

3GPP support for IP based Emergency Calls

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- Development of support for IP Based Emergency Calls has been ongoing in 3GPP since March 2003
- Development scope covers IP based emergency calls originated from 3GPP associated wireless networks and from ETSI TISPAN defined fixed broadband networks
- Development started with a Technical Report (3GPP TR 23.867) in 3GPP TSG SA2 which evaluated requirements and different solutions
- Development has now progressed to a design specification (stage 2 – 3GPP TS 23.167) in SA2 that is over 80% complete and associated IMS/SIP signaling enhancements in CT1 (stage 3 – 3GPP TS 24.229)
- This presentation focuses on the content of TS 23.167
- This specification (and others) are freely available at <ftp.3gpp.org>
- The presentation, though intended to be accurate, balanced and objective, contains the views of the author only and has not been seen or endorsed by 3GPP

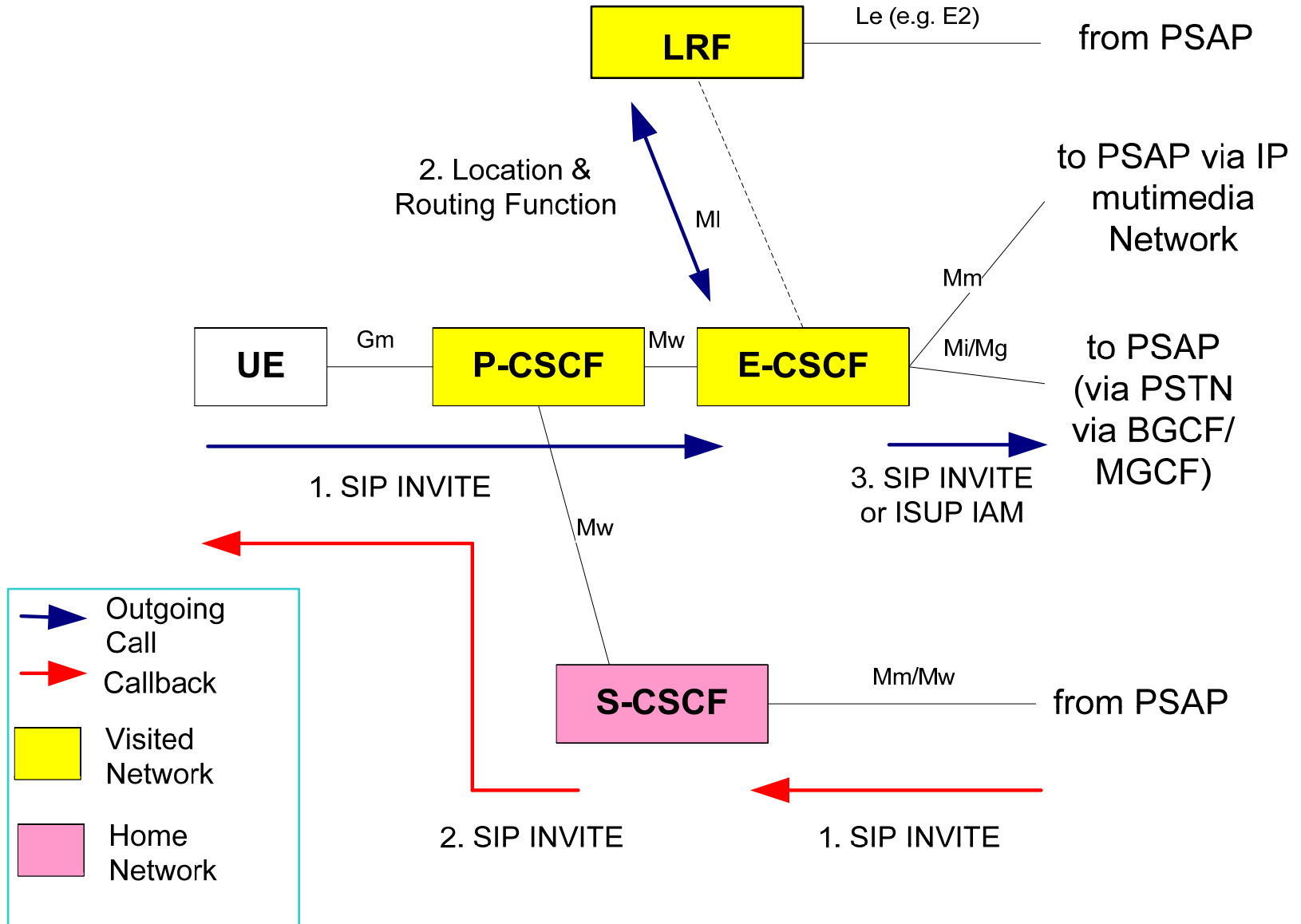
Abbreviations

3GPP	3rd Generation Partnership Project
BGCF	Breakout Gateway Control Function
CS	Circuit Switched
CSCF	Call Session Control Function
CT1	3GPP Core Network and Terminals TSG Working Group 1
E-CSCF	Emergency-CSCF
EMC	Emergency Services Call
ESQK	Emergency Service Query Key
GMLC	Gateway Mobile Location Center
IBCF	Interconnection Border Control Function
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Core Network Subsystem
IP-CAN	IP Connectivity Access Network
LRF	Location Retrieval Function
MGCF	Media Gateway Control Function
MGW	Media Gateway
P-CSCF	Proxy CSCF
PS	Packet Switched
RDF	Routing Determination Function
S-CSCF	Serving CSCF
SA2	3GPP Services and System Aspects TSG Working Group 2
TSG	Technical Specification Group
UE	User Equipment

Key Assumptions

- Use the CS domain for EMC if not specifically guided to use the PS domain
- Solution mostly independent of the access network type
- Support cellular access, fixed broadband, WLAN, nomadic access
- Support a variety of emergency SIP/TEL URIs (as in 3GPP TS 22.101)
- Prioritize an EMC
- UE normally detects an EMC but network must be able to detect also
- Support an unregistered (unauthenticated) UE where regulations allow
- Support is mostly in the visited (serving) network
- PSAP can be IP capable or PSTN legacy
- Support callback to a registered UE
- Support location provision to a PSAP
- Support a location query key (e.g. ESQK in the US)

