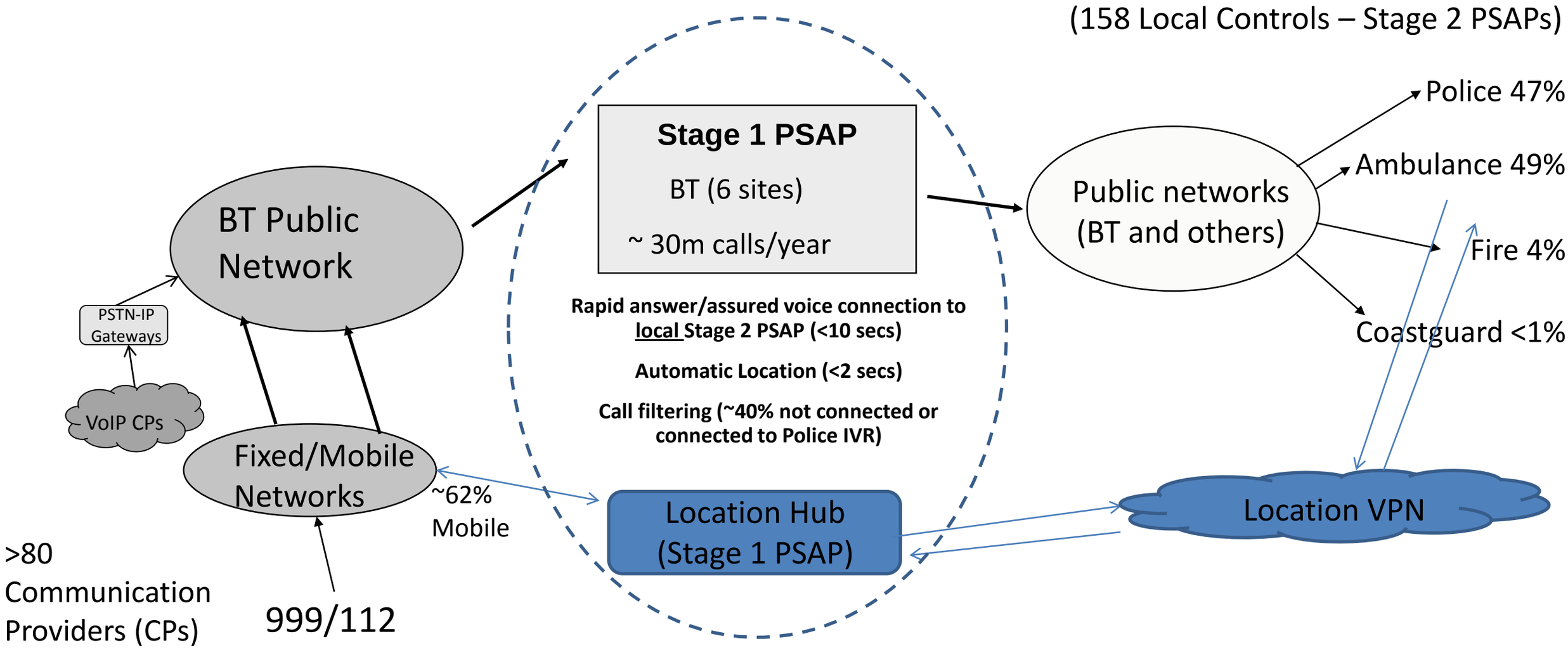
AML Update – September 2015

112 – improving precision for mobile calls

UK Emergency Service – at present

999/112 call handling : Voice + Location

- Voice : Mobile, Fixed, VoIP
- eSMS for hearing impaired (also ITUv21 text over voice, real time text using special terminals)
- Telematics in certain vehicles that includes a voice call + separate SMS data message



Making Mobile Location more precise

Using handset capabilities

Emergency Calls from Mobile Phones

- 62% of calls made to Emergency Services in UK from mobile phones - about 45k calls/day
- Location information based on mobile cell site coverage – caller could be located anywhere in what can be a large area
- Calls from mobiles on average 30 seconds longer before despatch.
  However can typically take 3 minutes of extra questions for stressed/injured victims……
  [LAS found that 4000 calls / month take more than 3.5 mins before despatch].
- Of the total ‘confirmed’ critical incidents, approx 36k per year involve searches of 30+ minutes because the mobile caller unable to give location
- 330k other cases of caller being unable to speak clearly : currently not able to be easily/fully checked ……..

Requirement for enhanced service (AML)

- No impact on standard emergency call (voice + cell location)

- Smartphone recognises an emergency call is being made
- Phone activates GPS & WiFi facilities and collects location information (for 20 seconds)**
- Zero-rated SMS containing location sent to 999 (not visible on handset)
- Minimum battery level needed to allow enhanced service
- BT matches received SMS to emergency (voice) call, verifies GPS/Wifi location is consistent with cell location
- Enhanced location information made available to requested Emergency Service (Police, Fire, Ambulance, Coastguard)

- This is not an App

** Note: where possible this will supplement the existing location information – does not replace it.

High Level Architecture

SMS via each network's SMSC as normal

Functionality integrated into phone OS

SMS Aggregation Service

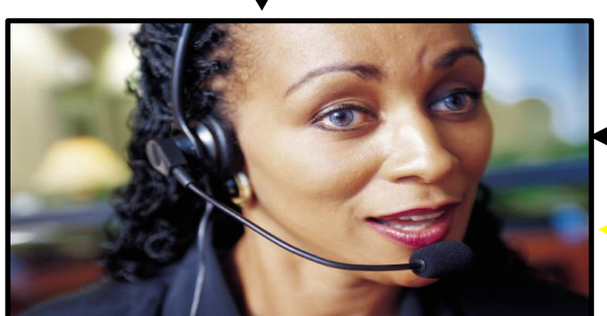
eSMS Server

SMS : phone number, WiFi or GPS location and precision along with data to validate message.

