EENA Technical Committee Document

HTML5 Geolocation

Accurate caller location in support of emergency services

Title	HTML5 Geolocation		
Version	1.1		
Revision date	08-09-2017		
Status of the document	Draft	For comments	**Approved**

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

Authors and contributors to this document

This document was written by members of EENA:

Contributors	Country/Organisation
Johan Sanden	Expert, Sweden
Cristina Lumbreras	EENA
Markus Bornheim	Avaya Germany EENA Technical Committee Vice-Chair
Andrew Hutton	Unify / Atos EENA Technical Committee Vice-chair
Martin Deroide	SDIS 56, France

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

Legal Disclaimer

This document is authored by EENA staff members with contributions from individual members of EENA and represents the views of EENA. This document does not represent the views of individual members of EENA, or any other parties.

This document is published for information purposes only and it does not declare to be a statement or interpretation of EU law or the national law of EU Member States. This document is entirely without prejudice to the views of relevant national statutory authorities and their legal functions and powers, whether under EU law or the national law of their Member State. Accordingly, under no circumstances may reliance be placed upon this document by any parties in compliance or otherwise with any applicable laws. Neither may reliance be placed upon this document in relation to the suitability or functionality of any technical specifications, or any other matters discussed in it. Legal advice, technical advice and other advice as relevant, may be sought as necessary.

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

Table of contents

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

1 Executive Summary

HTML5 Geolocation currently is being used by some emergency services organisations to request accurate location from the caller's smartphone, when needed. When the citizen dials 112, the most appropriate public safety anwering point (PSAP) receives the call. In case the network-provided location information from the Mobile Network Operator is not accurate enough or not available at all, the PSAP can send the caller an SMS with an embedded web link. When the caller opens the link of this SMS, the PSAP receives the GNSS based location after caller has approved to share the location with web link.

This document highlights why and how HTML5 Geolocation can make an impact to the emergency service and its citizens. It explains the capabilities of the existing web technology for accurate handset derived location using HTML5 Geolocation. This capability was initiated by the World Wide Web Consortium (W3C) to standardise a way of enabling GNSS service in web browsers back in 2010/2011. Additionally, this document also provides some examples on how it is used today for public safety and commercial businesses.

2 Introduction

Accurately locating 112 callers from mobile phones is becoming increasingly urgent across the European Union as mobile phones are ubiquitous in many EU countries.

The most common way to locate a wireless caller today is by requesting this information from the Mobile Network Operators (MNO), either to be sent directly with the incoming call or in a seperate step as an offline process. The accuracy of the returned location data as well as the speed of answer from the MNOs varies a lot due to a number factors;

- Density of cellular towers at the caller location
- Technology deployed by the MNOs in terms of LBS (Location-Based Services)
- Laws and regulations being different from country to country

When new technology emerges it usually creates a gap between the old and new which sometimes is hard to bridge for existing solutions. A key success factor for emergency services is to be able to use new technology to improve public safety which can be a challenging task due to number of reasons. Using HTML5 can bridge this gap at some level.

The purpose of adding HTML5 Geolocation capabilities at the PSAP is to create an alternative to cellular network-derived caller location information and is to give the caller an option to share the device-provided location data from his smartphone.

To put the HTML5 Geolocation in context, the list below summarises some information regarding other methods used today to locate mobile telephone callers[1].

[1] EENA documents:
Handset Derived Location for Emergency Calls
Caller Location in Support of Emergency Services

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

- **Mobile Network-provided Location Information**
  The most common way of locating a wireless caller is provided by the MNOs. The accuracy of the caller location information varies a lot depending on the deployed technology in the network, handset capabilities and rules and legislation in the specific country.

- **Advanced Mobile Location (AML)**[2]
  AML is implemented directly into the smartphone to automatically enable all location services and send the very accurate handset based location information when the citizen calls an emergency number (e.g. 112, 999, 911). AML can be implemented as an "invisible" SMS[3], or using HTTPS via a mobile data connection.

- **Emergency Apps**[4]
  Emergency Apps for smartphones can provide the handset based location data. There are requirements to be fulfilled in order to make emergency Apps effective and efficient:
  - Apps need to be downloaded and installed prior to any emergency call.
  - The caller in an emergency situation needs to remember to use the emergency app for making the emergency call.
  - Emergency Apps are bound to a local or nation-wide PSAP, i.e. when using the app in an emergency outside the geographically boundaries for the specific emergency app, a discrepancy where the call is routed and the app location data will be sent up[5] takes place.

