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Date:	3rd April 2013
Title:	TRAI Consultation Paper on "Universal Single Number Based Integrated Emergency Communication and Response System"
To:	Shri. Sanjeev Banzal, Advisor (Networks, Spectrum and Licensing), TRAI
CC:	
Source:	GISFI
Attachments	GISFI's response to TRAI Consultation Paper on "Universal Single Number Based Integrated Emergency Communication and Response System". Document No: GISFI_CSeON_201304383

Dear Shri Sanjeev Banzal,

On behalf of Global ICT Standardisation Forum for India (GISFI), I take this opportunity to thank TRAI, through you, for taking up an important subject for suitable definition, early implementation and the necessary regulation. GISFI, as country's ICT standardization organization is currently studying this topic of national importance under the Technical Working Group on "Cloud Computing & Service Oriented Networks (CSeON)". Based on our on-going study and standardization exercise on Emergency Telecommunication Services, we submit our response to some of the key aspects of the consultation paper. Our response primarily includes standardization perspective on the subject as currently being addressed by global standardization organizations and what we think relevant in Indian perspective that should be taken up for standardization in India. We have also presented GISFI opinion on some of the aspect of the TRAI consultation paper.

Our response to the TRAI consultation paper is enclosed herewith.

I also take this opportunity to inform TRAI that GISFI has achieved significant maturity in developing standards and defining the standardization approach in Indian perspective ensuring alignment with global initiatives with established close collaboration with other global standardization organizations. We have a firm work-plan and completed several India relevant Technical Reports and Technical Specifications that sets up the theme of our immediate and long term ICT standardization activity in India and will prove to be a key enabler for Indias' ICT transformation delivering various applications and services at large. Our standardization activities are organized in Technical Working Groups on Future Radio Network(FRN), Internet of Things(IoT), Green ICT(GICT), Security and Privacy(S&P), Cloud and Service Oriented Network (CSeON), Special Interest Group (SIG) and Spectrum.

We believe that many of our on-going standardization activities are aligned with that of TRAI plans and we offer our association to supplement your studies at pre-consultation stage or in establishing / establishing needs for developing national standards on Information and Communication Technology (ICT).

Sincerely,

Krishna Sirohi
GISFI Standards Committee Chairman

Enclosure: Response to the TRAI consultation paper on Universal Single Number Based Integrated Emergency Communication and Response System

Date:	5th April 2013
Title:	Response to the TRAI Consultation Paper on "Universal Single Number Based Integrated Emergency Communication and Response System" Consultation Paper No: 3/2013
To:	Shri. Sanjeev Banzal, Advisor (Networks, Spectrum and Licensing), TRAI
CC:	
Source:	GISFI
Document #	GISFI Document No: GISFI_CSeON_201304383

Global ICT Standardisation Forum for India (GISFI), takes this opportunity to thank TRAI, for taking up an important subject for suitable definition, early implementation and the necessary regulation. GISFI, as country's ICT standardization organization is currently studying this topic of national importance under the Technical Working Group on "Cloud Computing & Service Oriented Networks (CSeON)". Based on its on-going study and standardization exercise on Emergency Telecommunication Services, the response to some of the key aspects of the consultation paper is submitted below. Our response primarily includes standardization perspective on the subject as currently being addressed by global standardization organizations and what we think relevant in Indian perspective that should be taken up for standardization in India. We have also presented GISFI opinion on some of the aspect of the TRAI consultation paper. GISFI calls upon other stakeholder for close cooperation to evolve timely and optimal technical solution for the prevailing issues.

The point-wise response to the questions has been presented below:

4.1 What are the types of emergency services that should be made available through single emergency number?

Reply:

Background:

As per the CMTS license reproduced in section 1.12 of the consultation paper "*Emergency service means an emergency of any kind, including any circumstances whatever resulting from major accidents, natural disasters and incidents involving toxic or radio-active materials and emergency services in respect of any locality means the relevant public, police, fire, ambulance and coast guard services for that locality*".

As per the UAS license reproduced in section 1.13 of the consultation paper "*the licensee shall provide independently or through mutually agreed commercial agreements with other service providers, all public utility services including TOLL FREE services such as police, fire, ambulance, railways/road/Air accident enquiry, police control, disaster management etc. While providing emergency services such as police, fire, ambulance etc. it shall be delivered to the control room of concerned authority for the area from where call is originated*".

