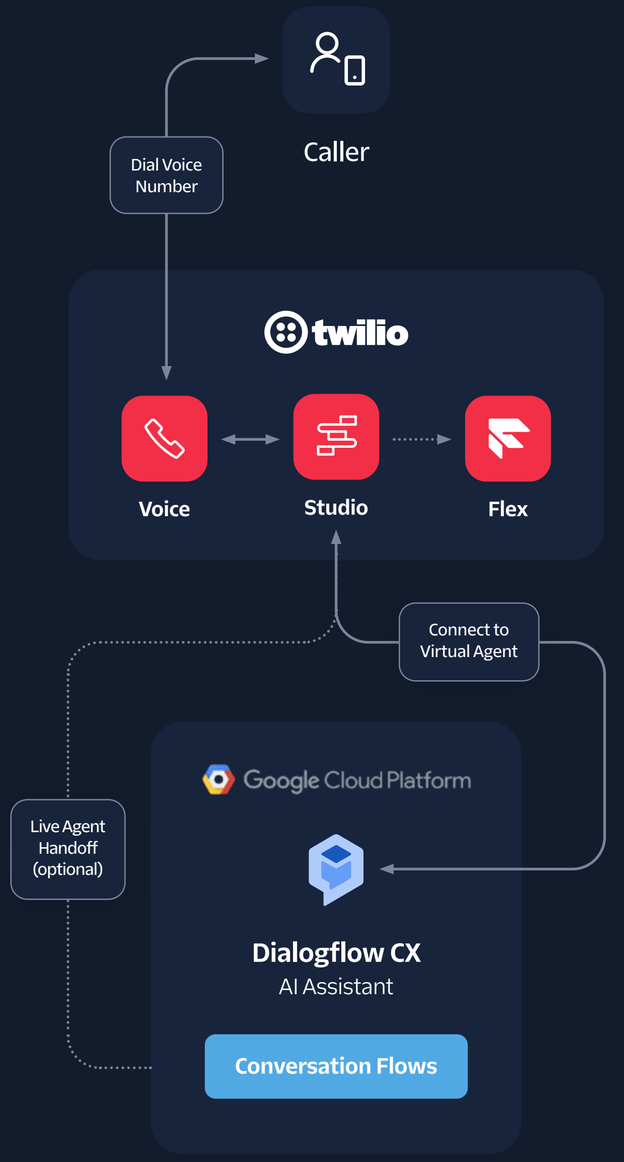
These Virtual Agents offer a more intuitive and efficient user experience compared to traditional IVRs by allowing callers to speak conversationally rather than navigate through rigid menu options. This not only enhances the caller experience, but also allows your organization to deflect some calls from human agents through self-serve automation. Importantly, using Twilio’s Virtual Agents means that you still have access to the robust capabilities of Twilio Voice, Studio, and the Super Network, just as with Programmable IVR. The diagram illustrates how Conversational Virtual Agents are architected with Twilio.

To help you deliver an exceptional Conversational Virtual Agent, Twilio offers a native one-click connector with **Google Dialogflow CX**. This mature AI-based virtual agent platform runs on Google Cloud Platform and tightly integrates with Twilio’s Programmable Voice, allowing customers to easily set up and manage this integration while providing the sophistication necessary to build professional-grade Virtual Agents. The integration is available as a native Studio Widget, making it simple to map a Twilio phone number to a Dialogflow Conversational Agent.

Powered by AI, these Virtual Agents utilize Automatic Speech Recognition (ASR) to transcribe spoken language and Natural Language Processing (NLP) to understand and respond to the caller’s intent. The Virtual Agent guides the caller through the appropriate conversational flow based on their input, with guardrails in place to ensure that only supported interactions occur within preconfigured flows.

Dialogflow CX and Studio can be easily configured to support live agent handoffs for when a caller requests to speak to a human agent. These live handoffs can be sent to Flex, Twilio’s contact center platform, or to third-party contact center providers. What’s more, Twilio supports intelligent call routing, enabling you to use caller traits, call metadata, or other information to dynamically route the call to the best possible agent.

