Emergency SOS via Satellite

Operations guide for PSAPs

September 2022

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Emergency SOS via satellite

iPhone can help users reach emergency services when cellular and Wi-Fi networks are unavailable.

Emergency SOS via satellite provides connectivity for iPhone users who experience an emergency where terrestrial communication networks are unavailable. iPhone uses a constellation of low earth orbit satellites and an extensive network of ground stations to connect users with Public Safety Answering Points (PSAPs).

To provide users and dispatchers with the best possible experience even when using a low-speed satellite connection, iPhone provides an on-device questionnaire, high-quality location estimates, and access to Apple's Enhanced Emergency Data (EED). Together, these features can reduce the number of messages required to get critical information from a user in need.

This backup connectivity feature on iPhone is intended for use in extreme circumstances only. The availability of this feature does not change the normal emergency calling, texting, RTT, or Emergency SOS workflows: Users still use their local emergency number as they would for an on-grid call. Once iPhone determines that no supported terrestrial network is available for an emergency call, it will automatically offer the option to connect via satellite.

Because satellite interactions are slower than traditional text, a user will first be prompted to complete a short questionnaire that covers some of the most common questions asked by dispatchers. After completing the questionnaire, they can choose to share a message-by-message transcript of their session with one or more of their emergency contacts. Next, iPhone will guide the user to align with an available satellite, and begin an emergency session. This process establishes secure communication with Apple, shares the user's location, and makes the user's Enhanced Emergency Data available to emergency services. Once it's complete, users can exchange freeform messages with emergency services, as iPhone guides them to stay connected via satellite.

Texting with emergency services via Emergency SOS via satellite is different from cellular text messaging in several key ways:

- User cannot make a voice call. This is a text-only service.
- User can only text with Public Safety Answering Points (PSAPs) or an emergency relay center.

- Text messages will take longer to send and receive when compared to SMS text messaging.
- User must have unobstructed line-of-sight to the satellite in the sky. Heavy foliage, buildings or canyons may slow or prevent messages from being transmitted or received.

Entry Points

Cellular or Wi-Fi based voice calling and SMS text remain the primary means of contacting emergency services with iPhone. When no cellular or WiFi connection is available, iPhone will offer a user the option to use Emergency SOS via satellite when they try to contact emergency services using any of the following methods:

- Voice emergency call from the Phone
- Text-to-911 from the Messages app
- Emergency SOS using *Call with Hold* or *Call with 5 Presses*
- Siri (e.g., “Hey, Siri! Call 911”)
- Fall or Crash Detection

Availability

Emergency SOS via satellite is available starting on iPhone 14 in the United States and Canada.

Demo Mode

iPhone users can demo the Emergency SOS via satellite feature by going to Settings > Emergency SOS > _____. Accessibility to a demo feature aims to reduce the volume of non-emergency calls and allows for gaining familiarity with Emergency SOS via satellite.

On-Device Questionnaire

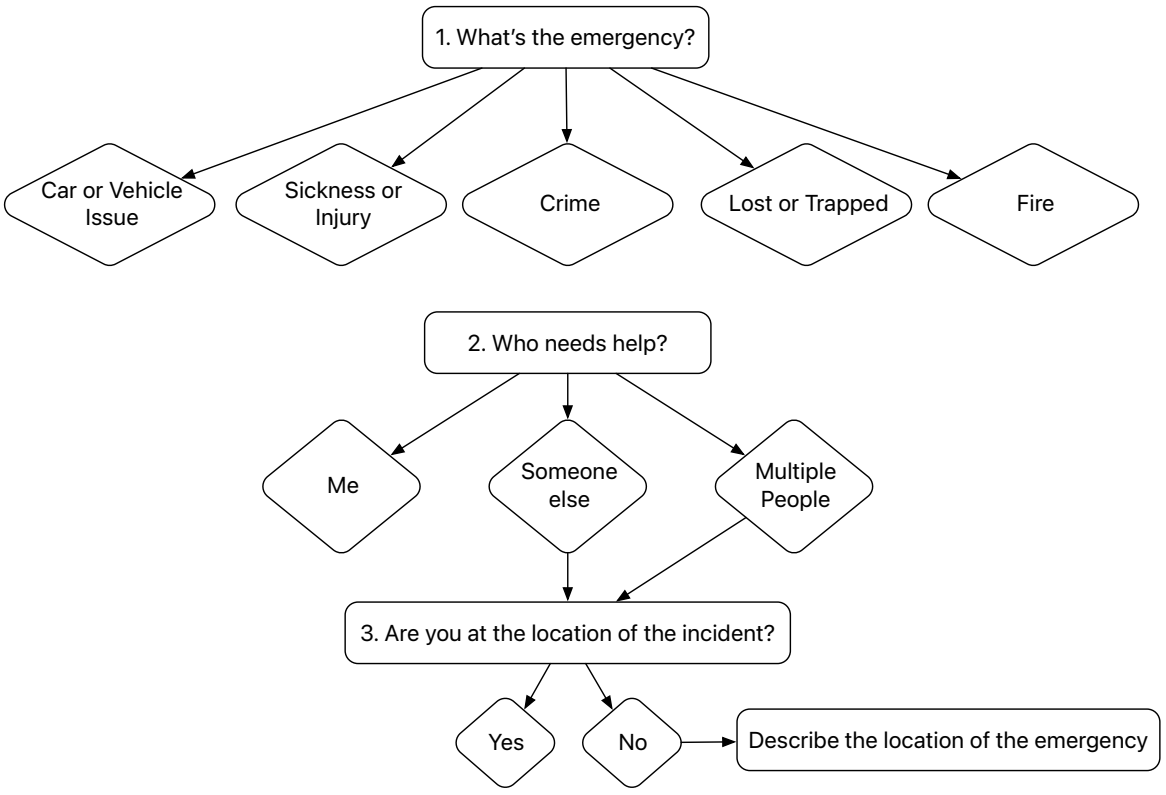
By asking common questions up front, iPhone can reduce time consuming back-and-forth texts with a dispatcher or telecommunicator.

