Emergency Calling (911/112/*) Services over Wi-Fi

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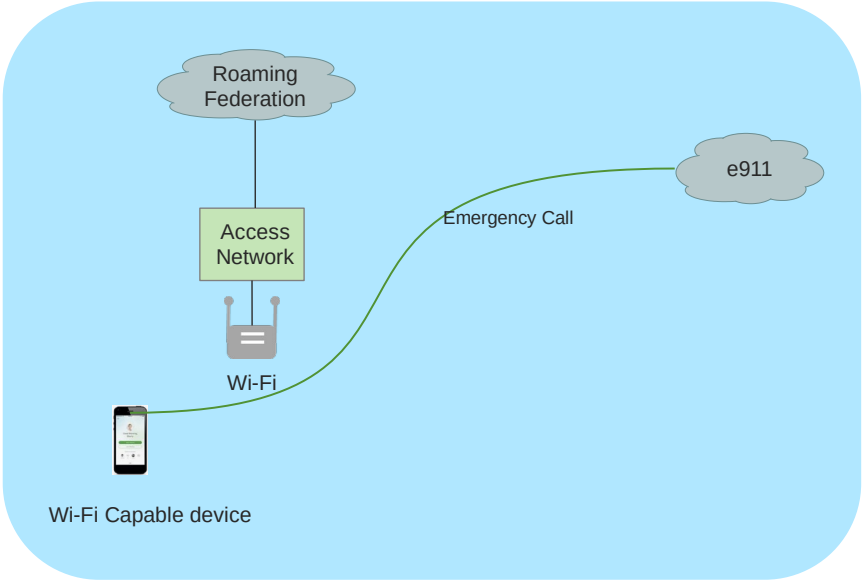
IETF 120 Vancouver, July 23rd, 2024

User Environments

- The focus is largely on scenarios where there is no availability of a public mobile network. Can a Wi-Fi capable device in such environments, make an emergency call, using the native dialer?