If any sensitivity conversation flows require caller authentication, **Twilio Verify** can be used to extend your Conversational Virtual Agent. Verify is a turnkey API for user verification, enabling you to quickly integrate one-time passcode authentication (OTP) into voice calls. Specifically, the virtual agent can push an OTP to a caller via SMS while on the line, and collect the password to confirm their identity before triggering protected conversation flows.

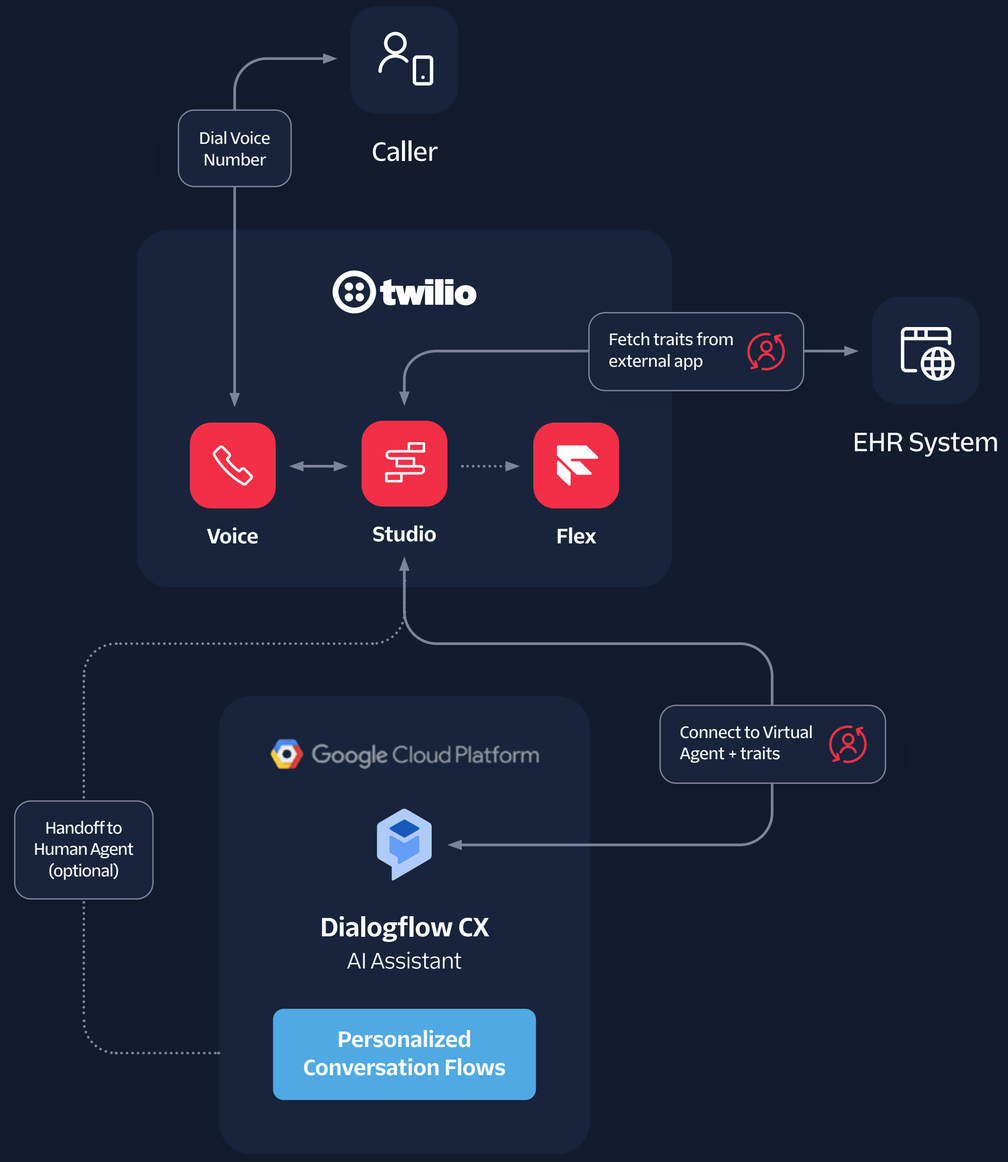


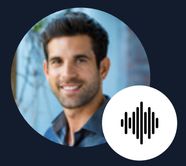
## The Power of Personalization

Beyond conversational agents, what sets Twilio apart from other voice agent platforms is the ability to make your Virtual Agents “caller-aware,” enabling highly personalized interactions. When personalization is implemented effectively, it can significantly enhance caller satisfaction and containment rates. By equipping the AI with relevant context, Twilio’s Virtual Agents can handle more requests independently, further reducing the need for human intervention and improving overall efficiency.