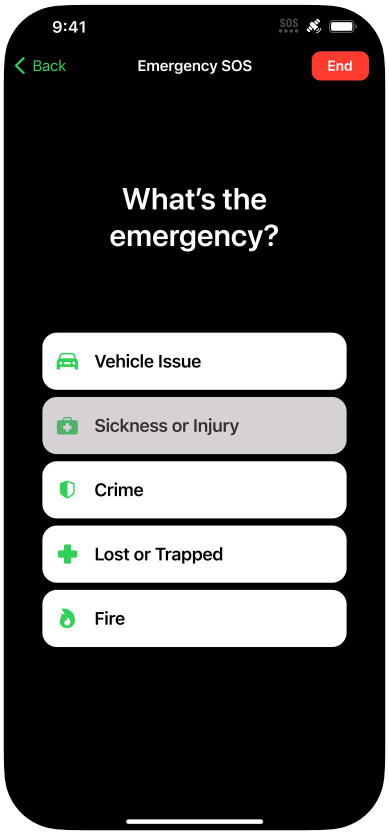
Once terrestrial network emergency options have failed, and a user has chosen to text emergency services via satellite, iPhone will guide the user to answer a few of the most common questions asked by dispatchers. This allows iPhone to efficiently send the most time-critical information first.

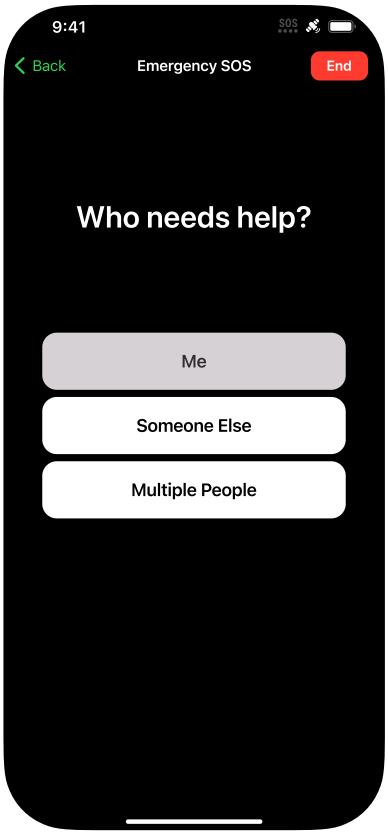
If a user answers a question in a way that indicates immediate dispatch is warranted, iPhone will stop asking questions, and send their answers immediately. In some cases, clarifying questions may be asked if additional detail can help emergency services reach a dispatch decision.

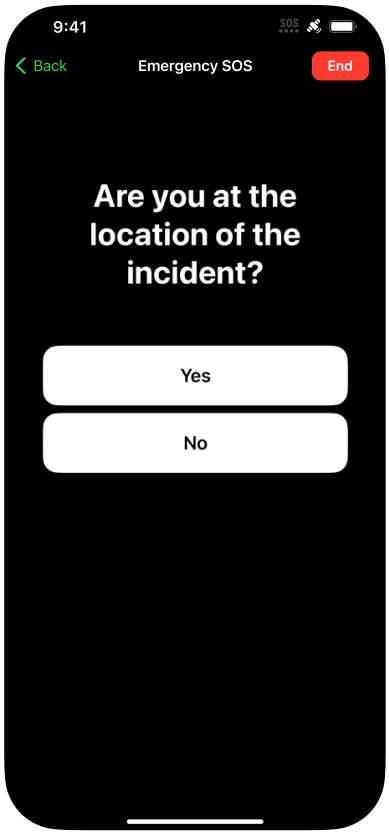
Basic questions

These questions are asked at the start of every questionnaire flow, and cannot be skipped:




9:41
SOS
Back
Emergency SOS
End
What's the emergency?
Vehicle Issue
Sickness or Injury
Crime
Lost or Trapped
Fire