Architectural Model

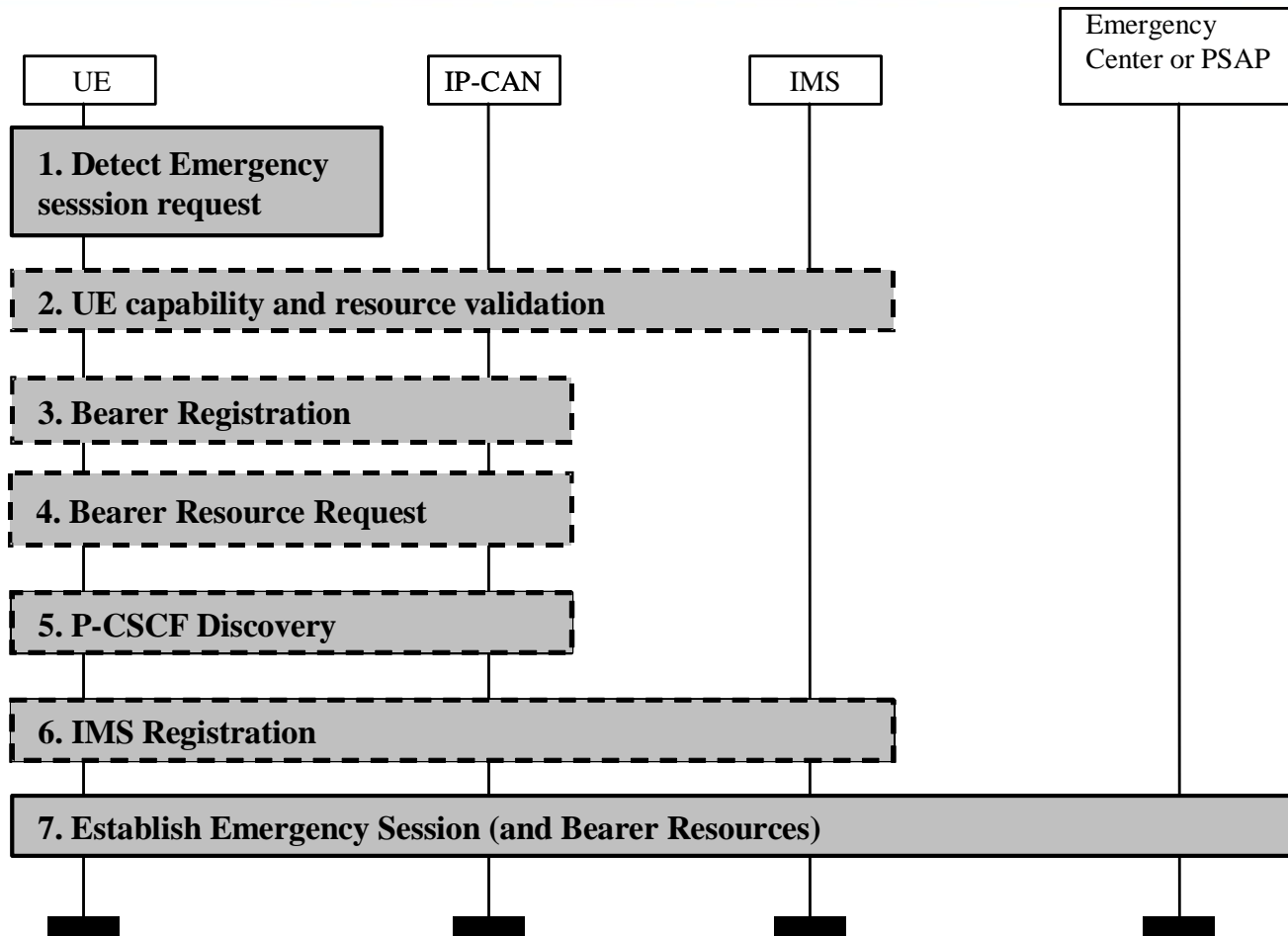


- Handle registration requests (with an emergency Public User Identifier) like any other registration request and forward the request to the IBCF or I-CSCF in the user's home network.
- Detect an emergency session establishment request.
- Reject/allow emergency requests unmarked by the UE
- Reject/allow anonymous emergency requests
 - Note that an unregistered UE would include an "anonymous user" indication and an EMC indication in the SIP INVITE
- Select the E-CSCF in the same network to handle the EMC
- Prioritize the EMC (implementation dependent)
- Validate any Tel URI provided by the UE
- Provide the Tel URI if aware of the Tel URI associated with the UE's emergency Public User Identifier (if the UE provides no Tel URI)

- Located in the visited network
- Performs specialized S-CSCF type functions
- Receive an EMC establishment request from a P-CSCF.
- Can query an LRF to retrieve location and/or routing information and determine the correct PSAP
- Route EMC establishment requests to the correct PSAP including anonymous EMC requests (e.g. unregistered UE)
- Routing and/or location retrieval functionality could also be integrated in the E-CSCF

