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March 2022

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Anonymous

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Recommended Citation

Anonymous, "Obtaining Accurate Position Data for the PIDF-LO Header in Emergency Calls", Technical Disclosure Commons, (March 30, 2022)

https://www.tdcommons.org/dpubs_series/5030



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Obtaining Accurate Position Data for the PIDF-LO Header in Emergency Calls

ABSTRACT

PIDF-LO (presence information data format location object) is an HTTP, XML tag format that includes a location object. PIDF-LO enables sending location objects natively on an emergency (E911) call over the internet, enabling high speed, high accuracy provisioning. This disclosure describes techniques to obtain accurate position information for the PIDF-LO header during emergency calls. If wireless positioning is available and location certainty is below a threshold, then the position fix is sent over the PIDF-LO. If wireless positioning is unavailable, a finite number of timed attempts are made to determine location using available positioning technologies. Upon exhausting the number of attempts, if the best-found location uncertainty is below a threshold, then the position fix is sent over the PIDF-LO. If the location uncertainty is above the threshold, no position fix is sent over the PIDF-LO.

KEYWORDS

- Emergency call
- Enhanced 911 (E911)
- Presence Information Data Format Location Object (PIDF-LO)
- Session Initiation Protocol (SIP)
- Public Service Access Point (PSAP)
- Global Positioning System (GPS)
- Global Navigation Satellite System (GNSS)
- WiFi Positioning System (WPS)
- Device-Based Hybrid (DBH)
- Position fix

BACKGROUND

PIDF-LO (presence information data format location object) is an HTTP, XML tag format that includes a location object. PIDF-LO enables sending location objects natively on an emergency (E911) call over the internet, enabling high speed, high accuracy provisioning even as a caller moves about a building or campus. PIDF-LO is carried in the SIP (session initiation protocol) invite message for emergency calls. Sending accurate location information to telecom carriers in the SIP invite message enables the carriers to route the call to the nearest or most appropriate PSAP (public service access point, a call center for emergency calls such as police, ambulance, fire brigade, etc.). With inaccurate SIP PIDF-LO location data or when location data is unavailable, a substantial number of emergency calls may be routed to the wrong PSAP.