9:41
SOS
Back
Emergency SOS
End
Who needs help?
Me
Someone Else
Multiple People

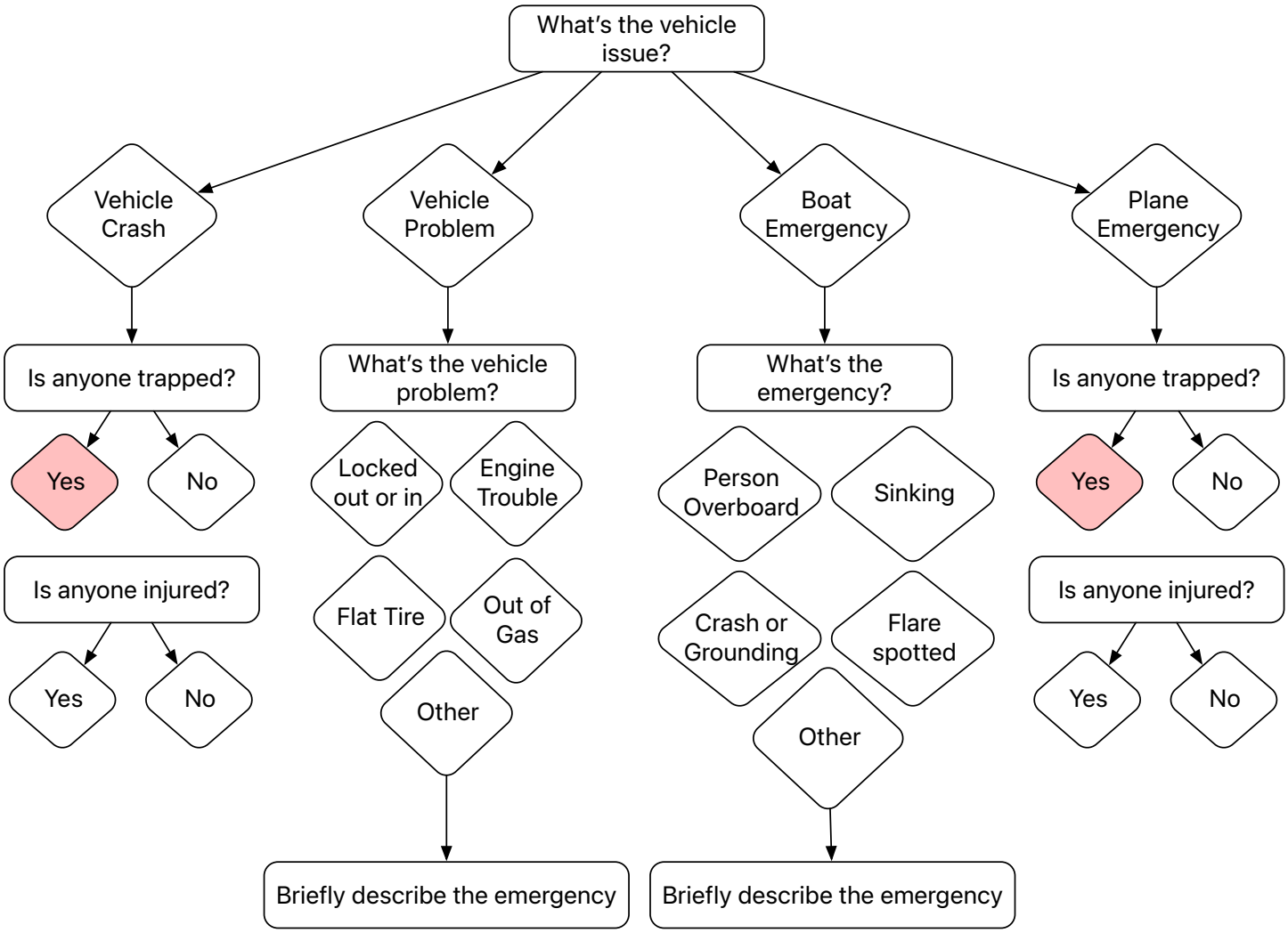

9:41
SOS
Back
Emergency SOS
End
Are you at the location of the incident?
Yes
No

Emergency-specific questions

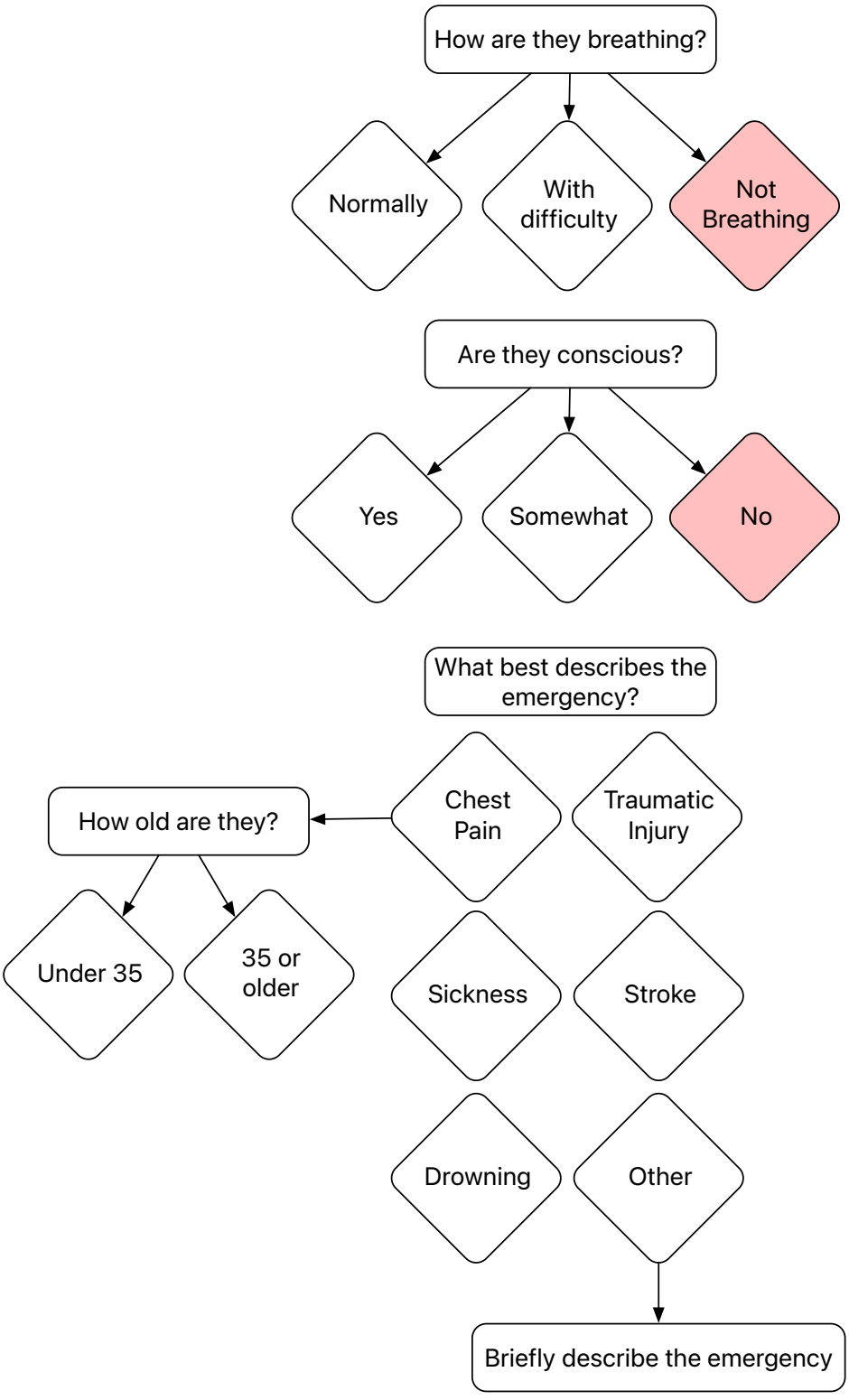
Based on the user's responses, iPhone will ask additional questions to further assess the nature of the emergency. The user may skip one or more of these questions. Responses shown in red will end the questionnaire, and iPhone will guide the user to transmit their responses immediately.