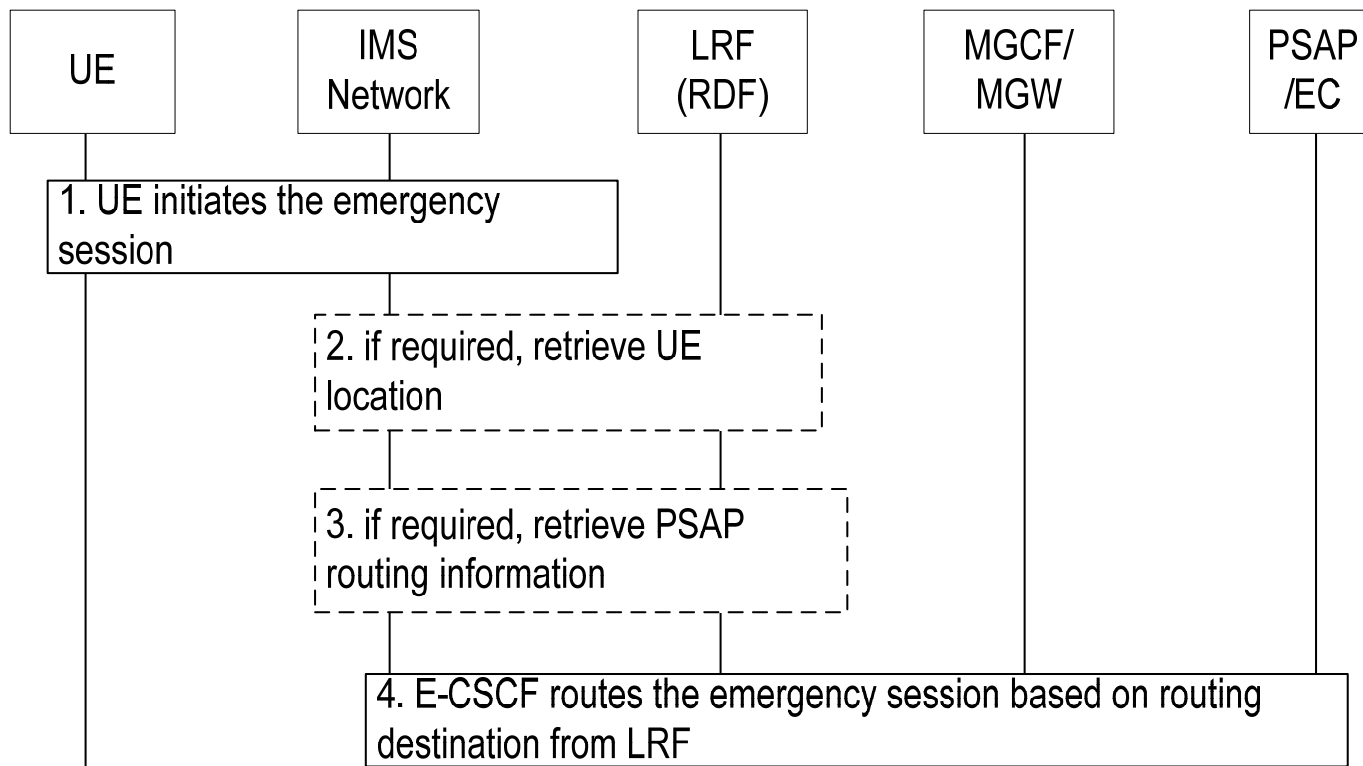
- Can support location retrieval and routing determination
- Can contain an RDF (routing determination function) and a location server (e.g. GMLC)
- The RDF provides the correct PSAP address to the E-CSCF (Tel URI or SIP URI)
- The RDF could also manage ESQK allocation in the US
- LRF may retrieve or use an interim location (for routing)
- LRF can be used for subsequent accurate location
 - LRF stores a record of the EMC
 - E-CSCF notifies the LRF when EMC is released
 - LRF provides correlation information to the E-CSCF for transfer to the PSAP in the EMC establishment request (e.g. an ESQK)
 - PSAP uses correlation information when requesting location directly from the LRF

EMC Establishment



- Step 6: Registration is in the home network – UE provides an Emergency Public User Identity
- Step 6 is skipped by a UE with insufficient credentials for authentication and may be skipped by a UE that is already IMS registered (e.g. if served by the home network)
- In step 7, the UE includes an emergency service indication and/or an emergency public user identity