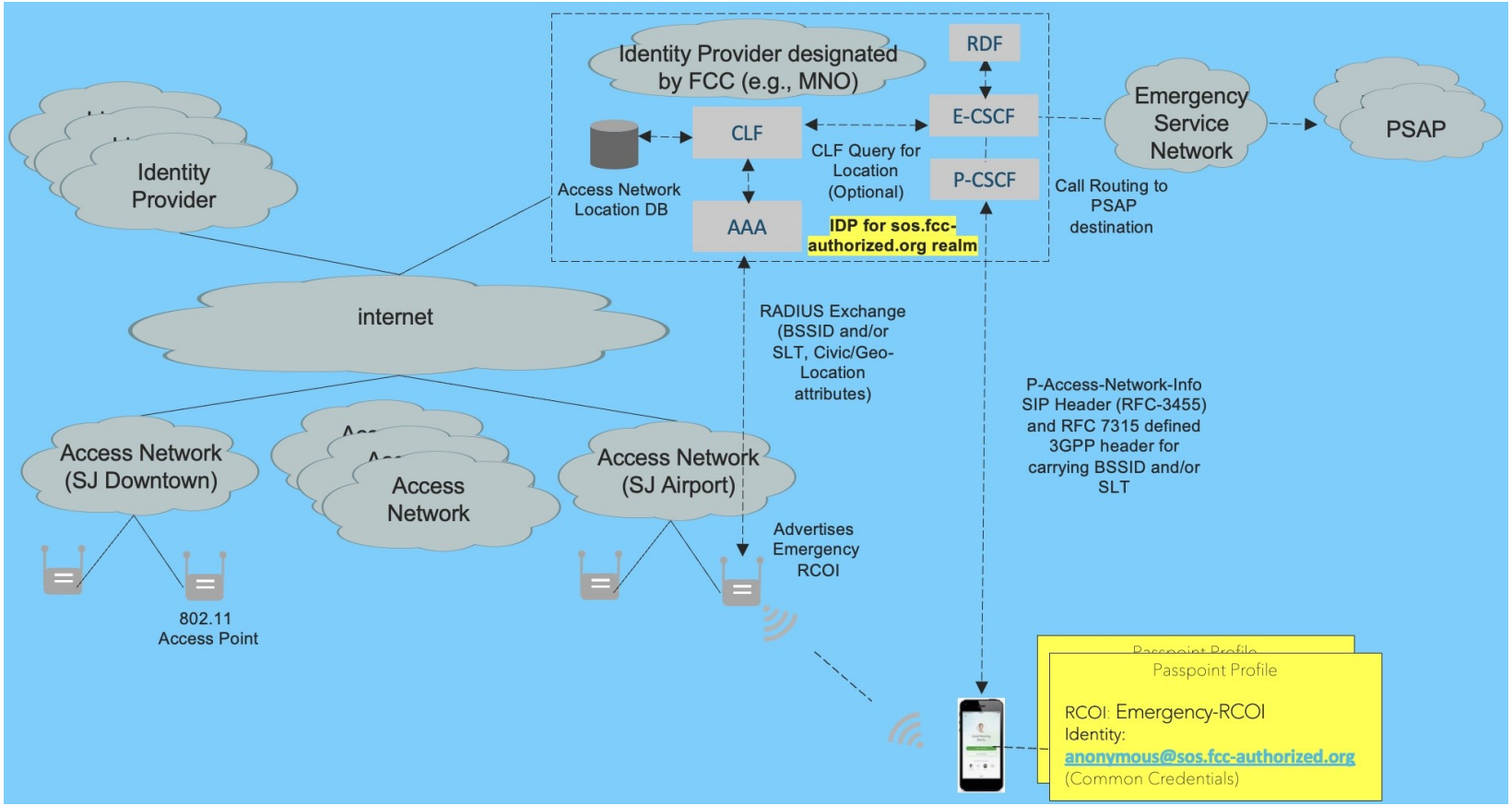
Scenario Description

Device	The use case applies to devices with • Wi-Fi interface and (optional) SIM • Wi-Fi interface is available Device is pre-configured with the default emergency passpoint profile. This may have been installed as part of the carrier-bundle upgrade, time of manufacturing at the OEM, part of enterprise software upgrade, or by the end user.
Cellular Network connectivity	H-PLMN and V-PLMN RAN unavailable; H-PLMN Core and IMS unavailable.
Wi-Fi Access	OpenRoaming federation Wi-Fi network is available in the location. The hotspot is configured to enable access to users with emergency passpoint profiles.
Wi-Fi Calling Feature	Wi-Fi Calling is enabled
Description	User dials 911 on native dialer Device discovers and attaches to the OpenRoaming hotspot supporting emergency services. Temporary access is granted to the device for making the emergency calls. Device obtains the voice service configuration from the access network. User's call is routed to the emergency voice server. The call is routed to the nearest PSAP.

Key Technical Elements

- WLAN Network Identification & Selection
- Passpoint Profiles on Device
- Legal and Regulatory Requirements
- Emergency 911/112/* Service Configuration Delivery
- Signaling of Access Network Location
- Detecting Rogue Caller & Location Spoofing