Response:

As evident from the above description, emergency situations require services delivered to the affected people by public, police, fire, ambulance and coast guard services for that locality. While emergencies affecting individual(s) are mostly responded by these service providers on request; emergency situations arising from natural disasters, nuclear/chemical/biological accidents, outbreak of war are best dealt by public warning systems.

Further the offered emergency services may also include the following:

a. Emergency service cell of the cooking gas provider [LPG cylinders, piped gas] on gas leakage
b. Control rooms of Indian Railways, State Transport Corporations, and Airports.
c. Control rooms of National Disaster Management Authority (NDMA).

These may help to avert or manage potential emergencies which are best dealt by trained professionals belonging to the above organizations.

In the context of emergency telecommunication services, there are mainly four scenarios for services:

a. Alerting civilians (communication from authorities to public)
b. Alerting authorities (communication from public to authorities)
c. Communication between authorities
d. Communication between civilians

However, in the present context of the consultation paper the first two categories listed above i.e; communication from authorities to public and communication from public to authorities are recommended to be included within the scope of service delivered through single emergency number.

For the purpose of public warning systems, the communication from authorities to public needs to be delivered through a predefined emergency number, so that the people in distress recognize and trust the source of the warning or alert. This would help deal with the problem of intentional or mischievous spread of rumors or incorrect information. This information may be delivered through standards based technologies such as the Cell Broadcast System (CBS), Short Messaging Service (SMS) on cellular networks, E-Mail and other broadcast or multicast communication systems.

Communication between civilians can be hampered during large scale emergencies such as natural disasters. In such events, the citizens require some means to communicate with their close ones. It is essential to explore means to deliver such services such as

common message portal or voice message gateways where people can leave message for their kin. Also, recent world events have shown the impact of social network media during emergency situations such as terror attacks. It would be appropriate to consider alternate means of emergency service delivery through platforms such as social networking.

Summary of GISFI Recommendations:

1. Include the following services within the purview of emergency services that should be made available through single emergency number:
a. Emergency service cell of the cooking gas provider [LPG cylinders, piped gas] on gas leakage
b. Control rooms of Indian Railways, State Transport Corporations, and Airports
c. Control rooms of National Disaster Management Authority (NDMA)
2. Communication from authorities to public and communication from public to authorities are recommended to be included within the scope of service delivered through single emergency number.
3. Public warning services: The communication from authorities to public needs to be delivered through a predefined emergency number. Especially in disaster conditions, when large volume of emergency calls are made, the public warning and alert services can deliver common information to all affected people.
4. Need to explore alternate means of service delivery for communication between civilians such as message gateways for text and voice, social networking interfaces over the Internet etc.

GISFI Standardisation Activity:

GISFI working group on Cloud and Service Oriented Networks (CSeON) is currently working to define the Emergency Telecommunication Services framework that would address the issues in service delivery through standardized interfaces.

4.2 What universal number (e.g. 100,108 etc) should be assigned for the integrated emergency communication and response system in India?

Reply:

Background:

In India, the numbers “100” and “108” have become synonymous with emergency response. Though “100” has been primarily a police emergency number, rapid modernization of police network along with the implementation of the new DIAL 100 network has made “100” a gateway to hospital and fire emergencies as well. At the same time, “108” Emergency service implemented in 12 states in India have made the number very accessible to common citizens to approach medical emergency response providers.

Response:

Thus, it is recommended that one of the above two numbers itself be designated as the universal number for IECS services. Any new number will take time to be acceptable by the citizens of India. Also, these two numbers belong to Level ‘1’ series in the National Numbering Plan 2003. They shall not be used as first digit for telephone exchange codes in basic telephony services. Level ‘1’ is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Further, the choice between the number “100” and “108” depends on the following issues:

1. National numbering plan:

Both “100” and “108” are Category 1 services: These are the mandatory services to be provided by all the Access Providers.

(i) According to the national number plan, 100 is categorized as Restricted. These are the services to be accessible at least within local area.

(ii) According to the national number plan, 108 is categorized as Unrestricted. These are the services, which shall be accessible from anywhere, national or international.

Thus, with the view of accessibility, 108 is more reachable from the common citizens on any of the access networks anywhere in India.