EMC Establishment using the LRF

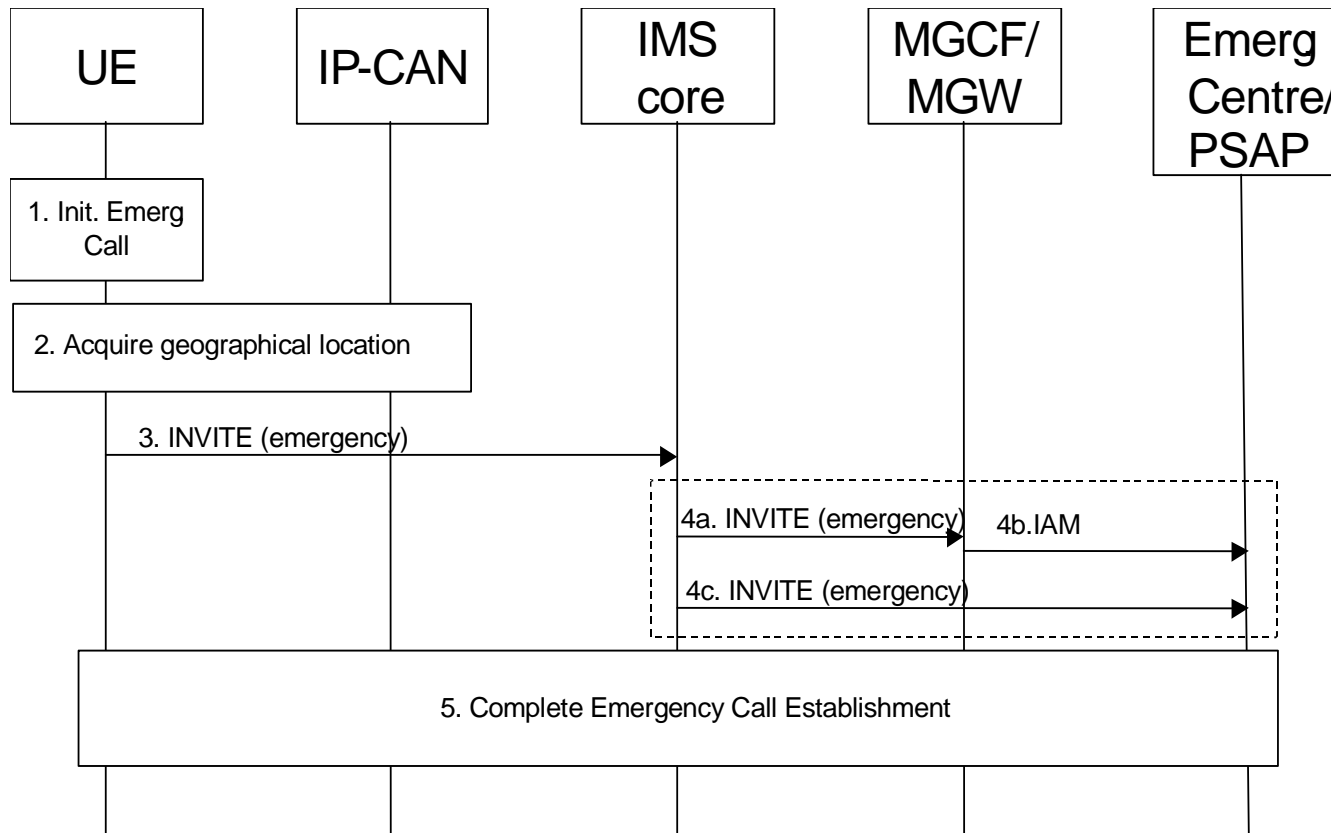


- Step 1 – SIP INVITE sent from UE to the P-CSCF and then E-CSCF
- Step 2 – E-CSCF may query LRF for location information
- Step 3 – LRF can invoke RDF to determine PSAP
- Step 4 – LRF returned information used to route the EMC