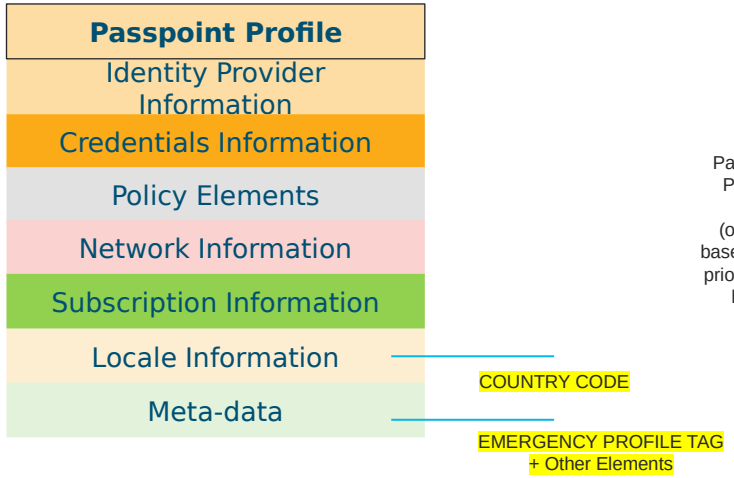
End-to-end System View

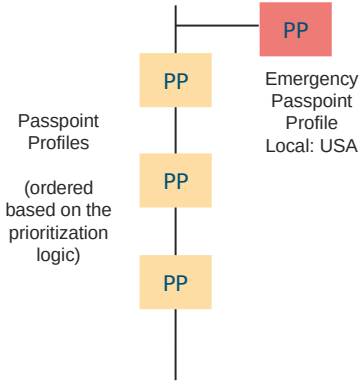


Passpoint Profiles

Emergency Passpoint Profile

- It is proposed to extend the Passpoint profile structure to include new elements which are required for supporting emergency services.
  - A new meta-data element which tags the Passpoint profile as an emergency-passpoint profile.
  - Profile prioritization ordering rules do no apply to emergency profiles. The selection logic is explicit, tied to Application triggers capturing user's intent, such as dialing 9-1-1, invoking an App, or special keys are pressed.



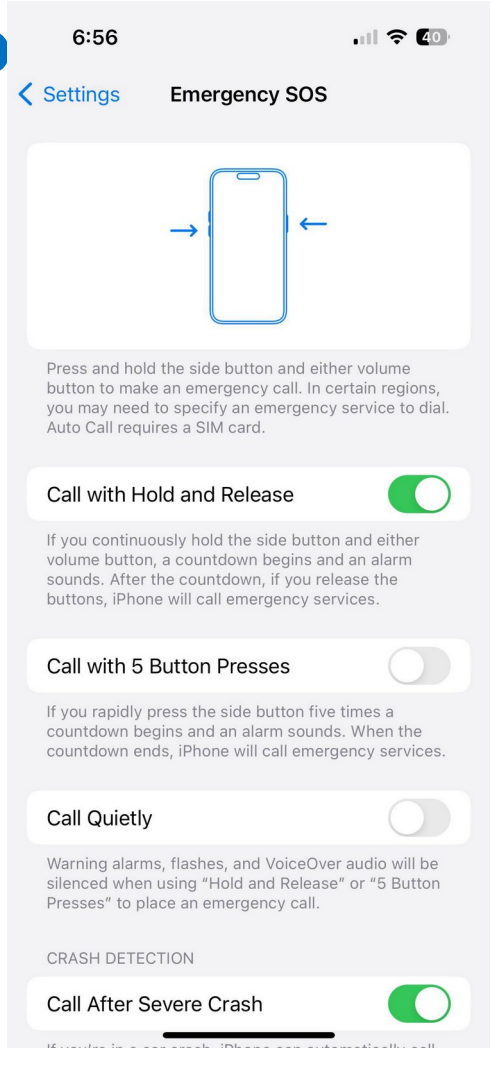


Device Logic when user selections an emergency app, or dials 9-1-1

1. **Check if cellular access is available**
2. **Check if the device is already connected to internet**
3. **If either of these conditions are not met, select emergency service profile for the locale.**