3 HTML5 Geolocation

3.1 How does HTML5 Geolocation work?

The Geolocation functionality is a subset of the HTML version 5 standard released in 2014 by the W3C (world wide web consortium) which has representatives from vendor such as Google, Apple and Microsoft to make the web more accessible and feature rich experience. Also the HTML5 also supports functionality such as video and audio in the web browser. It is not related to an emergency voice call so it can be useful in other scenarios for example when emergency service is requested by SMS or other means.[6]

The Geolocation functionality exposes a set of methods that can be invoked by standard web technology in browsers that supports HTML5. Sometimes it can even be used on a laptop/desktop connected to a Wi-Fi in a densely populated area to acquire a location using the nearby Wi-Fi base stations to calculate a location.

To mitigate privacy concerns, all requests that are made to the HTML5 Geolocation functionality requires a consent between the user and the website for accessing any location data available to the browser. This is process is initiated by the website but handled by the browser which basically is asking the user to permit or deny to share this information with the website.

3.2 What information can be derived from HTML5 Geolocation?

The geographic coordinate reference system used by the attributes in this interface is the World Geodetic System (2d) [WGS84]. No other reference system is supported.

- The **latitude** and **longitude** attributes are geographic coordinates specified in decimal degrees. (required)

---

[2] EENA Operations Document Advanced Mobile Location (AML) in the UK
EENA Operations Document Advanced Mobile Location (AML) Specifications & Requirements

[3] Original concept, development and implementation by British Telecom (BT, John Medland)
[4] EENA Operations Document 112 Smartphones Apps
[5] This has been identified and addressed by EENA and the document Pan-European Mobile Emergency Application (PEMEA):
[6] Test applications: https://html5demos.com/geo/, https://www.w3schools.com/html/html5_geolocation.asp

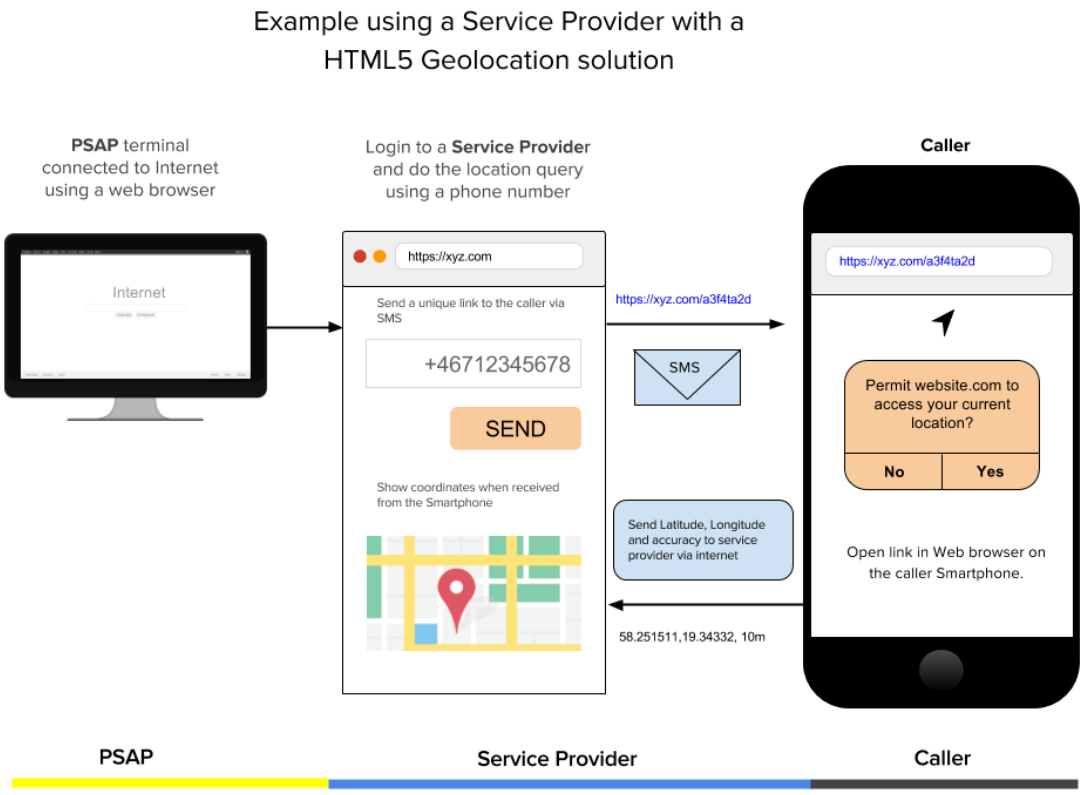
European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