In practice, this means providing the Virtual Agent with data traits about the caller that are relevant to the conversation. The conversational flows governing the Agent’s behavior can then incorporate caller data into its logic, resulting in more personalized exchanges. Twilio Studio supports the ability to reach out to 3rd-party health systems, to personalize a call with a Conversational Virtual Agent. Any external application with an available API can be used to pull in individualized patient data to augment your agent. With access to individual attributes, the Virtual Agent can adapt the conversation to each person they speak with, greatly improving their usefulness and efficiency. The diagram illustrates how Conversational Virtual Agents can be extended to include personalization via integration to 3rd-party health systems.

Organizations seeking to enhance self-service capabilities and reduce reliance on human agents can benefit from Twilio’s Conversational Virtual Agents. Transitioning from traditional touch-tone IVR systems to more intuitive, natural language interactions, these “AI 1.0” Virtual Agents can significantly improve the caller experience. They can also optionally leverage personalization by incorporating caller profile data, allowing for more tailored and relevant interactions. This not only has the potential to boost caller satisfaction but also enables the automated handling of basic tasks, ultimately streamlining operations and reducing costs by deflecting calls from human agents. Still, this architecture supports handoff to human agents when necessary to ensure the caller’s inquiry is addressed.



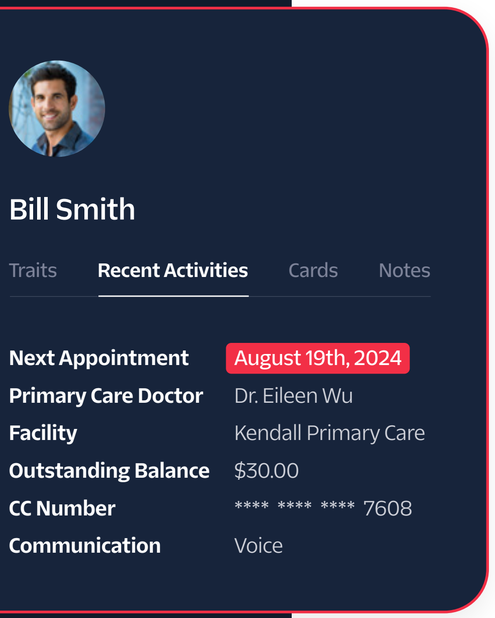


**Bill**

I'd like to reschedule my appointment with Dr. Wu.

**Virtual Agent**

Sure, I'm happy to help you reschedule your August 19th appointment with Dr. Wu. Is there a preferred date you'd like to come in?




# Spotlight
# **Self-Service Patient Scheduling**

Scheduling is one of the primary reasons a patient calls into healthcare organizations, and is a task well-suited to a Conversational Virtual Agent.

A Twilio Conversational Virtual Agent can be built to respond to appointment-related inquiries, personalized to the individual patient. For instance, this patient is calling to reschedule their appointment. Through integration with an EHR, the Virtual Agent is able to automatically pull up the previously booked appointment, offer alternative times, and even securely collect pending payments for previous visits – all through a conversational exchange over the phone.

These types of interactions handled by the Twilio Virtual Agent can save staff time, keeping them focused on higher-value work. Relatedly, when implemented successfully, Conversational Virtual Agents can help improve patient satisfaction and reduce resolution time via seamless self-service experiences personalized to their needs.