Emergency Passpoint P

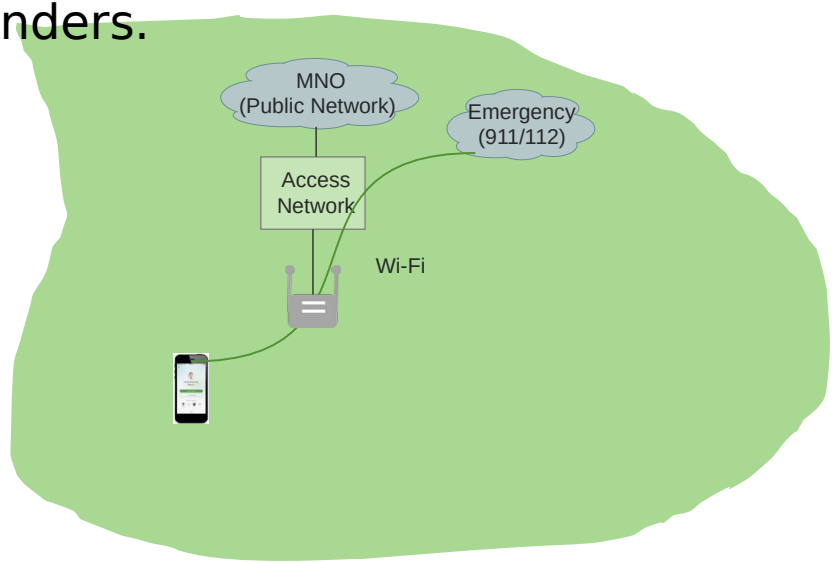
- Passpoint profile invocation based on application / OS Triggers.



Location Considerations

User Location

- The physical location of the user during emergency calls is crucial for prompt and effective emergency response. Emergency systems rely on the caller’s location for selecting the appropriate Public Safety Answering Point (PSAP), dispatching emergency personnel, and identifying rogue callers who might be using spoofed locations to mislead responders.



Key Considerations

- Location Data Type
  - Civic Location
  - Geo-Spatial
- Confidence Level Indicator
- Location of the Access Network
- Granular Location of the Device
- Entity Asserting the Location
- Discovering the Location Database

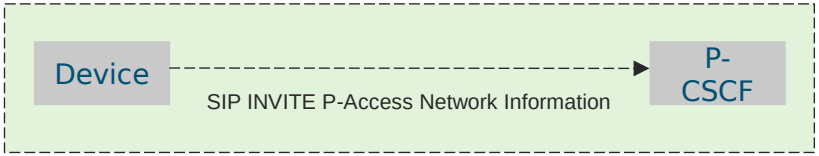
Location Signalling from the Client

- When the client sends a SIP INVITE request. It can contain a UE-originated P-Access-Network-Info (UE P-ANI) header.

- The P-Access-Network-Info header is used in SIP (Session Initiation Protocol) to convey information about the access network through which the user is connected. This Private header structure is defined in RFC 7315 and is managed under 3GPP namespace.

P-Access-Network-Info: IEEE-802.11; ssid=”WBAWi-Fi"; bssid=00:11:22:33:44:55; operator-name="ExampleOperator"; location-info="lat=37.7749;long=-122.4194"; i-wlan-node-id="node123.example.com"