Call routing by cell ID to BT112 (not shown) and EAs

Phone number, WiFi or GPS location and precision along with data to validate message.

Location Analysis to remove invalid WiFi /GPS results



Most calls : Cell coverage at call arrival (c98%)

BT Location Hub

~80% calls : GPS/WiFi at , or shortly after call arrival

GPS co-ordinates and map description passed by voice or as data

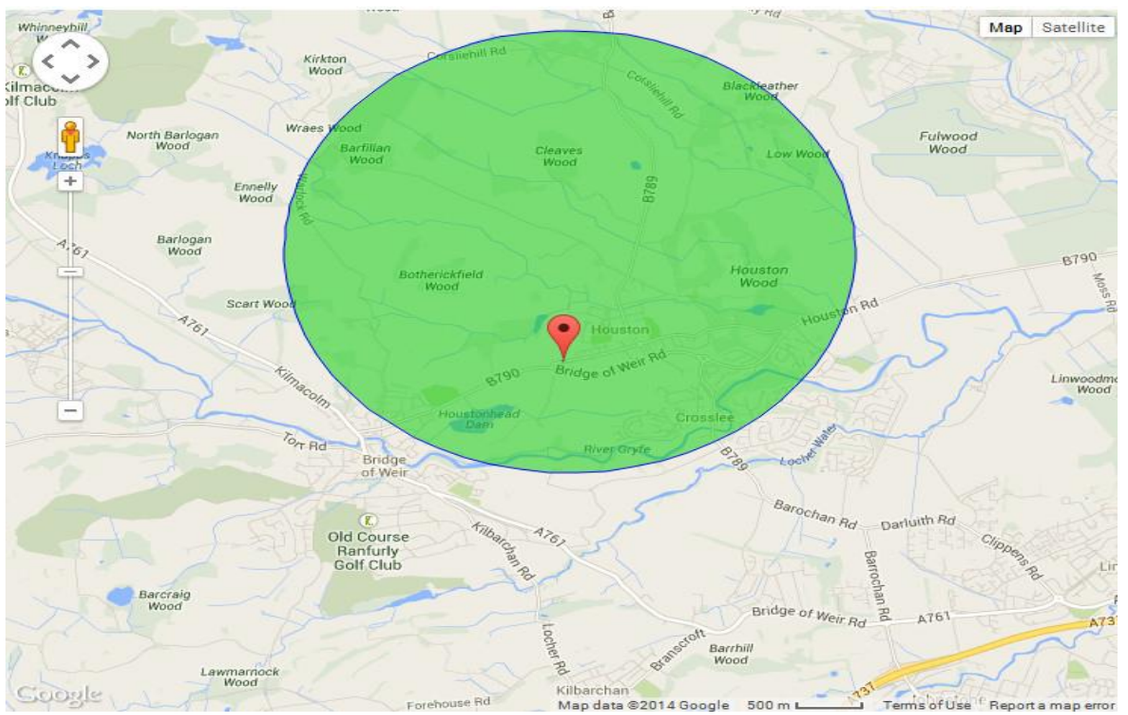
Cell coverage from mobile networks

New development

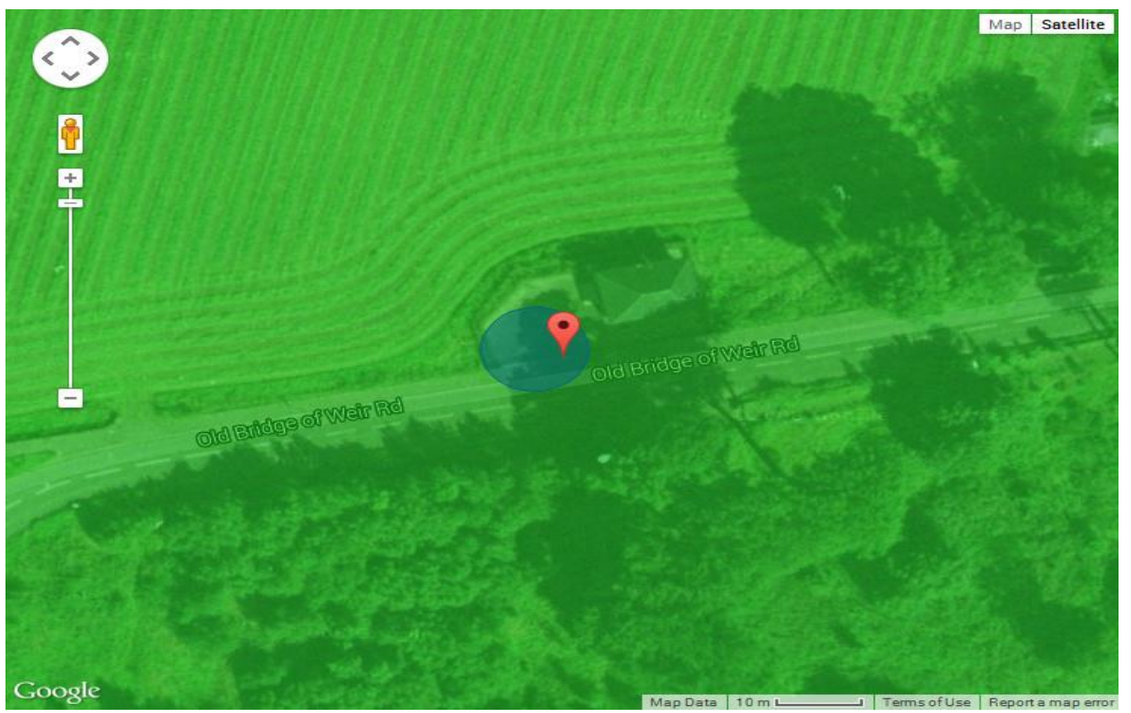
New integration

Results - Rural

Network location – 2024m radius