If the user doesn't respond, iPhone prepares to send the information collected up to that point.

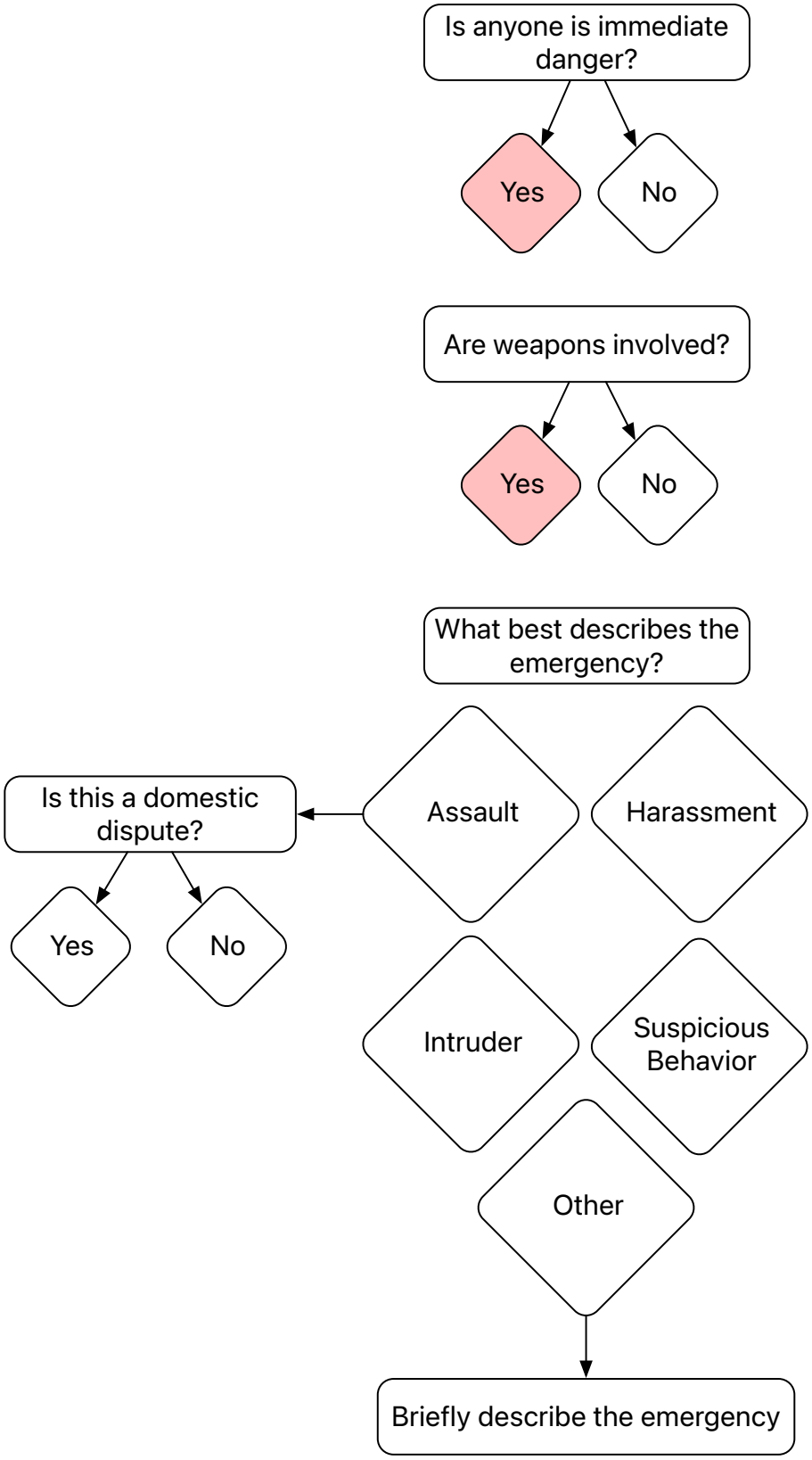
Car or vehicle issue



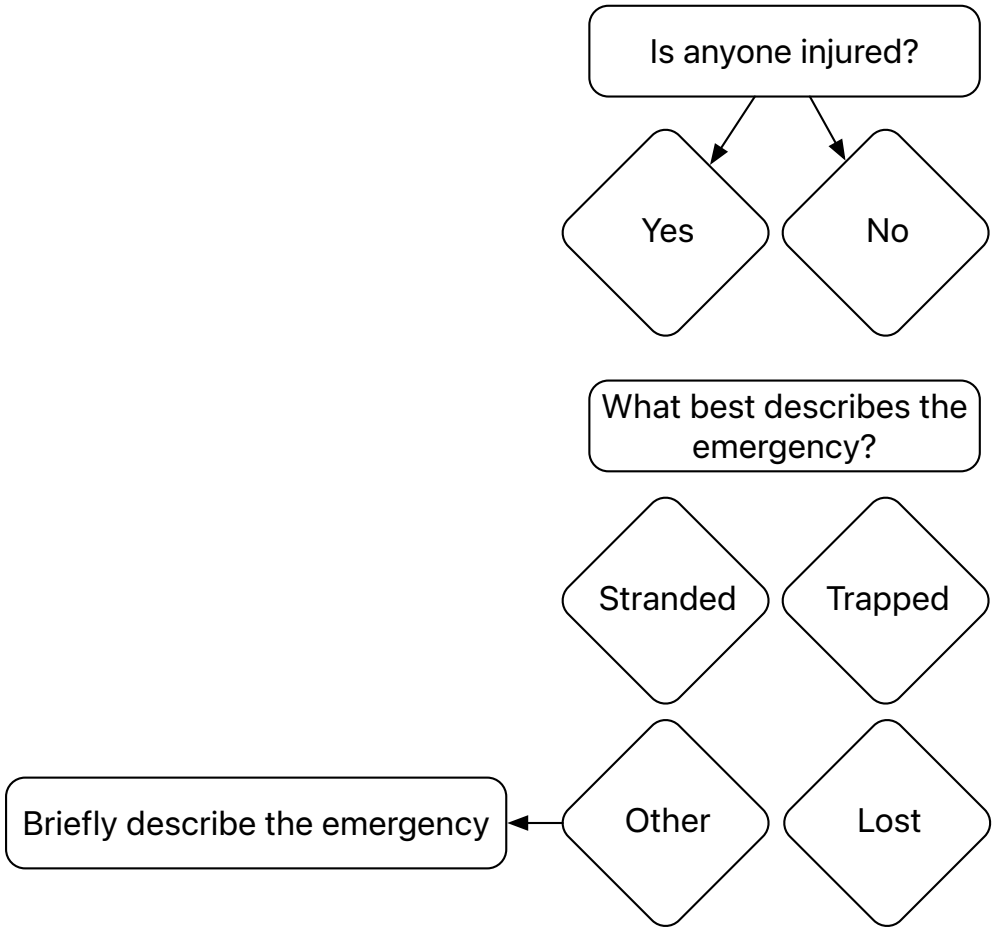
Sickness or Injury



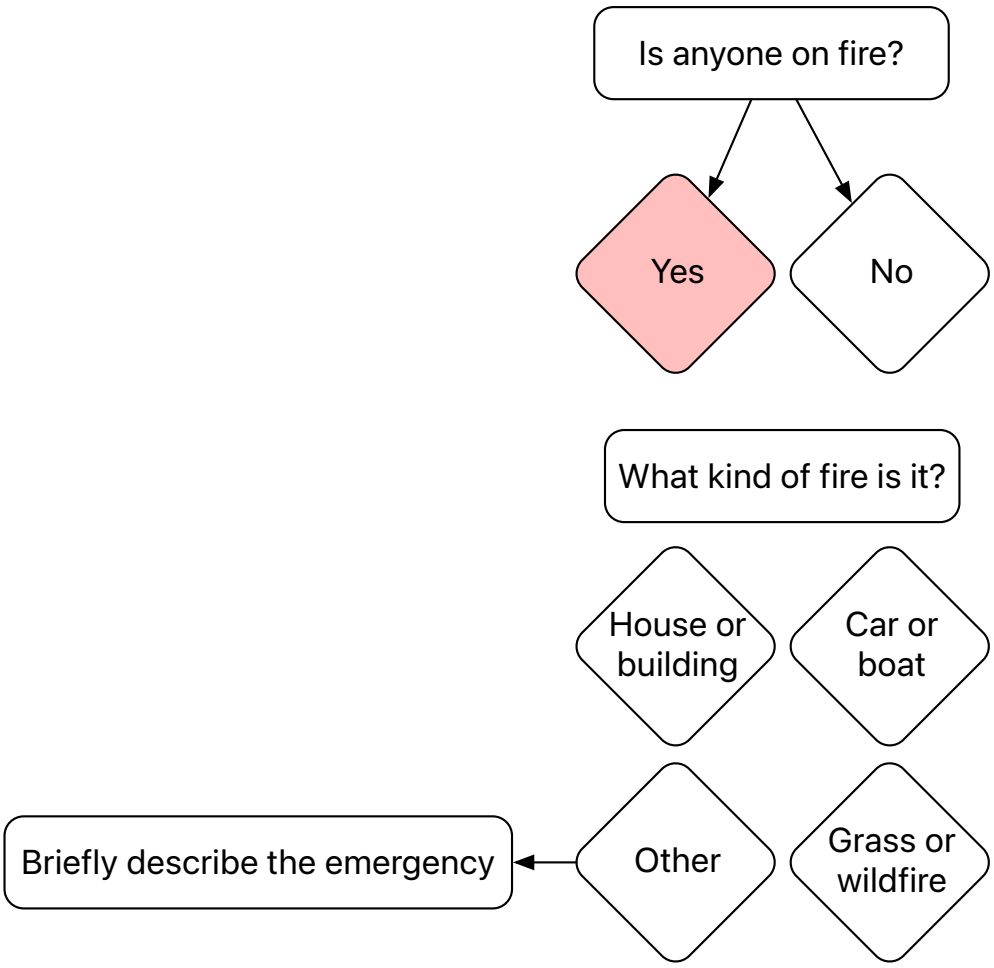
Crime


Is anyone is immediate danger?
Yes
No
Are weapons involved?
Yes
No
What best describes the emergency?
Assault
Harassment
Is this a domestic dispute?
Yes
No
Intruder