Location Source:
BSSID, GPS,
DHCP Options
RFC4776,
RFC3825

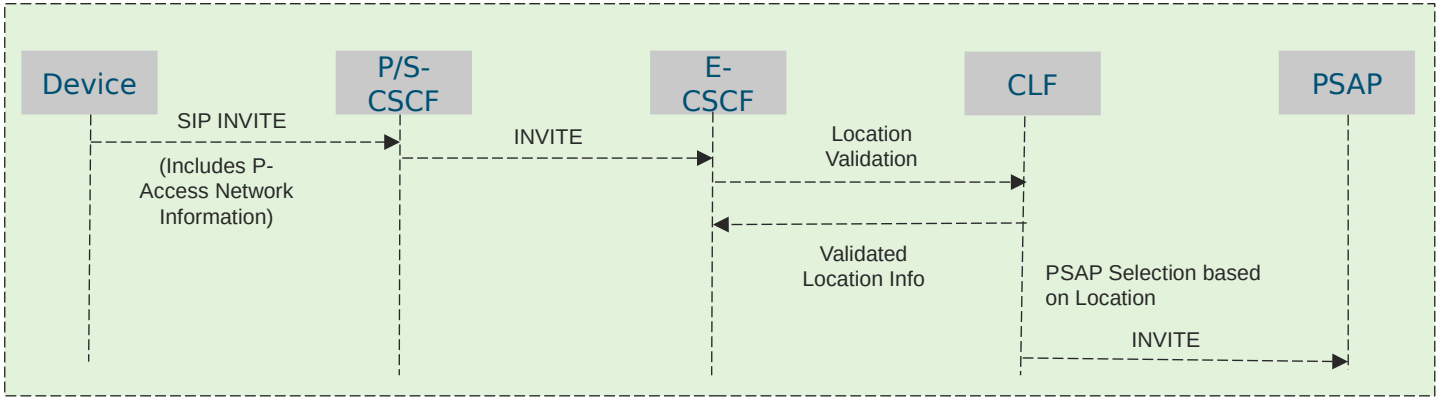


>>> Caller’s IP is 10.10.1.1. MAC address: MAC-1
>>> SIP Server is EmergencySIPServer.com (10.10.1.2)

INVITE sip:911@EmergencySIPServer.com SIP/2.0 (=> which resolves to 10.10.1.2)
Via: SIP/2.0/UDP 10.10.1.1:5060;branch=z9hG4bK776asdhds
Max-Forwards: 70
From: sip:MAC-1@EmergencySIPServer.com;tag=1928301774
To: sip:911@EmergencySIPServer.com
Call-ID: a84b4c76e66710@10.10.1.1
CSeq: 314159 INVITE