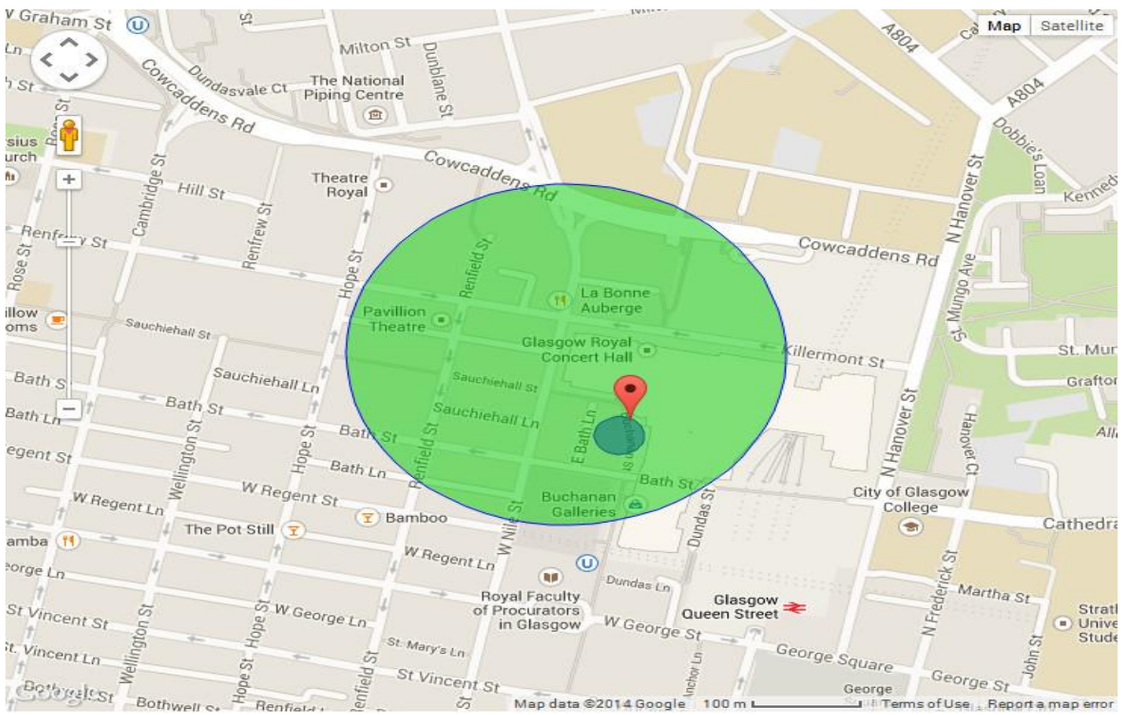


Handset – 6m radius – GPS



Results - City

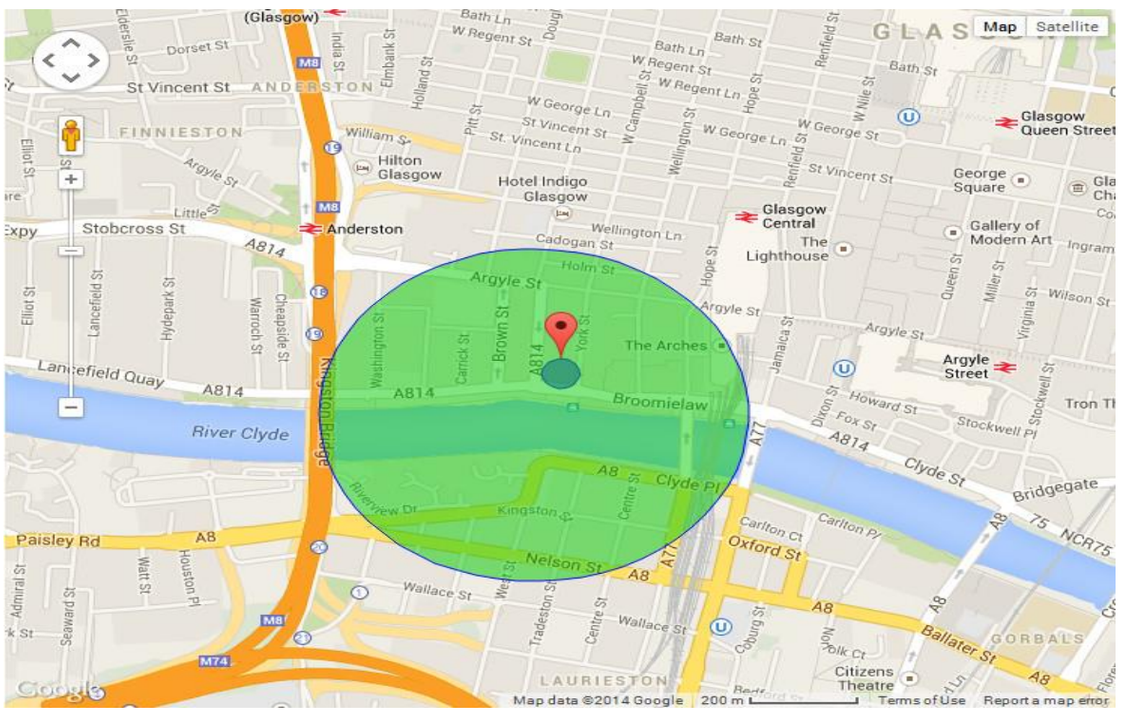
Network Location – 195m radius



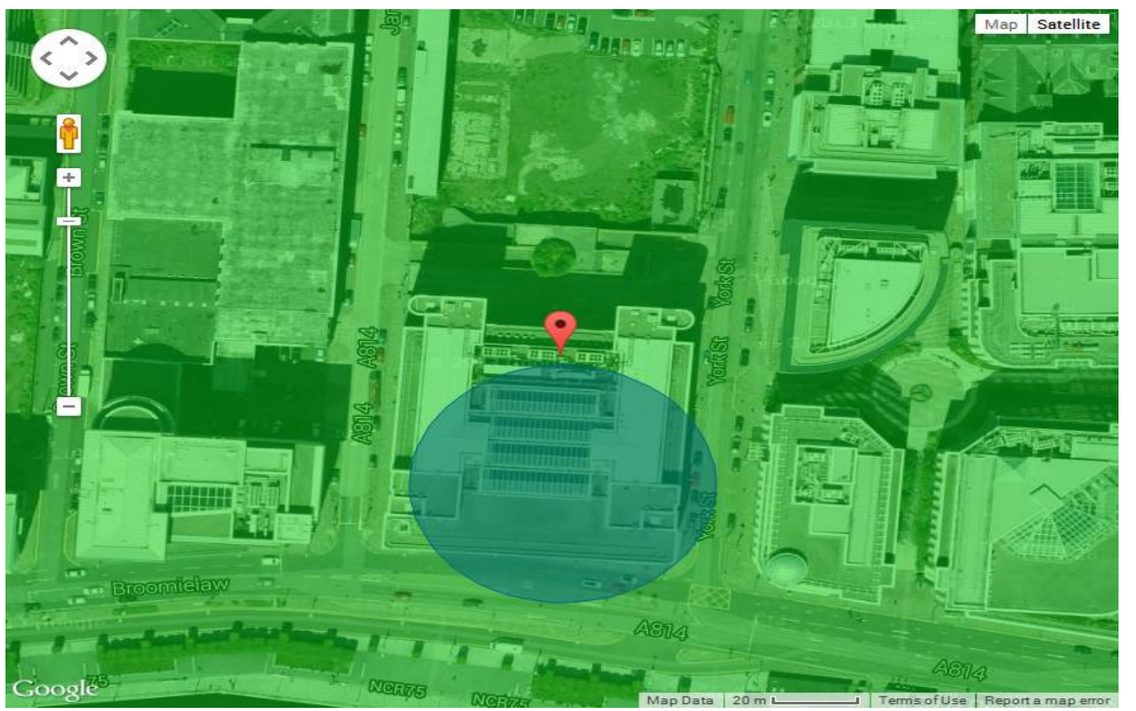
Handset – 22m radius – GPS

Results - Office

Network – 383m radius

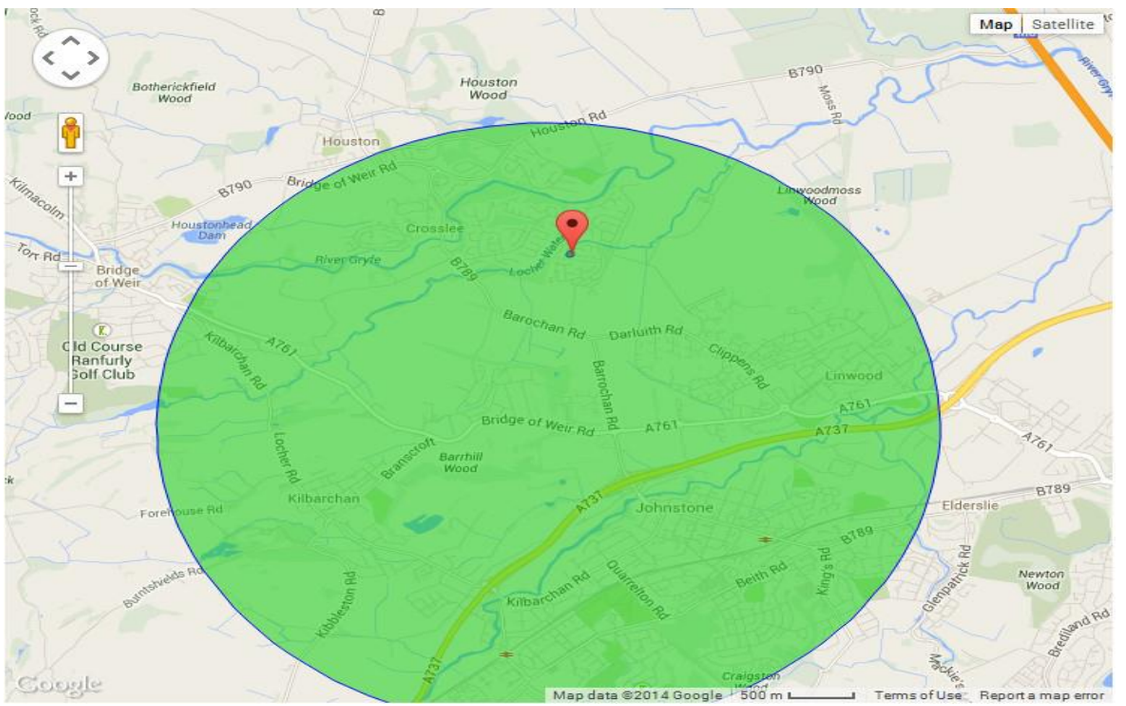