Emergency Services Registration

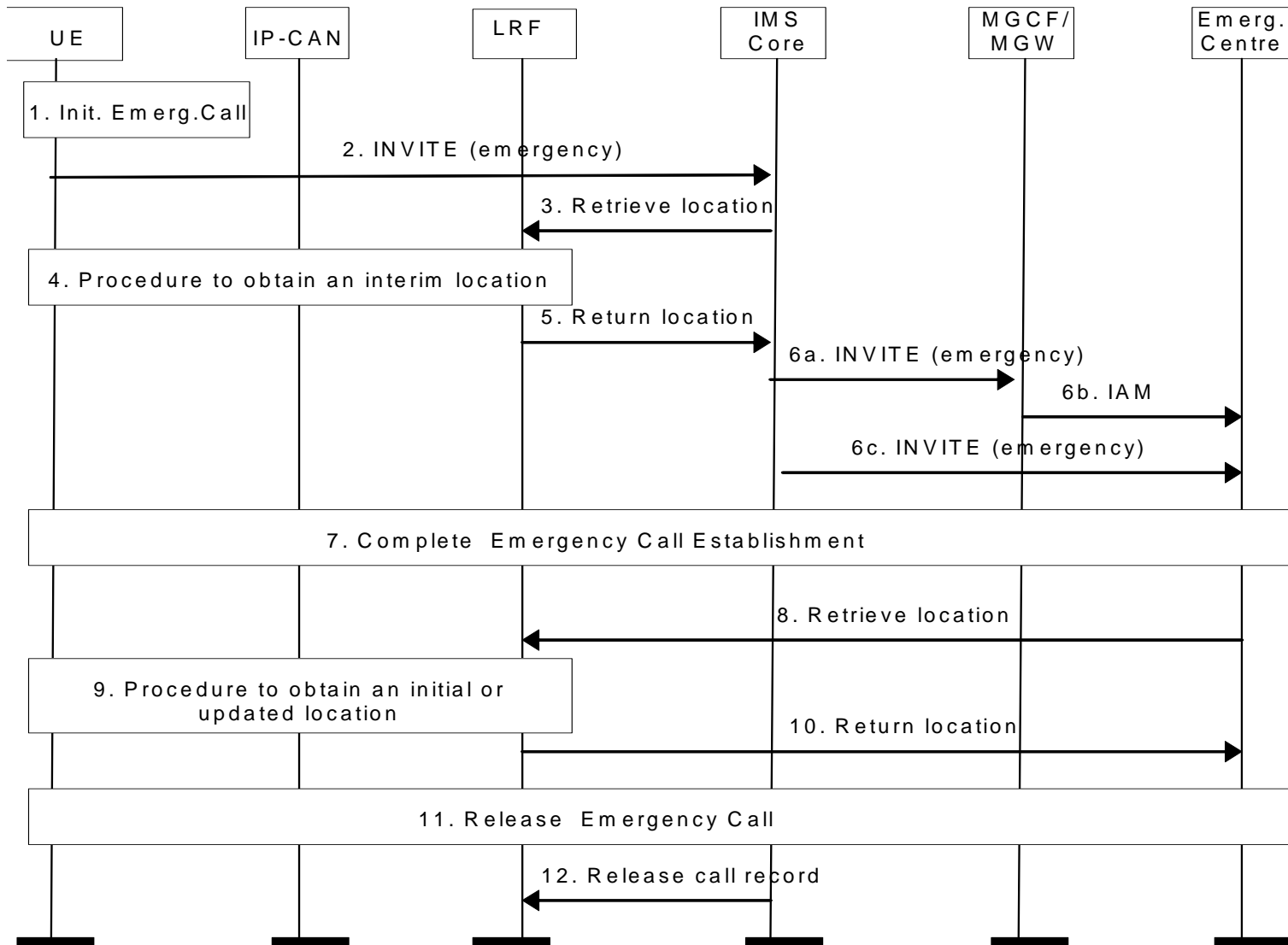
- Similar to but distinct from normal registration (e.g. both may occur)
- Required if the UE has sufficient credentials to authenticate with the IMS network and is not served by the home network
- UE inserts an emergency Public User Identifier in the registration request (format TBD)
- The Registration is sent to the Visited Network P-CSCF and then Home Network (e.g. S-CSCF)
- The main purposes are:
 - Authenticate the UE identity at the IMS level in the visited network
 - Obtain a verified callback address (SIP URI or Tel URI)
 - Ensure that callback via the home network will succeed
 - Enable the home network to suppress supplementary services on callback (e.g. call waiting)
 - Enable provision of EMC service to roaming users (including authentication and callback) where no normal roaming agreement exists between the visited and home networks
- But there are some issues
 - Must be completed before call origination can start (hence adds delay)
 - May not be needed in all cases (e.g. possibly if the UE has already registered via the P-CSCF)
 - Might occur in parallel with call origination (one suggestion at last SA2 meeting)
 - Might be avoided with a revised architectural model (another suggestion at the last SA2)

Location Retrieval by the UE



- Provides one option for location support and is the default for fixed broadband access