**For a demo of the Patient Scheduling Virtual Agent, please contact us.**

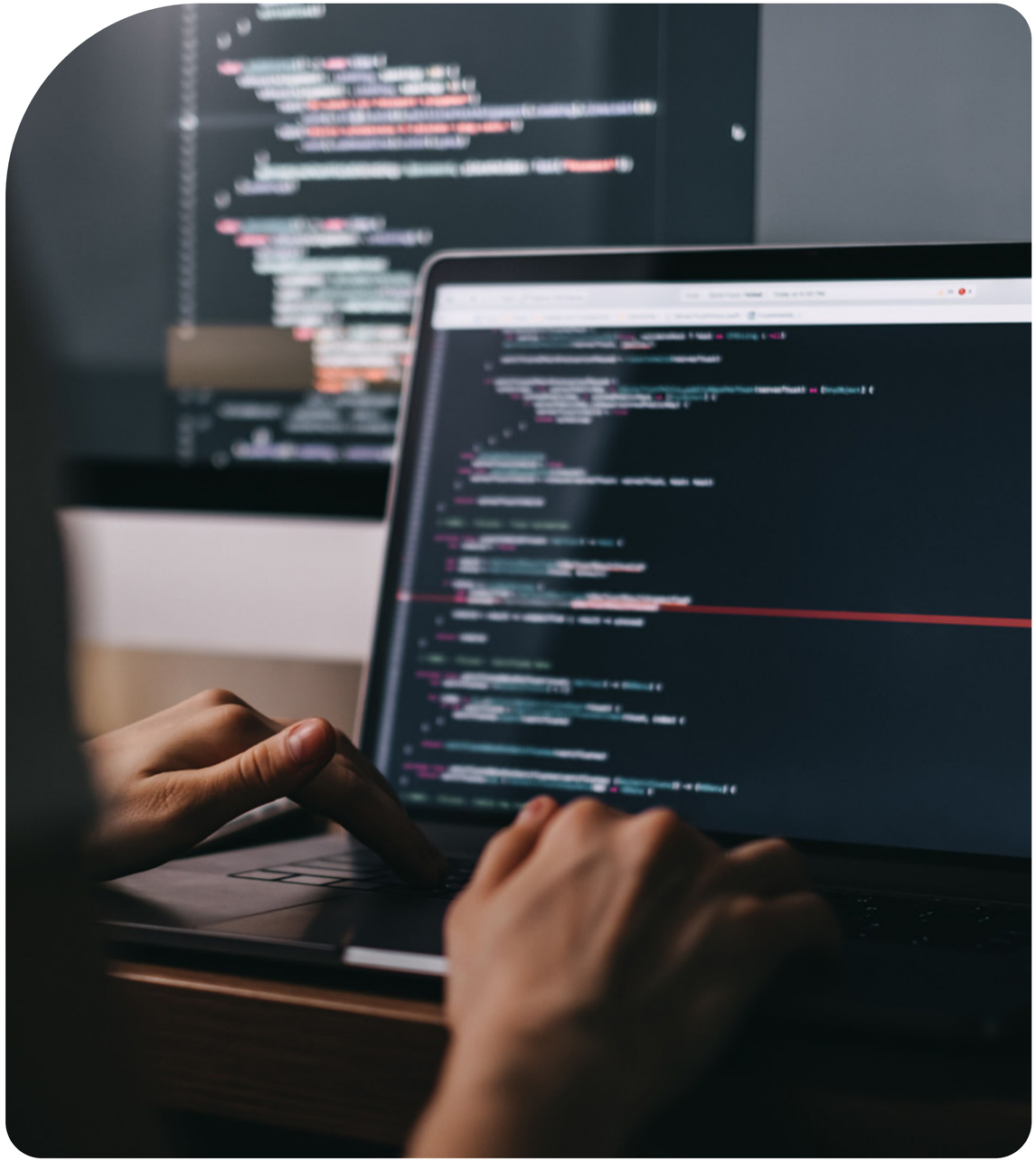
Chapter 05

# Generative AI Virtual Agent [Frontier]

The next frontier of voice virtual agents is **predicted** to involve the use of Generative AI and Large Language Models (LLMs). While Conversational Virtual Agents are effective in production today due to their strong performance, predictability, and scalability, they are limited by the predefined flows or “phone trees” they can support.

**Generative AI Virtual Agents,** however, transcend these limitations by enabling freeform conversations between callers and AI assistants that are increasingly flexible, intelligent, and human-like. For organizations aiming to be on the bleeding edge of automated voice engagement, beginning to experiment with Generative AI (GenAI) Virtual Agents now can pay dividends later. Powered by LLMs, these agents can handle a much wider range of inquiries and support many languages, offering a new level of versatility. They can also be fine-tuned with organizational knowledge bases, individual customer memory, and integrations with digital tools, providing more personalized, targeted, and actionable assistance. This capability leads to higher potential containment rates and caller satisfaction compared to “AI 1.0” Conversational Agents. Moreover, GenAI Virtual Agents can simplify configuration when compared to traditional phone trees, as much of the setup can be accomplished through natural language prompting rather than defining detailed logic and programming.