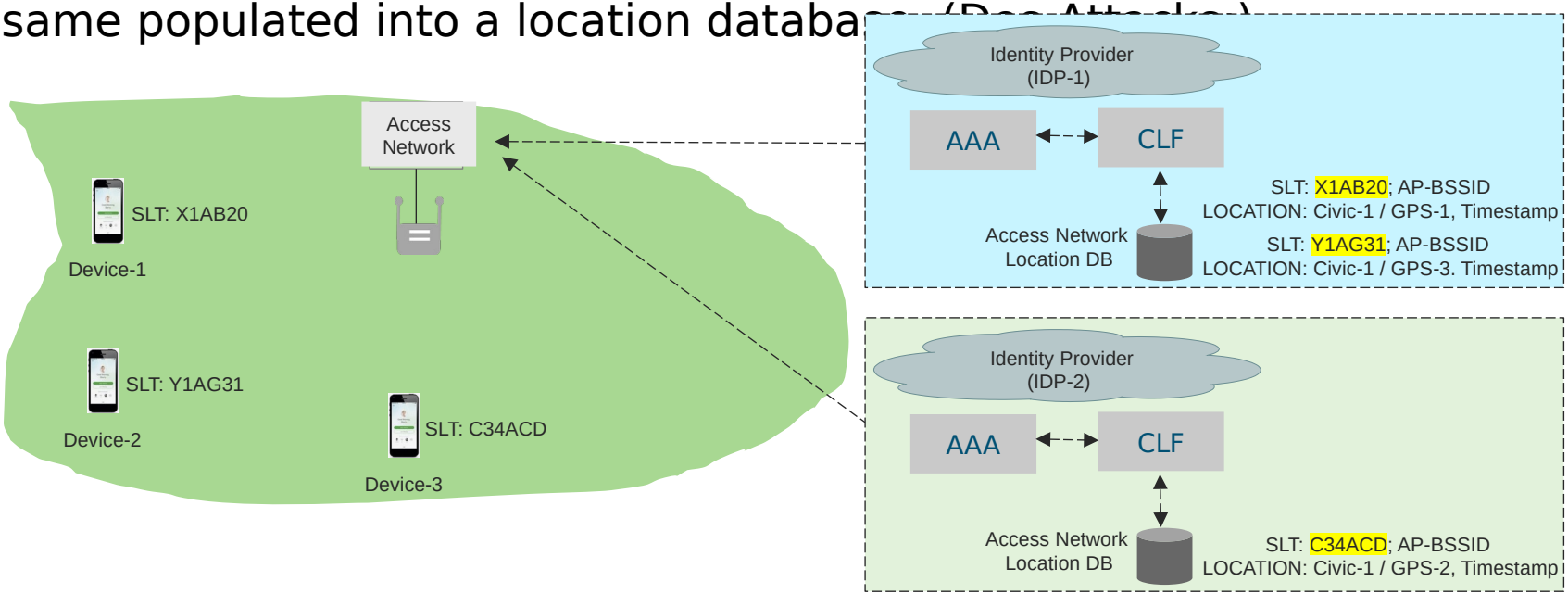
Location Validation at the IMS System

- The IMS network validates the UE inserted P-ANI by performing a location dip. How do we bring the same support to Wi-Fi access with Open Roaming? Network should have the ability to provide the client location; Emergency system should have the ability to validate the client location.

