January 12, 2018

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: PS Docket No. 17-344   Request for Comment on Response Efforts Undertaken During
2017 Hurricane Season

Filed via https://www.fcc.gov/ecfs/filings

Dear Ms. Dortch,

I am a software developer working in the field of online maps and geolocation. My comments
collectively respond to the following three questions.

B. Questions Regarding the FCC's Response
2. Are there any actions that the FCC should consider to improve the communications industry
response to hurricanes? If so, what would those be?
3. ... Is there additional information or assistance that the FCC should provide at the beginning or
during an event?

C. Questions Regarding Communications Service User Experience
2. Were consumers able to effectively reach 911 ...?

First comment

A call to 911 is only **effective** if the PSAP knows the caller's location. Without that critical
piece of data it is hard/impossible to dispatch responders. Currently the FCC prohibits carriers
from getting latitude longitude coordinates directly from the caller's smartphone.[1] Most
smartphones produced since 2011 use both USA satellites (GPS) and Russian satellites
(GLONASS) to produce coordinates. The FCC prohibits the use of Russian satellite data for the
purpose of 911. Currently the raw USA-satellite-only data is transmitted to a black box on the
cell tower which then processes that USA-only data and produces the phase 2 coordinates.

Action item: It is long past time to change the rule and allow carriers to get coordinates **directly
from the phone** in order to save more lives. Uber does this and 911 should do it also.

If carriers were allowed to get coordinates directly from the caller's phone then the carrier could
quickly place highly accurate phase 2 coordinates into the database where they could be accessed

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[1] https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A1.pdf at paragraphs 39 and
40.

by the PSAP. This could happen for almost all calls made outdoors or inside near a window. More satellites = more data = better accuracy in difficult conditions such as heavily wooded areas, urban canyons and indoors (as long as the caller is near a window).

If the no-Russian-data rule was eliminated then the phase 2 exemption for heavily wooded areas could also be eliminated since there would be no need for it. I have an iPhone 4S. That was the first iPhone that uses both USA and Russian data to produce coordinates. I have tested this phone in (1) old growth evergreen forests in the Washington State Cascade Mountains and (2) dense mature second growth evergreen forest. In both cases my phone had no problem producing coordinates with good accuracy and that correctly showed my location on the topographic map.

In addition, if carriers were allowed to obtain phase 2 coordinates directly from the caller's phone then most likely smaller carriers that presently use technology related to triangulation would switch to the more accurate coordinate system for reporting phase two coordinates. Why? Because it would be a huge cost savings.

Second comment

Basically no one knows **critical** aspects of contacting 911. To the best of my knowledge when someone calls 911 with a cell phone the phone will try to connect to a tower owned by the phone's carrier for **17 seconds** before then trying to connect to any tower. [2] The public does not know about the 17 second rule for the simple reason that neither the FCC nor anyone else has informed the public. How many calls to 911 would have connected but did not since the caller hung up in frustration prior to 17 seconds?

Now consider someone who has tried and failed to (1) make a voice call to 911, (2) make a voice call to anyone else and (3) text to 911. What now? As their last chance to communicate with someone they try to text a friend. If voice roaming is **off** then the text will only be sent if their phone connects with a tower owned by the phone's carrier. If voice roaming is **on** then the text will be sent if the phone can see any tower on which the phone can roam. I strongly suspect the public is generally not aware of the critical need to turn on voice roaming when they are desperately trying to send a text to anyone.

Attached is a copy of my report titled "The Smart Way To Use A Cell Phone To Contact 911" that expands on the above points.

Action item: The FCC should engage in an aggressive educational campaign that incorporates these ideas, along with any others, to increase awareness in the public of how to most effectively use their smartphone to communicate the need for help.

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[2] https://transition.fcc.gov/Bureaus/Wireless/Orders/1999/fcc99096.txt at paragraph 41
https://apps.fcc.gov/edocs_public/attachmatch/FCC-08-171A1.pdf

Third comment

No one, including the FCC, can make good decisions without good data. How often do carriers fail to provide **any** phase 2 coordinates for 911 calls made with cell phones? How often do carriers provide phase 2 coordinates that **never** have a low enough accuracy value to be very useful? The answer to both questions is that the FCC has **no idea** because it is not requiring that this critical data be reported.