DESCRIPTION

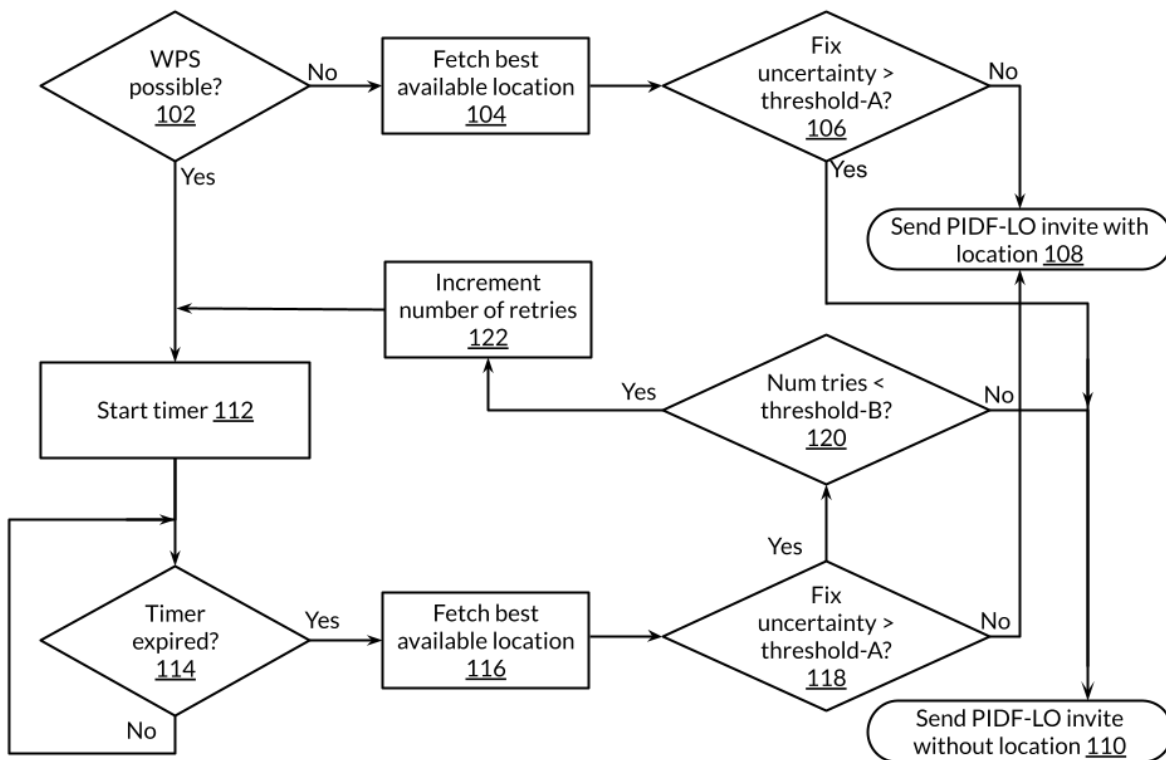


FIG. 1: Obtaining accurate position information for the PIDF-LO header during emergency calls

This disclosure describes techniques (illustrated in Fig. 1) to obtain accurate position information for the PIDF-LO header during emergency calls. Upon (or prior to) dialing an emergency call, the modem determines, e.g., via communication with an access point (AP), whether a WiFi positioning system (WPS) is available (102). The AP sends a notification to the modem indicating if WPS is available. The notification can be based on whether there is an active data connection, whether the device is connected to WiFi, whether WiFi APs have been detected recently, etc.

If WPS is unavailable or infeasible, a best available location (104) is fetched using other technologies, e.g., GPS, GNSS, etc., or from a cache. The uncertainty in location compared to a certain threshold-A. If the uncertainty is lower than threshold-A, the PIDF-LO invite message is sent with location information (108). If the uncertainty is greater than the threshold-A, the PIDF-LO invite message is sent without location information (110).

If WPS is available, a timer is started (112). The modem is configured to expose an API that can be invoked to indicate what the timer value is, e.g., zero seconds if WPS is unavailable, 0.5-1.0 seconds otherwise. The modem can also expose another API that enables the timer to be stopped by another entity. Upon expiry of the timer (114), a best available location is fetched (116) from available positioning modes, e.g., WPS, GPS, DBH (device-based hybrid location), etc.

The uncertainty in location compared with the threshold-A (118). If the uncertainty is lower than the threshold-A, the PIDF-LO invite message is sent with location information (108). If the uncertainty is greater than the threshold-A and the number of tries is less than a threshold-B (120), the number of retries is incremented and the timer restarted. If the uncertainty is greater

than the threshold-A and the number of retries exhausted, then the PIDF-LO invite message is sent without location information (110).

The modem can listen to indications from AP that WPS or DBH based position fix has been found and stop the timer. It can also reduce duration or stop the timer, if AP notifies that no WiFi access points were found or if DBH/WPS fix is not found. The modem can additionally listen to GNSS indicators and stop the timer when the indicator is detected. If such an indicator signal is used, the AP can send a notification to the modem if no WPS position is found, and the timer can be shortened.

CONCLUSION

This disclosure describes obtaining accurate position information for the PIDF-LO header during emergency calls. If wireless positioning is available and location certainty is below a threshold, then the position fix is sent over the PIDF-LO. If wireless positioning is unavailable, a finite number of timed attempts are made to determine location using available positioning technologies. Upon the expiry of the number of attempts, if the best-found location uncertainty is below a threshold, then the position fix is sent over the PIDF-LO. If the location uncertainty is above the threshold, no position fix is sent over the PIDF-LO.