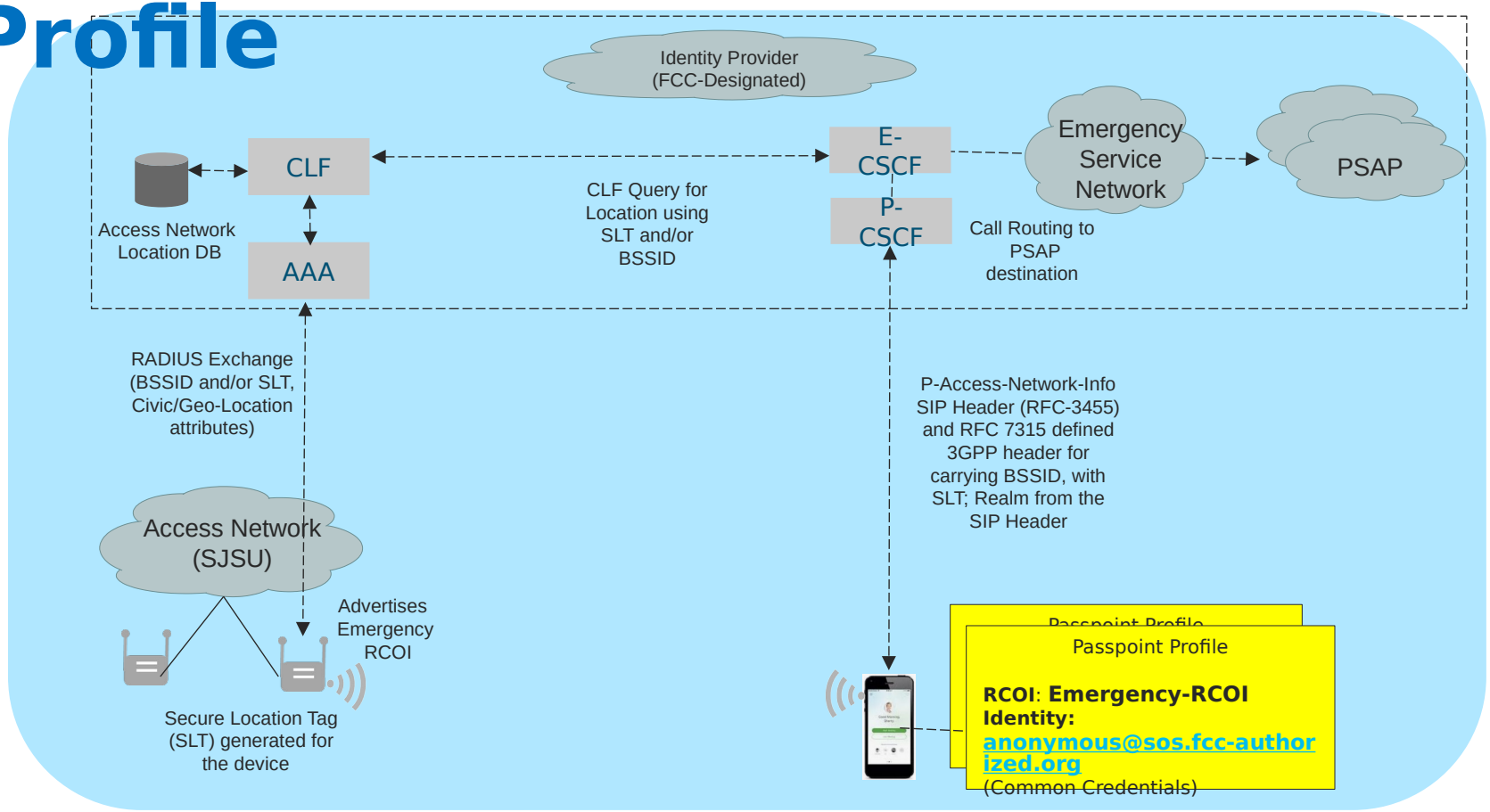


Dynamically Generated Location Tags

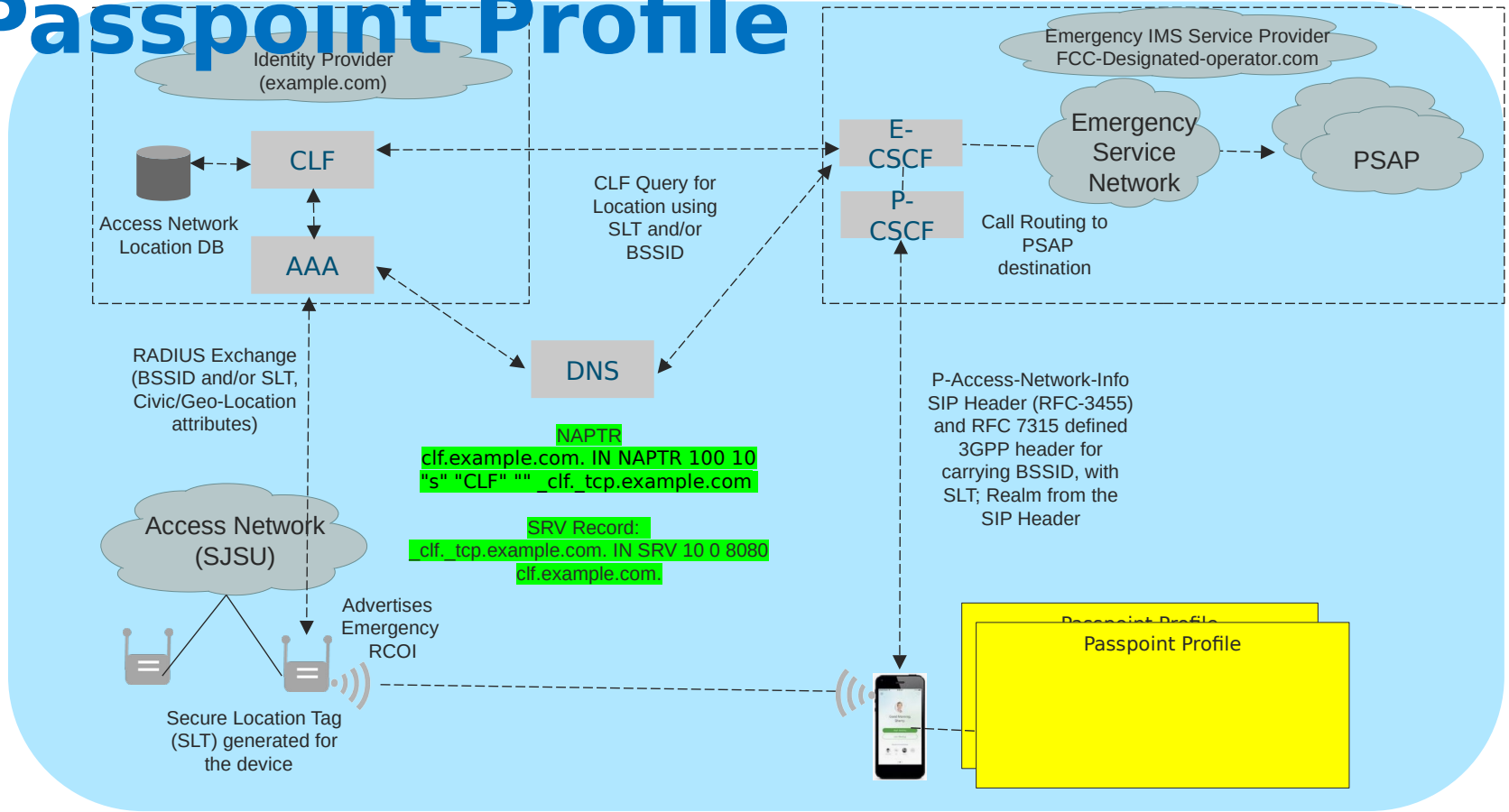
- The access network will generate a unique location tag for each connected device. This tag is referred to as (ANP signed) Secure Location Tag (SLT). The tag, the location of the access network or the device, other device identifiers will be signaled to the IDP, and the same populated into a location databa