==Action item:== The FCC should require that the carriers and PSAPs cooperate and submit quarterly reports in a uniform digital format to the FCC. These reports should provide sufficiently detailed data on both of the above questions so that the FCC will be well-informed for making relevant decisions. This data will help the FCC decide whether the lack of accurate phase 2 coordinates is a sufficiently large problem to warrant allowing carriers to obtain coordinates directly from the caller's phone irrespective of the fact that those coordinates are based in part on date from the Russian GLONASS satellites.

Further, this critical life-safety data should be publically available on the FCC website. If some carrier(s) have a pattern of failing to provide accurate phase 2 coordinates then users might decide to vote with their feet and move to a different carrier. **No good public purpose would be served by keeping this critical data secret.**

Fourth comment

When someone calls 911 with a smartphone and (1) they cannot provide an address or good location description and (2) the carrier does not provide phase 2 coordinates with good accuracy, then how does the 911 call taker know where to send responders? How many die needlessly because **accurate** location data is not quickly available to the PSAP?

Much of this problem can be fixed quickly and at ==no cost==.

When the above situation happens, the PSAP call taker can ask the caller to:
1. Browse to findmesar.com
2. Tap the "Next format" button until the yellow screen appears. The yellow screen displays latitude longitude in decimal degrees which is the coordinate format used by all PSAPs.
3. Wait a few seconds for the accuracy to get to 10 meters or less.
The caller can then read off their coordinates and the equally important accuracy value to the PSAP call-taker.

==Please go ahead and try this on your phone right now.== And since you are likely inside, go over close to a window. (Some windows in commercial buildings might have a coating that impedes signals from the satellites,)

I am the developer of ==FindMeSAR==. This is a public service project and part of my way to "pay it forward". Anyone can use it. There is no cost.

FindMeSAR has been reviewed and blessed by APCO for use in the field of public safety. https://appcomm.org/ And here is a report on a SAR mission that used FindMeSAR. The story seems to indicate that "phase 2" coordinates from the wireless carrier were also available but they were not accurate. http://atalayasar.org/node/478

I have tried various ways to get FindMeSAR on the radar screen of the PSAP community and basically failed. Yet this browser app fills a critical need, works and is free. My conclusion is that the only way that PSAPs will find out about FindMeSAR is if someone they listen to - like the FCC - tells them.

In addition to providing fast and accurate coordinates for smartphone calls to 911, FindMeSAR can also be used by first responders. During the rescue efforts after the recent Montecito mud and debris flow disaster I followed twitter posts from people that monitored scanners. At least a couple of times first responders themselves needed help but there was confusion over their location. Cell service was out so communication was by radio. But when the responders themselves radioed for help they did not provide GPS coordinates.

FindMeSAR can fix that problem.

The first time that FindMeSAR is opened on a phone or tablet, that device needs to be online. After that first time FindMeSAR will work offline and quickly display coordinates with excellent accuracy. How is this browser app able to work offline? It uses a coding technique called appcache which saves this browser app (about 100kb) on the device. The app includes an icon that can be saved on the screen.

Thus, any first responder that has previously opened FindMeSAR on their phone can open this browser app when their device is offline, get their coordinates and accuracy value and then report that location data by radio.

For more information please open FindMeSAR and tap the "Tips" button.

Action item: Merely putting information about FindMeSAR or other useful apps on the FCC's website will accomplish little to nothing. No offense but I seriously doubt folks at PSAPs are taking the time to look at your website. However, you have email contact information for every PSAP. At a minimum the FCC should push this information out to the PSAPs by email.

Respectfully submitted,

/s/

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The Smart Way To Use A Cell Phone To Contact 911

By Joseph Elfelt, https://mappingsupport.com

Updated 12/18/2017

(See a mistake? Have relevant information to share? Please send me an email via this contact page: https://mappingsupport.com/p/gmap4_contact.html)

In an emergency there are four things that everyone should know about using a cell phone to communicate with 911. These tips could save a life - maybe yours.

1. Be able to tell 911 your coordinates.

Critical: If you give 911 your coordinates then also give the accuracy value.

When you call 911 with a cell phone the wireless carrier will often be able to provide the call taker with coordinates for your location that have reasonably good accuracy. But for a variety of reasons this does not always work! The burden is then on you to tell 911 your location. If you can provide a street address or useful description of your location (i.e. south end of Home Depot parking lot), great. Now think about how often you are at a place where you do not know the address or a place that has no address. What now? How are first responders going to easily find you?