- Step 2 – UE obtains its own location if possible or obtains location from the IP-CAN (IP Connectivity Access Network) – e.g. using DHCP for fixed broadband access
- Step 3 – Location information included in the SIP INVITE (e.g. in a pidf-lo)
- Step 4 – Routing based on UE provided location

Location Retrieval by the IMS Core



- Note: both location procedures may be combined in a later version of 23.167

- Additional Impacts are being defined to support EMCs in different 3GPP Access Networks
- The impacts mainly concern obtaining IP connectivity and support for unregistered UEs
- The impacted access networks comprise:
 - General Packet Radio Service (GPRS) – 3GPP TS 23.060
 - Interworking WLAN (I-WLAN) – 3GPP TS 23.234
 - Fixed Broadband Access in the EU (TISPAN)
- Compatibility with the NENA i2 solution is also being progressed

Ongoing Issues

- Ongoing issues reflected in contributions to the last SA2 meeting (August 28-September 1) are summarized here
- Emergency Registration Procedure optimization or elimination
- How best to support Voice Call Continuity (VCC) following handover between different access types
- Support of privacy in some world regions
- Restricting IP access – e.g. for unregistered users
- Improving compatibility with NENA and IETF solutions
- More precise definition of the E-CSCF to LRF interface
- GPRS and I-WLAN access specific impacts
- The associated contributions and meeting report are available at:

ftp://ftp.3gpp.org/tsg_sa/WG2_Arch/TSGS2_54_Sophia_Antipolis/