Using Emergency Passpoint Profile



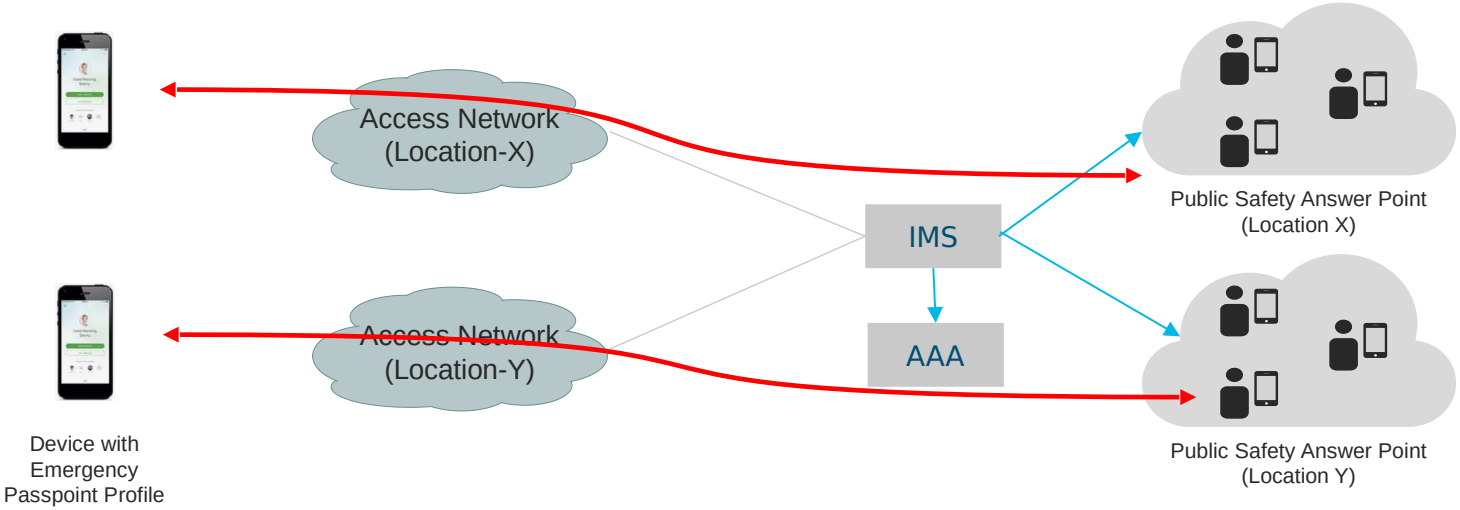
Using Default (Non-Emergency) Passpoint Profile



Working POC

Call Routing

- PSAP Selection & Call Routing



Next Steps

- The proposed approach based on roaming federation architectures enables a device with an emergency Passpoint profile to make emergency 911 call from any of the Wi-Fi hotspots which is part of the federation.

- These mechanisms improving access to emergency services over Wi-Fi. It can potentially save lives.

- Does the working group agree with this view? Should IETF should document techniques for improving access emergency 911/112/* service.