Everyone needs an app on their phone that will:
* Display their latitude longitude in decimal degrees (example: 47.313296, -121.161776)
* Display the accuracy value for those coordinates
* Work offline
* Minimize the possibility of user error

FindMeSAR is a browser app I wrote that meets these requirements and does not have extraneous features that could result in user error. The first time you open FindMeSAR your browser must be online but then the app will work offline by using a coding technique called appcache. To give the app a try:
1. Make sure your location services are turned on.
2. Browse to https://findmesar.com and give permission.
3. Tap the "Next format" button until the yellow screen appears.
4. Wait a few seconds for the accuracy value to get to 10 meters or less.

The app includes an icon you can save on your home screen. For more information you can start FindMeSAR and then tap the "Tips" button.

The important point here is not which app you use but rather that everyone have an app on their phone that is easy to find in an emergency and meets the requirements listed above.

Critical Android tip: If you open settings and go to the screen where you turn location services on/off, then you will see an additional setting for location mode (might be called "method").
There are three choices which are often called:

1. High accuracy
This name is misleading. It should really be called ==medium accuracy== since it allows data from cell towers, bluetooth, etc to degrade the more accurate data produced by the GPS and GLONASS satellites.

2. GPS only (also called "Device only") ==<== Use this setting!==
This setting only uses data from the satellites and produces coordinates with the ==best accuracy== values. Most phones produced within the last ~6 years use data from both the USA satellites (GPS) and Russian satellites (GLONASS) and produce coordinates with good accuracy.

3. Power saving
This setting ignores the GPS chip in the phone and will produce the ==worst accuracy== values. If someone with an Android phone is using FindMeSAR and not getting an accuracy value under 10 meters in few seconds then they likely have their phone on this setting.

Would you like to know some details about why Uber can find you to give you a ride but 911 can sometimes not find you to save your life? Spoiler alert: Blame the FCC.

Most smartphones produced within the last ~6 years get data from both the USA satellites ("GPS") and the Russian satellites ("GLONASS"). ==More satellites = more data = better accuracy==. Uber gets your coordinates directly from your phone. And unless your phone is an antique, your phone produced those coordinates using both GPS and GLONASS data.

When you call 911 the wireless carrier *does not* get your location directly from your phone. **FCC regulations prohibit the use of Russian (GLONASS) data to help determine your location for the purpose of 911.** To read about this, see pages 14-15, paragraphs 39 and 40 of this 2015 FCC document. https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A1.pdf. Instead, the FCC allows only data from USA satellites (GPS) to determine your location for 911. ==Fewer satellites = less data = poorer accuracy==. In heavy forest or urban canyons this GPS-only data might not produce any coordinates for your location or produce coordinates with very poor accuracy.

When a smartphone calls 911, here is what happens:
1. If location services are 'off', they are turned 'on'.
2. The phone transmits the raw GPS-only data to a black box on the cell tower.
3. That black box processes the GPS-only data and produces coordinates and an accuracy value. This is the "phase 2" data.
4. That coordinate and accuracy value go into a database.
5. The 911 call-taker can query or 'bid' to get the coordinate and accuracy value from the database.

Verizon, Sprint, U.S. Cellular, AT&T, T-Mobile and various smaller carriers attempt to determine your location as described above. Some smaller wireless carriers use various

technologies related to cell tower triangulation in order to produce coordinates and an accuracy value for your location. This 'triangulation' method is generally considered less accurate than the GPS-only method used by the large carriers.

If you would like to dig deeper into this topic then here is a link to a report I produced about a year ago. This earlier report includes links to various documents on the FCC's website. https://mappingsupport.com/p/sar/call-911-with-a-cell-phone.pdf

2. Always try making a voice call to 911 even if your phone says there is no service.

<mark>Critical:</mark> Wait 30-45 seconds for the call to go through before hanging up.

The reason to wait at least 30 seconds before hanging up is because the call routing technology might try for first 17 seconds to connect to a cell tower for your phone's carrier before trying to connect to any other compatible cell tower. For some background on this 17 second rule see: https://transition.fcc.gov/Bureaus/Wireless/Orders/1999/fcc99096.txt at paragraph 41 https://apps.fcc.gov/edocs_public/attachmatch/FCC-08-171A1.pdf

All wireless carriers are required by FCC regulations to carry all 911 voice calls as long as the tower and phone have compatible technology. You do not have to turn on any roaming for this to work. If your phone can 'see' a compatible tower for which your carrier does not have a roaming agreement then the **phone will claim there is no service but you will still be able to call 911**.