Suspicious Behavior
Other
Briefly describe the emergency

Lost or trapped



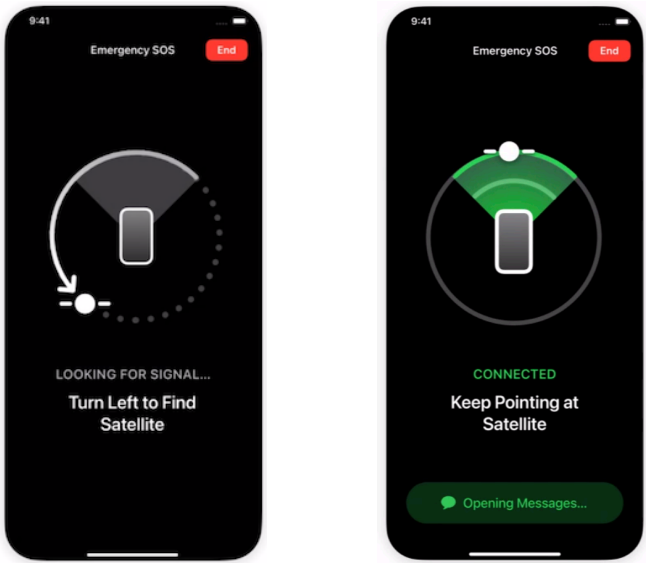
Fire


Is anyone on fire?
Yes
No
What kind of fire is it?
House or building
Car or boat
Other
Grass or wildfire
Briefly describe the emergency

Sending & Receiving

To send and receive satellite text messages in Emergency SOS via satellite, iPhone guides users to align their device with a satellite, and track it across the sky.