Handset – 34m radius – Wi-fi



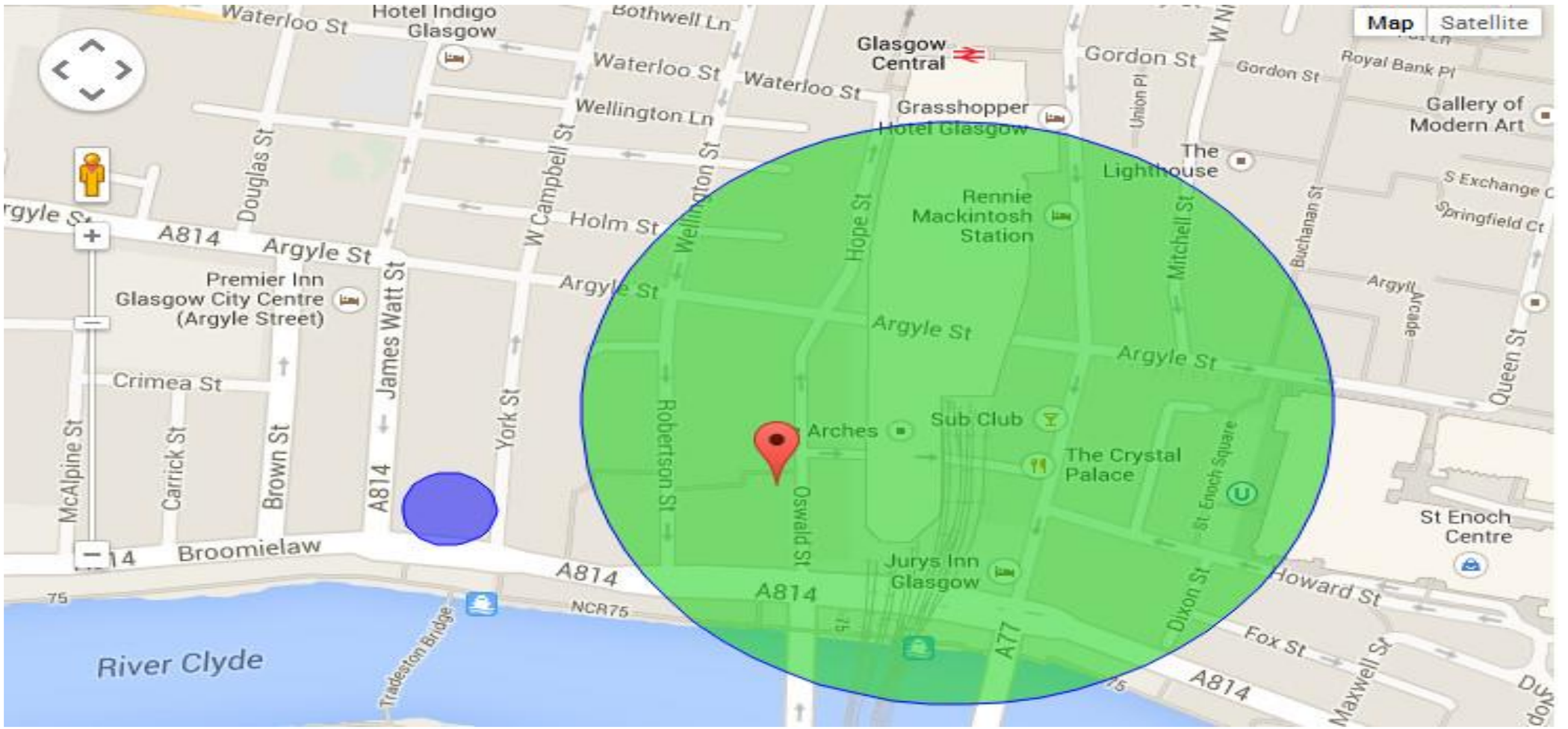
Results - Home

Network– 2808m radius



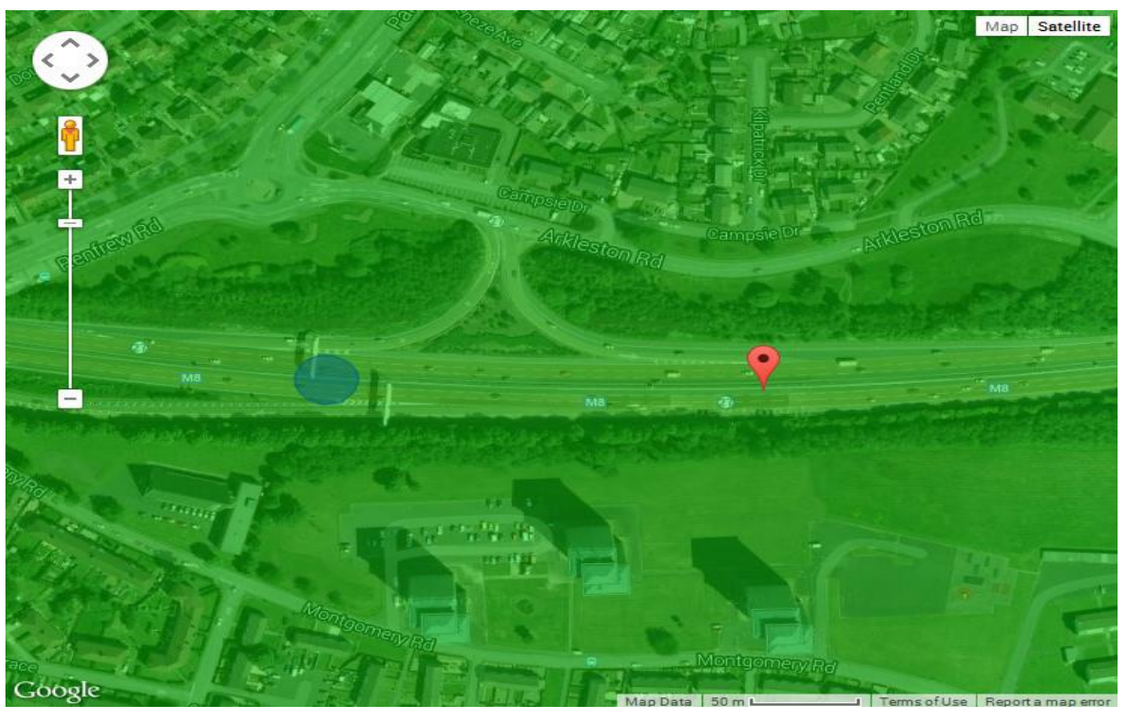
Handset – 30m radius – Wi-fi

Need for filter

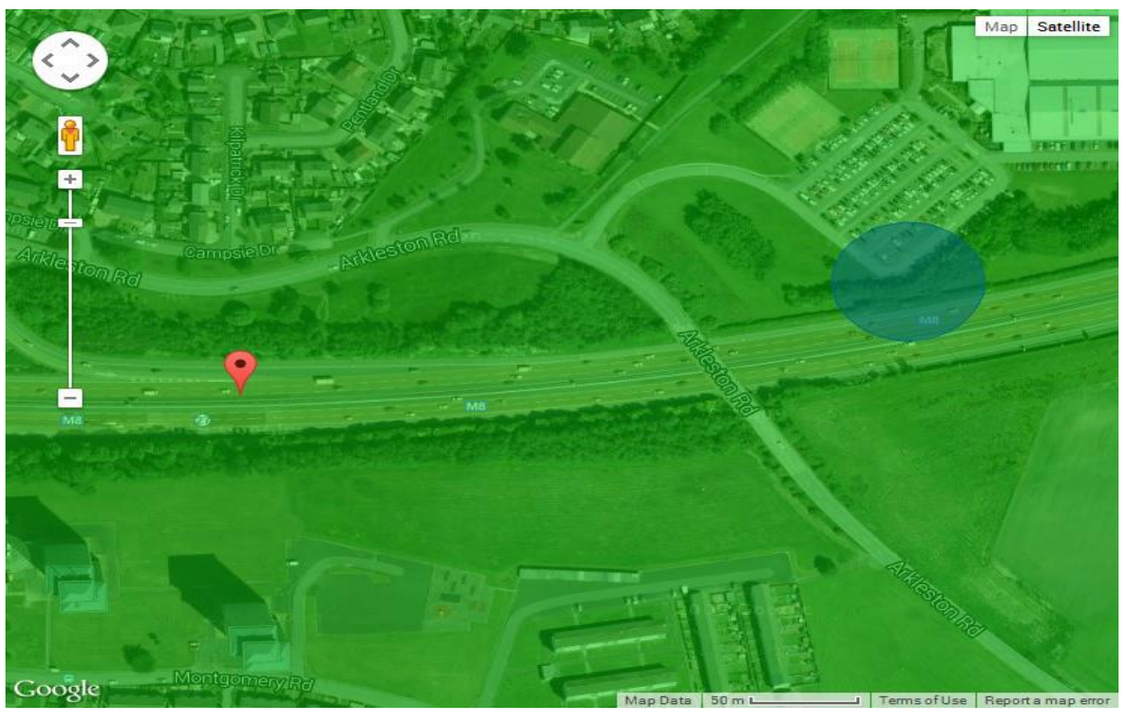


Results – Moving Car

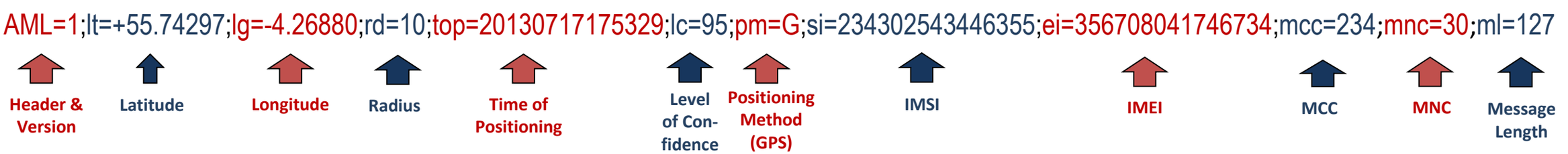
Westbound



Eastbound



AML Example SMS



Timeline to most effectively use the handset location

Event

Voice call set-up
~5s

Call answered by Stage 1 PSAP

BT999
TTA
~1s

BT PSAP handling
~8s

Call connect initiated.

Police TTA
~5s

Call answered by Stage 2 PSAP First Location search.