- The **accuracy** and **altitude** values returned by an implementation should correspond to a 95% confidence level. (required)
- The **altitude** attribute denotes the height of the position, specified in meters above the [WGS84] ellipsoid. (optional)
- The **accuracy** attribute denotes the accuracy level of the latitude and longitude coordinates. (optional)
- The **altitudeAccuracy** attribute is specified in meters. (optional)
- The **heading** attribute denotes the direction of travel of the hosting device and is specified in degrees, where 0° ≤ heading < 360°, counting clockwise relative to the true north. (optional)
- The **speed** attribute denotes the magnitude of the horizontal component of the hosting device's current velocity and is specified in meters per second. (optional)

3.3 How can HTML5 Geolocation be implemented?

The implementation usually applies of a unique one-time web link to be generated and embedded into the SMS which is sent from the PSAP. The unique link will identify the incoming data and handle it in the CAD or third party system to present the location data in the directly GIS view.

The following sequence of graphics shows the call and data flow in principle:



European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

1. The smartphone user calls 112, the call is routed from the mobile network (2G/3G/…) to the most appropriate Public Safety Answering Point (PSAP)

2. The telephony system of the PSAP connects the voice call to the call taker's phone

3. The call taker (or the telephone system through the telephony application integration) creates an SMS to be sent back to the caller, including the one-time link (URL) that is used to identify the caller in the web application and trigger the HTML5 geolocation process

4. the caller receives the SMS and clicks on the embedded URL, which opens the browser on the smartphone

5. the web application executes the programmed code to retrieve the location information from the smartphone, involving the caller who has to accept this request from his browser.

Once the location data is fetched from the smartphone, it can be displayed eiter in a simple browser window in the PSAP, or it can be integrated directly into the Computer Aided Dispatching (CAD) software.

From the citizen point of view a Smartphone with location services enabled and data plan is required for this to work, no apps is required since the technology already exists in the built in web browser.

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

3.4 Caveats and pre-requisites

There are some caveats and pre-requisites that need to be considered when looking to implement a solution based on HTML5 Geolocation. Some of them result more from a technical perspective, some of them are more operationally driven:

- **Data plan with Internet Access and location services turned on the caller's side**
  A data plan with internet access is required and the location services on the smartphone needs to be enabled for this solution to work. Whilst calling 112 has to be free of charge from the perspective of EU regulation, but data services are typically not free of charge, or might not be available with roaming users.

- **Access to data and SMS services during emergency calls in the mobile network**
  The smartphone has to have access to SMS and to data during the emergency call.

- **Access to internet services in the PSAP**
  As many PSAP organisations are currently reviewing their communications architecture, they would need to foresee access to the internet in order to be able to connect the terminating web application inside the PSAPs IT and applications setup.

- **Secured connection (https mandatory)**

  Since 2016, the major web browser vendors only allow access to this type of functionality on secure origins, i.e. a secure connection between client and server using HTTPS/SSL, and PSAPs must configure their IT systems accordingly, so the web links they provide to citizens are always secure.

- **Procedures in PSAPs during emergency calls**

  PSAP operations have to consider the cases where this approach is applicable and how in general especially manual activities in preparing and sending the SMS need to become part of their procedural framework.

  Also, in order to avoid confusion on the call taker's side during managing the emergency call, PSAPs have consider in how far the necessary steps to start and to manage the HTML5 data flows should be executed manually by the call taker, or rather should be automated between the communication and the CAD- and GIS-applications.

European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

4 HTML5 Geolocation in real life scenarios

4.1 Benefits for citizens and emergency services

The benefits of having a HTML5 Geolocation based solution is that the basic technology is well tested and the capability is already in place in almost every smartphone with GNSS servives. With an ever growing penetration of smartphones with web browsers that support this feature this is a straight-forward solution to enhance access to precise caller location data for emergency services purposes.