Once a user has completed the questionnaire, iPhone will guide them to align with a satellite, and track it across the sky.



Message length

Texts sent with Emergency SOS via satellite are subject to the same 160-character limit as SMS texts. If a text message is longer than 160 characters, it will be split for delivery.

Transmit times

In open sky conditions with minimal obstructions, messages sent from the user to the PSAP or emergency relay center can take tens of seconds to a few minutes to transmit. Messages sent from the PSAP or emergency relay center to the user are faster.

Transmit time increases with message length. To optimize transmit times, users and PSAPs need to keep messages short and the user should seek an open view of the sky with as little obstructions as possible (e.g. trees, buildings, complex terrain).

Example initial data transfer
A user is requesting emergency services from an Apple device via satellite. Transmit & receive times are longer than for cellular SMS. User responses may be delayed due to satellite movements.

The user CANNOT MAKE A VOICE CALL because they are outside cellular coverage.

At 15:25 local time, Michael Cavanna requested emergency services near these coordinates: Latitude 37.3320 North, Longitude -122.0071 West.

Responders may need to search an area extending at least 10 meters in all directions for a 95% chance of finding the user.

The user's estimated altitude (HAE) is 57m. Responders may need to search 30 meters above and below this level for a 95% chance of finding the user.

The user has cached Enhanced Emergency Data with Apple. QUERY ADDITIONAL DATA!

The user's device battery state is MEDIUM. Their verified phone number is +1.408.399.2364.

The user requests help with a SICKNESS OR INJURY.

This request is for THEMSELF.

The person in need is BREATHING NORMALLY.

The person in need IS CONSCIOUS.

The specific emergency is TRAUMATIC INJURY.

The user's iPhone has its region set to UNITED STATES. The user's iPhone has its default language set to ENGLISH.

This concludes the initial data. Two-way text with the user is now available.

Clear line-of-sight
To send and receive satellite texts, the user must have clear line-of-sight to a satellite and hold their iPhone in position until the transmission is complete. If the connection is interrupted, messages will be queued until the user's iPhone reconnects.

Location updates
Because a user could move around during a session, and because location estimates could change during a session, iPhone may briefly pause the satellite session and attempt to update its location estimate on a periodic basis. Once an updated estimate has been made, iPhone will prompt the user to align with a satellite for transmission. Dispatchers can routinely re-bid location to ensure a current location is being displayed.

Satellite movements
Due to normal satellite orbits, the user may experience gaps in availability. iPhone recognizes these gaps and clearly informs the user. These gaps typically occur between 1-2 times per hour for a given location, and may last between 1-7 minutes, each. Message transmission is not possible during these periods, but messages that were "sent" will be queued and transmitted once a connection is reestablished. It is worth considering that inactivity from the user could be caused by a satellite gap, but it may also be from other causes.

Periodic cellular scans
During an emergency text session, iPhone will periodically conduct a passive scan to look for networks that could allow the user to make a voice emergency call. If one is found, the user will be offered the option to try calling. Additionally, if a data connection becomes available, iPhone will seamlessly hand-off the satellite text session to the terrestrial network to provide faster service to the user. If the user again loses terrestrial connectivity, iPhone will switch back to satellite just as seamlessly.

Limitations of Emergency SOS via satellite
The user's environment, tracking accuracy, and the presence of obstructions will all impact the time required to transmit and receive messages. For example, complex terrain, buildings, and trees can make it more difficult to align with and continuously track a satellite. The time required to transmit or receive a message also increases with increasing message length. Typical transmission times will range from tens-of-seconds to a few minutes. Receiving times will typically be faster. In some circumstances where the user is in extreme terrain, dense foliage, or other areas with significant sky obstruction, message transmission may not be possible.

Transcript sharing
When the user submits an emergency questionnaire, they will also be given the option to share a live conversation transcript with one or more emergency contacts. Emergency contacts will have no ability to contact the reporting party but will be able to view the Emergency SOS via satellite conversation in real time.

Handling Satellite Texts

Emergency SOS via satellite is designed to integrate with text-enabled PSAP's native workflows.

Emergency SOS via satellite uses the existing equipment, interfaces, and processes for Text-to-911. No additional software, hardware, integrations, peripherals or downloads are needed.

Dispatcher workflow

1. Accept the text session using your existing Customer Premises Equipment (CPE), call-taking software, or Text-to-911 interface.
2. Review the initial data transfer.
3. Text the user for additional information needed for dispatch. Focus on asking questions that are not answered by the initial data transfer or Enhanced Emergency Data.
4. Review the user's location. Map layers that show topography, recreational trails, land owners, property boundaries, and other off-grid features may be useful.
5. Dispatch field responders as needed. Be sure to include the provided search area.
6. Maintain contact with the user as long as required by local policy, or until field responders reach the user.

Initial data transfer

When the user completes the questionnaire, a block of critical information is sent to the PSAP or an emergency relay center which will include:

Questionnaire responses

Compiled responses from the initial emergency survey completed by the user will populate as text messages in your system's texting interface.

Location

A high-accuracy, high-integrity location estimate is gathered and sent in the initial message. The location will be displayed as Latitude and Longitude coordinates with an associated uncertainty calculation. The user's estimated altitude will also be sent with an associated uncertainty calculation.

Battery life

Battery level is displayed in one of four categories.