At the same time, Generative AI Agents are still in their early stages of maturity. Despite their promise, there are ongoing challenges with latency and accuracy across the GenAI Agent landscape. Relatedly, healthcare organizations face compliance and privacy constraints when using this emerging technology. Therefore, it is important to approach implementation thoughtfully and with a spirit of experimentation and fast iteration. While some organizations may be comfortable rolling out Generative AI Agents in production today, it may make sense for others to focus their near term efforts on deploying Twilio’s more mature IVR and Conversational Virtual Agent solutions (see above) while internally testing GenAI Agents in parallel. Relatedly, some organizations are deploying Generative AI Agents for select use cases in controlled environments that supplement existing IVRs for early customer feedback.



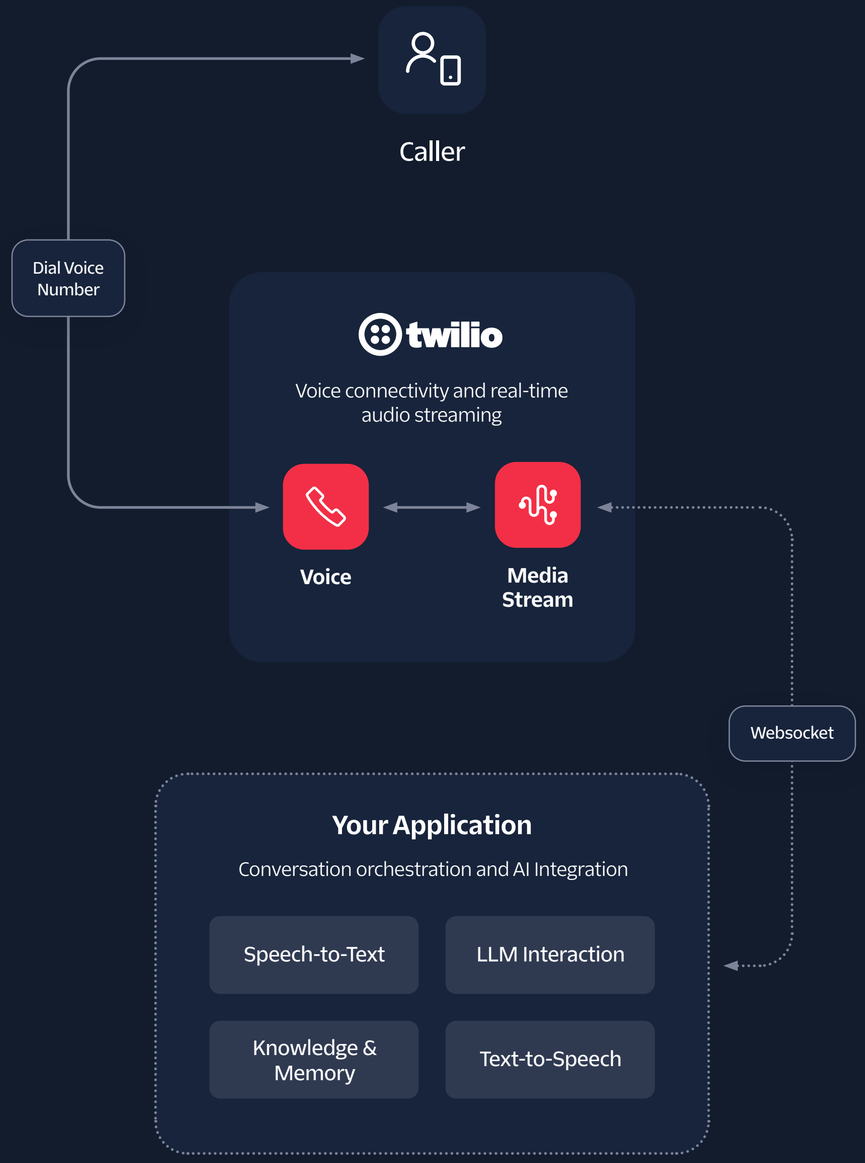
## “Bring Your Own AI” (BYO-AI) Agents

One approach to get started with GenAI Agents immediately is to integrate Twilio Programmable Voice calls with third-party AI platforms. We refer to this as a Bring Your Own AI (BYO-AI) approach. This requires development to stream Twilio Voice calls (via Media Streams) to a custom application to integrate the raw audio with a suite of capabilities required to create an end-to-end GenAI Assistant. These capabilities include:

- **Speech recognition:** translate spoken language to LLM
- **LLM interaction:** provide personality prompt and deliver caller input for model processing
- **Text-to-speech:** translate LLM output to speak back to caller
- **Knowledge & memory:** Fine-tune LLM to know about your organization and the caller to provide more effective assistance

The diagram is a high level architecture for how to build GenAI Virtual Agents on Twilio with BYO-AI.

There are a variety of third-party platforms and vendors that can provide the aforementioned generative features to integrate into your app. An example implementation of this approach using OpenAI (LLM), Deepgram (speech recognition), and ElevenLabs (text-to-speech) can be found in **call-gpt**, an open source repository created by the Twilio team. Please note that call-gpt is not a HIPAA Eligible Service. Alternatively, if you are considering or already using Twilio’s Dialogflow CX integration described above, you can enable their **generative features** to augment your Conversational Agent with GenAI.



## Twilio AI Assistants [Developer Preview]

**Twilio AI Assistants** is a **Twilio Alpha** project that lets you build omnichannel, customer-aware Generative AI Agents natively within Twilio in a no/low code environment. It's core features include:

- **Customer Memory:** During conversations, Assistants create a golden profile that you can augment, reference, and build upon in future interactions using Twilio Segment
- **Tools & Knowledge Sources:** Assistants can make API requests to interact with other systems and use unstructured knowledge sources to provide additional context for answering users' questions and take discrete actions.
- **Human handoff:** If an Assistant can't answer a question or there are topics you don't want it to handle, the Assistant can automatically hand over the conversation to a human agent in the Twilio Flex contact center.
- **Guardrails and monitoring:** Assistants have a set of prompt injection detection rules, content moderation, and hallucination measurements that act as a safeguard, ensuring the trust and observability of each interaction.

With Twilio AI Assistants, much of the complexity involved with the BYO-AI architecture described above is abstracted and handled natively by Twilio. This project represents the opportunity to greatly simplify the developer experience of building GenAI Virtual Agents. However, as with the broader GenAI ecosystem, Twilio AI Assistants have known limitations today, and is available as a Developer Preview designed for early testing and experimentation. If interested in trying Twilio AI Assistants, get started building **here**.

**Note:** as of September 2024, Twilio AI Assistants is not a HIPAA Eligible Service. AI Assistants is currently available as a Developer Preview and is not currently recommended for production use for healthcare customers.

# Start Your Virtual Agent Journey with Twilio Today

As healthcare organizations navigate the digital transformation of their voice and contact center strategies, Twilio's suite of Virtual Agent solutions offers a scalable and adaptable approach. Whether starting with a foundational Programmable IVR, advancing to Conversational AI with natural language capabilities, or exploring the bleeding edge with Generative AI agents, Twilio can support every step of the journey and future-proof your strategy. The ability to personalize interactions and integrate with existing healthcare systems further enhances the value that these Virtual Agents can provide, driving patient satisfaction and improved operational efficiency.

For organizations ready to take the next step in modernizing their voice-based patient engagement strategies, Twilio's Virtual Agent offerings provide the tools and flexibility needed to create effective, patient-centric experiences that align with your organizational goals.

**To learn more about how Twilio's Virtual Agent offerings can transform your healthcare organization's voice front door, or to request a demo, please contact us.**


Today's leading companies trust Twilio's Customer Engagement Platform (CEP) to build direct, personalized relationships with their customers everywhere in the world. Twilio enables companies to use their communications and data to add intelligence and security to every step of the customer journey, from sales to marketing to growth, customer service and many more engagement use cases in a flexible, programmatic way. Across 180 countries, millions of developers and hundreds of thousands of businesses use Twilio to create magical experiences for their customers.
For more information about Twilio (NYSE: TWLO), visit: www.twilio.com.