Design considerations for Emergency Context Resolution

Mental Model

- Emergency response contexts enclose individuals seeking help.

- There can be multiple, overlapping contexts (e.g. fire, police, medical).

- One critical element of the emergency response context is the physical location of the individual seeking help.

- The emergency response context can change in response to load.

Some conflicts with Internet deployment models

- Physical location is largely unrelated to reachability and routing.

- The Internet's topology is path based, so "enclosure" is not a routing construct.

- Current Internet deployments use tunneling mechanisms that mask the underlying topology.

- "Application routing" above this layer remains dependent on it.

Approaches

- There are two basic mechanisms we might use to resolve the conflicts between these models

  - Change the routing system for emergency service calls† so that it fits how emergency service contexts work.

  - Map between the two, so that the mapping process generates a target that the existing system can reach using normal routing

    †Or similar session used to request help

Modifying the routing system

- During call set up, distinguish between emergency calls and normal calls.

- Carry or associate at least geographic data with the call, so that it can be used by emergency call routing system.

- Enable a mechanism that uses that data to route the call to the appropriate emergency responder for its context

Modified routing risks

- Identification of the emergency nature of the call can fail.

- The mechanism that uses geographic data to route calls must be sufficiently distributed that the network element identifying the emergency nature can always invoke it.

- The mechanism must also be sufficiently robust that it can handle call load.

- It must function quickly.

Modified routing benefits

- This process only occurs when needed
  - Avoids waste in the network
  - Ensures the data is fresh
- Special handling may ensure that relevant systems can provide higher quality of service.

Mapping

- Prior to an emergency call, geographic and other data is used to obtain a target.

  – May occur at any time (e.g. during IP address provisioning).

- When the emergency call is made, this target is substituted and normal call routing is used.

  – Addition QoS requests may be applied, but are separate.

Mapping risks

- User Agents must be able to handle the mapping.

- If provisioning is used, the data may not be fresh.

- If request for increased QoS is not made or accepted, competition for resources might hinder call completion or slow call set-up time.

- Geographic data used for call setup may not be made available, and it is otherwise valuable.

Mapping Benefits

- The ability to pre-configure the target can lower call set-up times.

- The ability to pre-configure may also help manage failure at individual nodes.

- It may be easier to distinguish among contexts when they overlap.

- Deployment in non-mobile environments may be less costly.

Hybrid approaches

- There is very likely to be a need for a mapping step at some point in the routing process.

- There is very likely to be a need for a specialized routing process in the face of load-induced context change.

- Both may require an association between the presentation-layer emergency request and the application layer emergency request (e.g.using 911 in 112 area)

A pointed digression

- The usual IETF work is about interoperability. This isn't. It's about optimization.

  - For call connection

  - For quick call connection

  - For quick, correct call connection.

- So usual guidelines (single, mandatory to implement methods...) may not apply. We may be looking at multiple co-exisitng methods.

So what's the baseline?

- Any mechanism that **must** be used to succeed becomes part of the baseline.
  - From my perspective that means a combination of:
    - Location
    - Mapping
    - Call routing.
- I believe that the best optimization strategy will be to allow multiple network elements to undertake these tasks.

Some scenarios

- PBX

  – Phone may be pre-provisioned with a target by dhcp or when connected to a switch.

- Roaming mobile

  – Phone may be provisioned by dhcp.

  – Call proxy may be able to retrieve location from network and associate location with target.

  – Call proxy may hand emergency call to specialized network element.

Things we need

- A lookup protocol that allows us to determine a target.

- A method for carrying location data along with emergency calls and similar sessions.

- A way of identifying emergency service targets that allows us to distinguish among them (fire vs. medical or police)

- A charter...