Emergency services have full control when and how to use HTML5 Gelolocation capabilities since the process can be initiate and owned by the emergency service. With user consent the location data can be exchanged directly between the smartphone and the emergency service without any active involvement from the MNOs once pre-requisites are clarified and can be assumed to be working. This makes it a global solution out of the box for the citizens once set up and deployed by PSAPs.

When a successful location has been acquired, HTML5 Geolocation accuracy offers the same quality like native 112 apps or AML, basically narrowing the location of the smartphone down to a few meters, which can make a huge difference in terms of resources applied to respond to the emergency case. In sparsely populated areas such as rural areas it can have an even greater impact compared to a network-based location solution.

4.2 Examples of the use of HTML5 Geolocation

Whilst HTML5-based geolocation services are embedded into many commercial applications already, it is currently not that visible in Emergency Services in general.

Due to the initiative of some emergency services in Europe and their IT department's activities evaluating the technology, we can assume that more and more services are going to pick this technology up.

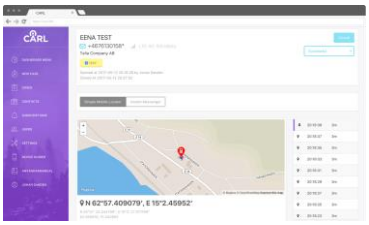
4.2.1 Usage in Emergency services in Sweden

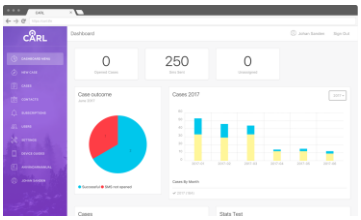
In Sweden three emergency services have added the capabilities to use HTML5 Geolocation to acquire better caller location: SOS Alarm (PSAP) implemented it in May 2017, JRCC (Swedish Maritime Administration) has been using this since 2014 and also the Swedish Police of the Region North makes use of the technology since beginning of 2017.

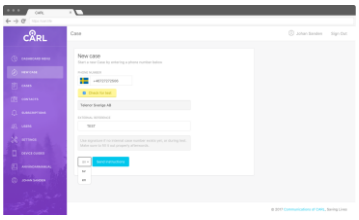
All these implementations are using SMS as a bearer of the web link where the caller location data can be exchanged at.

The following list shows some real successes of HTML5 geolocation in Sweden:

- Missing woman with severe medical conditions was successfully located using HTML5 Geolocation technology (http://www.vk.se/1997116/kvinna-hittad-tack-vare-ny-teknik, Swedish)
- Family was lost in the mountains during winter season and was successfully located by the Police.
- Drifting boat with engine failure during harsh weather condition was successfully located and people were rescued.
- A person lost in the woods could be guided back to the car only by giving oral instructions via phone. This was achieved by having the smartphone sending multiple locations points to determine in which direction to walk.







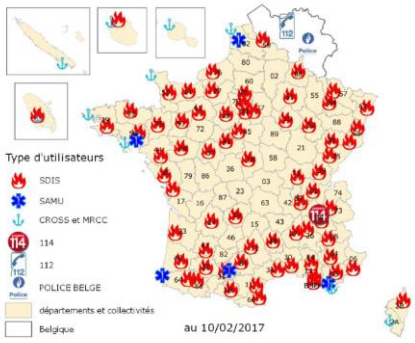
European Emergency Number Association – EENA 112
Avenue de la Toison d'Or 79, Brussels, Belgium
+32/2.534.97.89 | info@eena.org

4.2.2 Usage in Emergency services in France - Geoloc18_112

This system based on HTML5 has been developed and implemented by the fire-fighters from the French departments of the Morbihan and the Var. It is currently used by several emergency services organisations in France to get accurate location from the caller.

Additional features have been developed:

- SMS can be sent in different languages
- Different cartographies can be chosen
- Photos and video can be shared with emergency services
- Communication from Emergency services to citizen



5 Summary and Outlook

The process of Web-based HTML5 Geolocation usage can be controlled by each PSAP individually and on demand, guiding the caller through the process. User privacy in terms of location data is controlled by the caller, avoiding any privacy concern. HTML5 has also the capacity to deliver other data (e.g. smartphone operating system language, battery charging level) as well as media content (voice and video streaming through WebRTC), allowing for powerful extensions of current emergency calling capabilities.

Different ways of locating a mobile caller are available, but currently there is no solution covering 100% of all cases and insuring user privacy. Combining different solutions and intelligently choosing the right approach can make a difference to emergency services' efficiency.