Police call handling

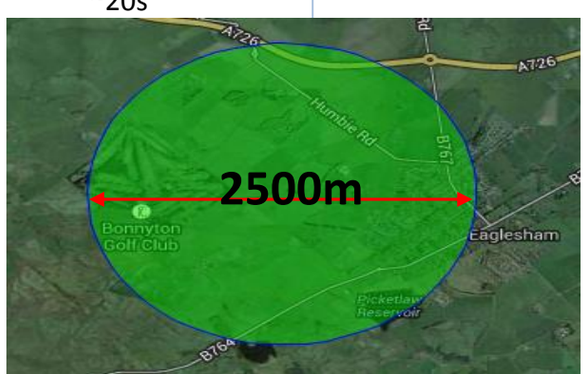
Re-query after ~ 20 secs

Second Location search

User makes call

Handset determines its location
~20s

Ntwk Data
~1s



Handset Data arrives with BT

Send SMS To BT
~4s

Process data
~1s

Handset Data Published on BT Location Hub

0 5 10 15 20 25 30 35

Time (seconds)

In live use - reaching more handsets and networks

- Live service since June 2014
- Initially HTC handsets on EE
  – all new models
  - upgrades for many existing handsets
- HTC handsets also now on O2 and Three networks
- Sony handsets also supported on O2 from August 2015
- Samsung and Alcatel successfully tested and about to launch

Recent weekly figures

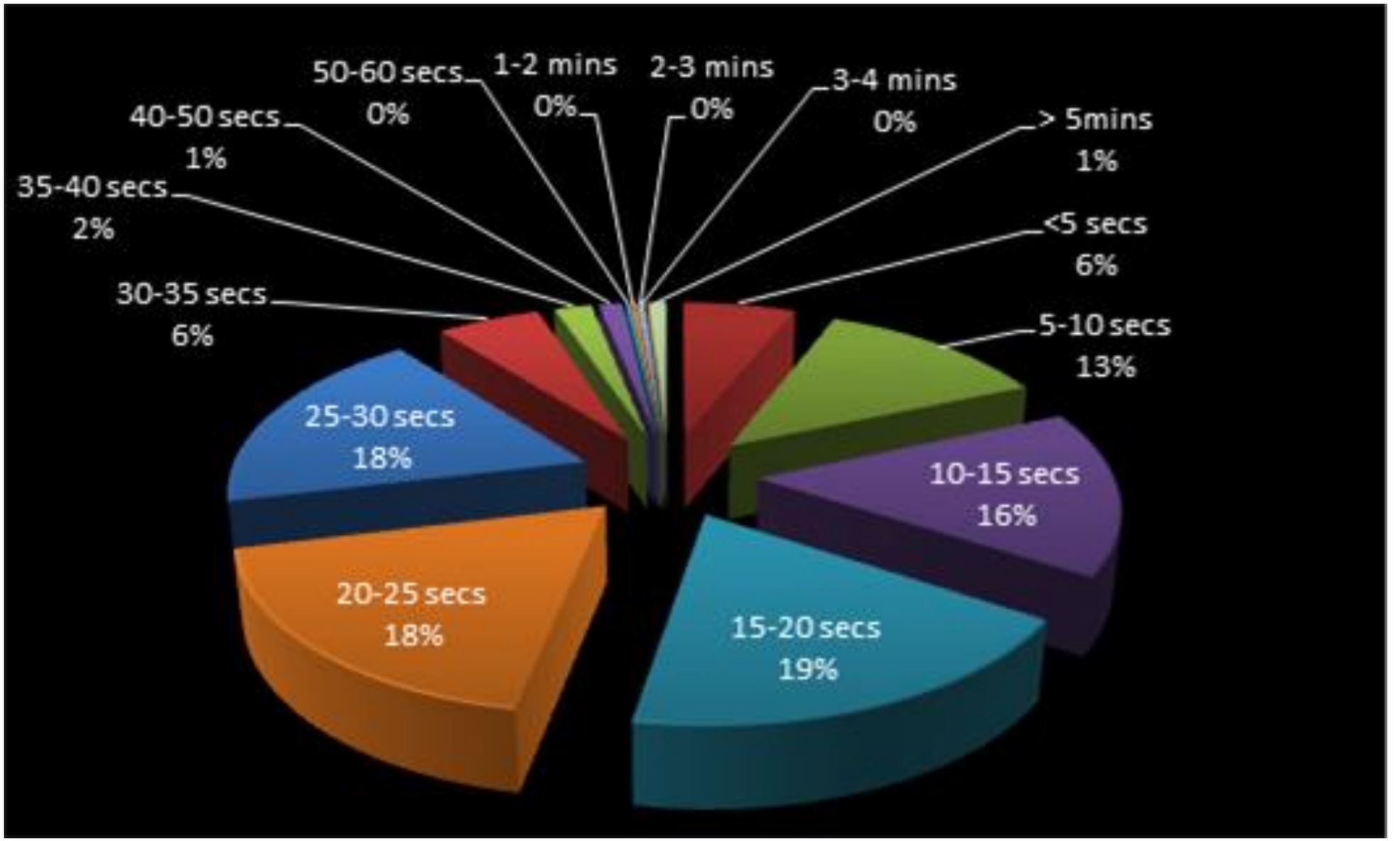
- Positions obtained from handset in live use (using AML) are :-