Even if you cannot make a voice call to 911 a text message might still work.

3. Try texting to 911.

<mark>Critical:</mark> Include your location in your text.

When you text to 911 the wireless carrier *does not* provide your coordinates to 911! The only way 911 will know your location is if you tell them! If you send coordinates then use latitude longitude in decimal degrees and also send the accuracy value for those coordinates. First responders might be skeptical of coordinates that do not have an accuracy value included.

In your initial message only send text. Do not send pictures, video, etc. If you establish communications and want to send a picture then you can ask if their text system lets them receive that type of data.

There are over 6,000 PSAPs (Public Safety Answering Points) in the USA. Over 1,000 PSAPs are now accepting text to 911. Here is a link to a spreadsheet (updated monthly by the FCC) showing the PSAPs that accept text. https://www.fcc.gov/file/12285/download

A weak connection to a cell tower might still be good enough to transmit a text message while a voice call would fail to connect. But note that text to 911 *does not* use roaming. For this to work your phone must have a good enough connection with a cell tower owned by your carrier for the text to go through.

4. Try texting to someone that can relay your message to 911.

<mark>Critical:</mark> Be certain to turn on voice roaming before trying this step.

Normal texting *does* use voice roaming. (You do not need to turn on data roaming.) If your phone only has a weak connection with a 'roaming' cell tower then you might be able to communicate by text but not voice. Of course this will not work unless you first make sure that voice roaming is 'on'.

Tip: Do not send text to a group. Instead, each text should only go to a single phone number. Texting to a group might use a data channel instead of a voice channel. To have the best chance of success it is important that your text message use a voice channel.

Tip for iPhone: Turn off iMessage. This is a data service and requires more resources and signal strength. Turning off iMessage will ensure your text message is handled as a standard text using a voice channel.

But what if none of the above suggestions seem to work?

When the signal connection between your phone and a cell tower is extremely weak, the tower will 'see' your phone but not be able to connect a voice call or send a text due to the extremely weak signal. The good news is that the cell network will still make one or more **data records** for each of your attempts. No, these data records do not show your exact location. Instead, these data records can be analyzed by someone trained to do so and that information gets combined with other clues which then results in a "mostly likely" area for first responders to check. When you attempt to communicate as described above you just might be creating the data records that will be a crucial clue in helping the search team finding you.

If you have been unable to establish communications with anyone then one option, depending on your situation, might be to try moving to higher terrain. Maybe by doing so you could find a weak cell signal that is still good enough to send/receive text messages.   However, search managers caution that if you move then you might be leaving a "mostly likely" area that searchers will examine first. Also, you might move into an area that has already been searched.

Tip for 911 dispatchers

Many 911 dispatchers can likely describe times when someone called on a cell phone and the wireless carrier either did not provide any "phase 2" coordinates for the caller's location or only

provided "phase 2" coordinates with a terrible accuracy value. What if the caller is not able to accurately describe their location in some manner (address, coordinates, landmarks)? How does the dispatcher know where to send help?

Here is an idea that might help. No, this will not work for all 911 calls where there is a problem getting a good location for the caller. But this idea will work for some calls. When other methods for accurately locating a wireless caller fail, the 911 call taker can ask the caller to:

1. Browse to findmesar.com
2. Tap the "Next format" button until the yellow screen appears. This screen shows the caller's location in decimal degrees which is the same format the wireless carriers use to send location data to PSAPs.
3. Wait a few seconds for the accuracy to get to 50 feet or smaller.
4. Tap "Stop"
5. Read off the coordinates, accuracy, timestamp and (optionally) elevation.

Note that FindMeSAR will not work on flip phones since they do not have a browser. Also the first time someone uses FindMeSAR their browser must be online.

Here is a short report from a SAR team in New Mexico that used FindMeSAR to locate lost hikers. The story seems to indicate that "phase 2" coordinates from the wireless carrier were also available but they were not accurate. http://atalayasar.org/node/478

Also FindMeSAR has been reviewed and added to the APCO app page at http://appcomm.org/. APCO is an international organization for public safety communication professionals.