Very low or unavailable	0-10%
Low	11-30%
Medium	31-60%
High	61-100%

It is important to consider the user's battery life within the context of their emergency situation and environmental conditions. A long duration response or extreme temperatures will consume more battery and might warrant suggestions that the user conserve battery or manage phone temperature over the duration of the emergency response.

For devices with low and very low battery levels, consider the guidelines below:

1. Tell the user that their phone has low battery.
2. Offer these suggestions to help the user extend their battery life:
    - Reduce screen brightness in Control Center by swiping down from the top right-hand corner of their device, and using the brightness slider, or by using the slider in Settings > Display & Brightness.
    - Lock iPhone when it is not necessary to send or receive messages (e.g., when moving to a safer location, or performing a task like stopping a bleed or providing medication).
    - Avoid exposing iPhone to extreme heat or cold.
3. Be brief. Focus on obtaining information that the questionnaire didn't address.
4. Convey urgent instructions to the user immediately.
5. If allowed by local policy, explain to the user that if iPhone turns off, you'll still notify field responders of their emergency and last known location.

Enhanced Emergency Data (EED)

Enhanced Emergency Data allows the reporting party to share their location and encrypted Medical ID data when they call or text emergency services. A PSAP has the option to query this data during an emergency call, if it has been

made available by the iPhone user. For more information on Enhanced Emergency Data, see the paper referenced on page 23.

EED includes the following information:

Medical ID
If the user has opted to share their Medical ID, critical medical history information (such as allergies and reactions, conditions and medications, or age) may be available.

Location
In addition to location information in the initial data transfer, location information can be queried by the PSAP dispatcher if the user has opted into using EED. Consistent with industry standards and best practices, PSAPs should set their call-taking software or customer premises equipment to automatically “re-bid / re-transmit” at least every 45 seconds.

Two-way text between PSAP and user

Emergency SOS via satellite delivers accurate location information and pre-verifies a user’s phone number to reduce the need for additional questions. To provide timely dispatch of emergency calls using Emergency SOS via satellite, you should make full use of the initial data transfer. Carefully consider whether additional location and telephone number verification are necessary in each case, as these can add significant time to a satellite text session. In many cases, it may be possible to dispatch based solely on the initial data transfer and Enhanced Emergency Data (EED).

Consider the length of each text message and avoid fragmentation at the 160-character limit. It may be preferable to send several short messages rather than one longer message. Since smaller, individual messages will arrive sequentially and at different times, avoid overwhelming the user with many questions or instructions until they have addressed each text.

Ending an emergency session
An emergency text session will automatically expire two hours after the last transmission from a user. Additionally, the user can end the session from their device at any time.

Restarting a closed session
In the event that a session is ended and the situation was not resolved, only the iPhone user will be able to restart the session in order to reestablish contact with the PSAP or emergency relay center.

Remember

- The user cannot make a voice call.
- Satellite texts take longer than SMS texts to transmit.
- Trust the location and phone number provided in the initial data transfer unless the provided data implies that these may be unreliable (e.g., a location uncertainty greater than 100m).
- The initial data transfer could allow for immediate dispatch.
- Medical ID information from Enhanced Emergency Data can reduce the number of messages required in a conversation.
- Become familiar with accessing Enhanced Emergency Data on your system.
- Consider the 160-character limit when composing messages and avoid message fragmentation for critical instructions.
- A clear line-of-sight is required between the user and a satellite. The connection may be lost when the position of the user or satellite changes.
- Inactivity from the user could be caused by a satellite coverage gap or it could be caused by another, unrelated event.

Handling Emergency Relay Calls

Relay telecommunicators bridge the gap between Emergency SOS via satellite and voice-only PSAPs using industry-standard training, certification, and tools.

In locations served by voice-only PSAPs, an emergency relay center will interact with the Emergency SOS via satellite user via text, and call the primary PSAP that serves the user's location via voice.

Dispatcher workflow

1. Accept the call using your existing Customer Premises Equipment (CPE) or call-taking software and the greeting specified by local policy.
2. Listen for the relay telecommunicator to explain who they are, and that they are in contact with a user who cannot make a voice call.
3. The relay telecommunicator will provide an emergency type (vehicle, crime, fire, medical, or search-and-rescue), and a protocol-based classification of the emergency, along with an urgency.
4. If you have automatic location capabilities, confirm that the user's location is displayed. If not, ask the relay telecommunicator to provide it.
5. Ask the relay telecommunicator any questions you are required by protocol or policy to ask, or that will facilitate your dispatch decision(s).
6. The relay telecommunicator will provide responses based on the data they have available, or relay your questions to the user, as required.
7. Once you have sufficient information, dispatch field responders.
8. Work with the relay telecommunicator to coordinate any post-dispatch or pre-arrival instructions for the user.
9. Maintain contact with the relay telecommunicator as long as required by local policy, or until field responders reach the user.
10. Before disconnecting, wait for the relay telecommunicator to provide an incident number and the relay center's telephone number.
11. Disconnect the call as required by local policy.

How Calls Arrive

Automatic routing in the United States

For emergency texts from users in the United States, calls from the emergency relay center will be automatically routed to the PSAP that serves the user's location based on the location estimate that accompanies that user's first emergency text. This process allows calls from the emergency relay center to arrive at most PSAPs via "911 trunks," just as if they were landline or cellular voice calls from within the PSAP's service area. This also allows the PSAP's Customer Premises Equipment to receive the user's estimated location via its normal Automatic Location Identification query, just as it would for a terrestrial voice call.

In these cases, the Automatic Number Identification field will display the user's verified phone number, or a temporary identifier assigned by Apple. In all cases, the Automatic Location Identification fields will be populated with the user's estimated location and uncertainty or "search area."

Additionally, the emergency relay center can provide both the user's telephone number and their location by voice, if needed.

Manual routing in other countries

For emergency texts originated by users outside the United States, emergency relay telecommunicators must first contact a third-party routing provider, and describe the user's location and emergency type. The routing provider will then connect the relay telecommunicator with a PSAP that serves the user's location.