  - 52% AGPS/GPS
  - 28% WiFi
  - 8% Cell
  - 11% with no location

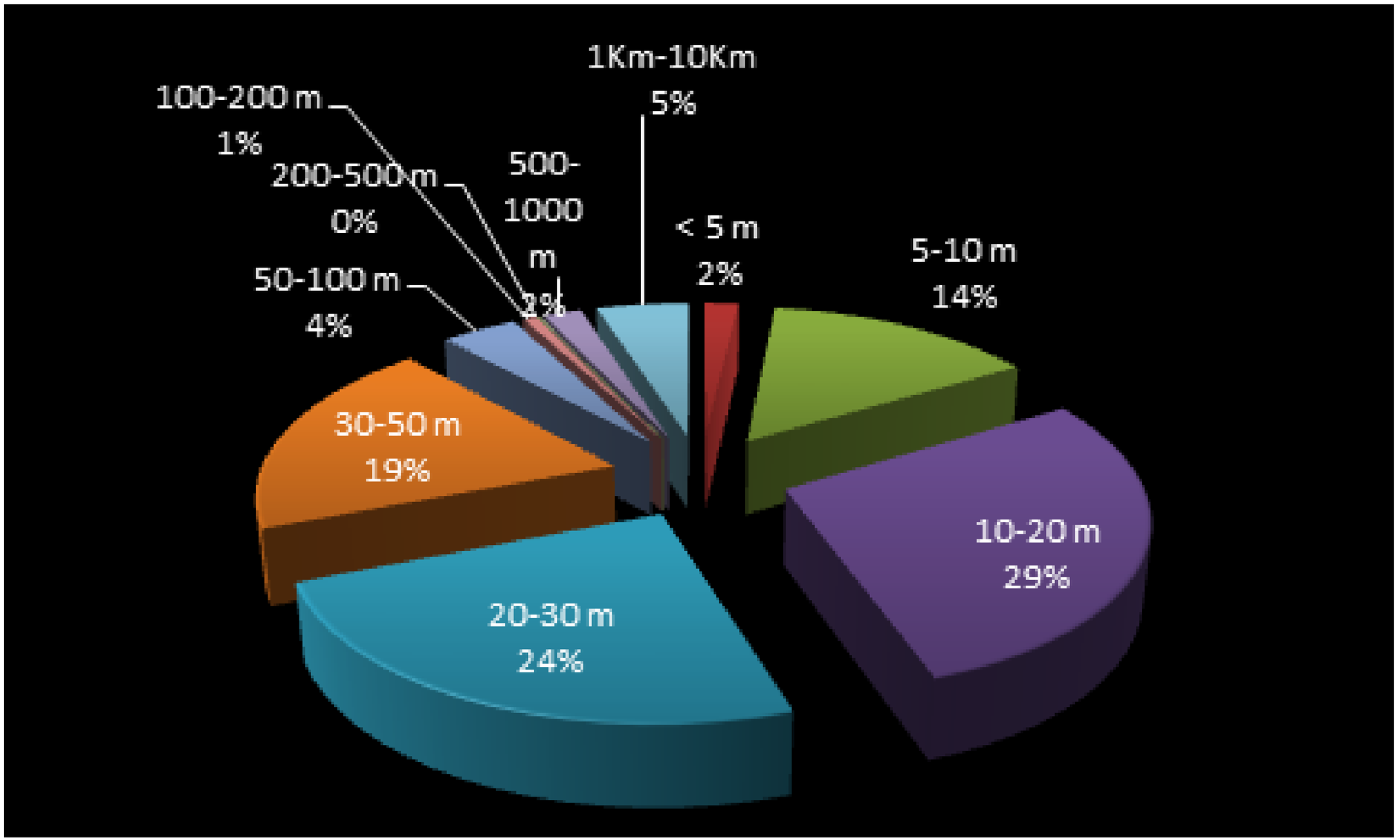
- ~90% of AML positions accepted after comparison with network location

- ~10% AML locations discarded after comparison

Time Delay in AML location arrival – 90% within 30 secs



Precision of AML Locations - 88%<50m radius



Summary in UK

- All UK Mobile networks, Home Office, Police and BT PSAP agreed requirements, engaged with Handset Providers
- Live service on HTC handsets since June 2014 for EE , with O2 and Three also now live for HTC. Sony launched on O2 with Samsung soon
- UK regulator (Ofcom) monitoring adoption by mobile networks
- Handset Providers developing sustainable capability for inclusion in new smartphones and software releases
- BT PSAP configured existing eSMS (text to 999/112) server to send information in location texts to it's location hub for Emergency Services, where compared to network location
- Ongoing monitoring shows working even better than expected…….but still need network cell location for cases where not available and to eliminate any unreliable readings from handset.

Moving forward – ideas to consider

- For other countries (and to work for roaming) :-

  - handset functionality could be configured to send SMS to different AML server in each country
  - each country would need to provide/modify a server to receive the AML SMS message from SMSCs, probably via an SMS Aggregator (or - as in UK - make use of existing server for emergency SMS service for deaf / hard of hearing users)
  - for PSAP access to AML information : depends on how PSAP obtains location in country concerned (straightforward in UK : https post from AML server to existing, centralised stage 1 PSAP Location Server, and Stage 2 PSAPs then retrieve in normal way)
  - still need network location for case where no handset location and to help validate handset location

  (could be automatically filtered or could present both network and handset location to PSAP)

- As handset location technology evolves additional data can be expected – eg height information - and made available to PSAPs (space available in SMS message)

- In the longterm, as PSAPs become IP based and networks become IMS using SIP, then a SIP header could also start to be used to carry handset location information.
  (But……need to not hold up voice call, allow SIP end to end, with questions of coverage and reliability to understand. SMS still robust, reliable and present over widest coverage so likely to be most practical to use for several years….)

Summary

- Increased location precision - shorter time to locate person in need
- Fewer questions about location – reduced caller stress
- Faster response to patients with life-threatening conditions
- Reduced costs to Emergency Services – less questioning, less searching
- Not an App – sustainable, does not depend on end user, supplements standard GSM voice call wherever possible
- Minor changes to mobile infrastructure : no new technical standards, quick to implement
- Could be introduced in other countries : principle can be adapted to allow for different PSAP and Location Delivery models

Any Questions

- John Medland – BT999 Policy Manager

John.Medland@BT.com