Calls facilitated by a third-party routing provider will arrive on either:

- primary emergency service trunks used for calls to a designated emergency number (e.g., 112),
- secondary emergency lines that can be reached by a full-length telephone number, or
- administrative lines

The choice of connection type will reflect requirements and local arrangements between the PSAP or a relevant government authority, and the routing provider. Once the the call connects, the routing provider's agent will drop off the call.

For manually-routed calls, the relay telecommunicator will provide the user's phone number or identifier, and their location to the PSAP by voice.

Relay Telecommunicators

Relay telecommunicators receive similar training to telecommunicators and dispatchers at most PSAPs. Like many PSAP employees, relay telecommunicators are certified in protocol-based dispatch for medical, fire, and law enforcement. In most jurisdictions, relay telecommunicators can provide protocol-based medical instructions to users, in coordination with a PSAP, to reduce dispatcher workload and speed-up delivery of crucial information.

When a relay telecommunicator's call arrives at a PSAP, they will first provide the PSAP with the user's location, and an overview of the emergency. Next, they will answer as many of the PSAP's questions as they can based on the user's questionnaire answers, information gathered from the user via protocol questions, and information provided by the user via Apple's Enhanced Emergency Data service. Then, they will relay any additional questions from the PSAP to the user, and provide the PSAP with the user's answers.

Relay telecommunicators will ask PSAPs to provide as much information as possible about any field response that is dispatched. This might include information such as the type of response (e.g., ambulance, fire, law enforcement), or the estimated time en route (ETE) to the user's location. In off-grid situations, this information can provide valuable reassurance to the user so that they remain calm and responsive, continue providing crucial information, and go-to or remain-in a safe location while responders work to reach them. While PSAPs are under no obligation to provide such information, Apple strongly encourages them to consider what, if anything, can be shared, consistent with user and responder safety.

Pre-arrival instructions

In jurisdictions where it is legally permissible, relay telecommunicators may provide users with instructions for handling medical and other emergencies while waiting for field responders. These instructions might include actions like moving a vehicle to a safer location, applying pressure to a wound, or starting CPR. All such instructions will be based on industry-standard protocols, unless a PSAP requests that a relay telecommunicator refrain from providing instructions, or that they provide different, PSAP-directed instructions. In those cases, the relay telecommunicator will follow the PSAP's directions.

Post-dispatch communication

In general, an emergency relay center attempts to remain in contact with a user until their emergency has been resolved. If the PSAP prefers to disconnect a relay call after dispatching field responders, the emergency relay center accommodates this request by providing a CAD reference number and the relay hotline. The emergency relay center can only reach users who maintain Emergency SOS via satellite connection to receive messages.

The relay hotline can be reached at: +1.***.***.****. This number can also be used up to 90 days after a relay call to request a transcript of the user-relay text conversation, as well as the relay telecommunicator's CAD notes.

Remember

- The user cannot make a voice call.
- Satellite texts take longer to transmit.
- Trust the location and phone number provided in the IDT unless the provided data implies that these may be unreliable (e.g., a location uncertainty greater than 100m).
- The initial data transfer could allow for immediate dispatch.
- An emergency relay center communicates with the user through text messages with a 160-character limit. Give short instructions to avoid message fragmentation of critical information. Relay telecommunicators can help you craft a succinct message.
- Work with an emergency relay center telecommunicator like you would any protocol-trained professional.

Handling Search and Rescue

Remote emergency texts may be more complex and require additional, specialized resources.

Due to the nature of Emergency SOS via satellite, some emergency texts from this platform will be remote and have greater complexity than a typical emergency call. Some cases may require resources outside of EMS, law enforcement, and fire. These might include specialized rescue teams for mountain, swift-water, or cave rescue, and may also require coordination with government agencies such as a park service, forest service, or coast guard.

Dispatcher advice (not to replace standard workflows and protocols)

1. Consider the emergency type, location, environmental conditions, and conversation with the user to determine whether search and rescue resources may be necessary.
2. Contact/consult the local search and rescue manager, incident commander or authority and provide all critical emergency information and the current Latitude and Longitude coordinates.
3. Ask the search and rescue manager if there are additional questions for the user to aid the emergency response.
4. Relay specialized questions, information, or instructions to the user if requested by search and rescue leadership.
5. If requested, stay connected to the user until the emergency has resolved. Advise to conserve battery if a prolonged response is expected.
6. Disconnect the call as required by local policy and in conjunction with the search and rescue manager.

It will be helpful to be familiar with your agency's search and rescue policies. Review the list of government agencies, land managers, and specialized rescue teams that operate in your jurisdiction and have a contact list for search and rescue resources easily available.

Currently, there is no way for a search and rescue manager, incident commander, or field responder to communicate directly with a reporting party. All text communication is sent and received from the local PSAP or an emergency relay center.

Additional Resources

Apple provides a comprehensive suite of public safety training and support resources for Emergency SOS via satellite.

The following resources help you train PSAP staff to respond to emergency texts using the service:

- Webinar – Detailed introduction to Emergency SOS via satellite
- Console card – Reference card for PSAP dispatchers to keep at their desks
- Executive overview - One-page reference document for emergency services leadership
- Milam Springs exercise – Interactive training exercise for PSAP team members, leadership, and field response partners
- Enhanced Emergency Data informational document – Detailed description of EED, its applications, and how it works

Download training resources
Emergency SOS via satellite training resources are available at:

link

Recommended next steps

1. Encourage your team to watch the Webinar replay.
2. Have them read the console card and operational guide.
3. Facilitate the Milam Springs exercise and identify areas of strength and potential weakness in policy, procedure, and knowledge.
4. Review your agency's policies for text messaging, location and phone number verification, and working with protocol-certified relay telecommunicators.

Contact Apple emergency services experts
How to contact Apple for support ## ## Office hours, schedules

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