2. Uniqueness of the number:

The number “100” is used for emergency services in India, Israel, Nepal, Belgium, Greece, Argentina and Peru.

The number “108” is currently not utilized by any country as their emergency number.

Though, there is no international guideline of not using the emergency number used by another country, it may be a preferred practice to utilize a number which is unused by any other country for emergency purposes. This is especially because in future more Internet Calling Interfaces may be provided access to dial Emergency Telephone numbers. If there is another country with the same Emergency Telephone number as the number designated as universal emergency access number in India, it may potentially lead to misdialing and calls meant for another service terminating at the PSAP in India.

3. Implementation challenges:

The number “100” has been used by the Police Dept. from a long period and is serving the citizens for crime related emergencies. Implementation of a nation-wide single number IECS system will take time and may not be rolled out simultaneously in all places. In this intermediate period, if 100 is utilized for other emergency services such as medical/fire/natural disasters etc; it may cause overhead and deficiency of service rendered to the needy citizens.

The number “108” on the other had is currently dedicated for emergency medical services in 12 Indian states. Additionally there is an existing PSAP like infrastructure for handling of emergency calls and dispatching to other departments like the Police if necessary. So phase wise rolling out of service utilizing the same number (“108”) may not cause disruption of emergency services to citizens.

Summary of GISFI Recommendations:

1. Based on the above described three points, we recommend the number “108” to be utilized for Universal number for IECS in India.

GISFI Standardisation Activity:

1. GISFI CSeON WG is looking into issues in supporting calls originating from Internet or through VoIP gateways to the PSAPs. Some of the issues include location, establishment of caller identity, routing and security challenges.

4.3 Should there be primary / secondary access numbers defined for the integrated emergency communication and response system in India? If yes, what should these numbers be?

Reply:

Background:

As mentioned in the reply to Question 4.2; we recommend use of the number "108" as the Primary emergency number.
However, as mentioned in the consultation paper, the ITU Recommendation E.161.1
"*A Member State that is planning to introduce a second alternative emergency number could use either 112 or 911, or both, which should be routed to the existing emergency number. A second alternative emergency number facilitates for example emergency calling by travelers visiting the country.*"

Response:

India as a member state of the ITU, may support 112 and/or 911 as secondary alternative emergency number. This would not only facilitate foreign travelers to India; but also provide gateway for GSM phones in Emergency Mode to make calls to the proposed IECS network in India.

However, the following issues need due consideration:
(i) Numbers starting 911xxxxxxx are valid mobile subscriber numbers in Indian network. Dialing such numbers with more time gap between key presses may lead to routing this call to the PSAP. There is a need to consider this issue and bring out necessary regulatory amendment for not to allocate this number series to customers in India if 911 is supported as a secondary emergency number.
(ii) Apart from 911 and/or 112, there would be need to support the existing emergency numbers like 100/101/102 as secondary numbers till a nationwide unified IECS system starts operation.

Summary of GISFI Recommendations:

1. The primary emergency response number should be 108. The IECS network should support appropriate routing of secondary numbers such as 911, 112, other additional international emergency response numbers along with the currently used emergency numbers in India such as 100/101/102 to the nearest PSAP.
2. Appropriate technical solutions should be established that distinguish between genuine calls to the emergency PSAP in India and accidental calls due to misdialing a number prefixed with the emergency response number of other countries.

GISFI Standardisation Activity:

1. GISFI CSeON WG is studying the national numbering plan 2003 and issues related to supporting secondary emergency numbers are within the scope of study.

4.4 For implementing single number based Integrated Emergency Communication and Response System in India, should the database with information of telephone users be maintained by the individual service providers or should there be a centralized database?

Reply:

Although both the approach of keeping the database of the subscriber either with respective Service Providers or with centralized, there are few positive aspects if it is kept centralized. The response time for any data base query in Emergency Response System is absolutely critical. In case it is kept distributed with the Service Providers, the same may get compromised, unless there are very well defined response time performance criteria and a strict regulation to ensure compliance. If this database is kept centralized, system could be designed such that the database update is not operationally critical. Having centralized database and rightly updated from all the telecom network, gives tremendous strategic advantage provided it kept under safe mechanism and esure no business disadvantage to the service provider and no loss of individual privacy to lawfully unauthorized person.

From the perspective of standards, US Emergency service standards (NENA) has defined a role called as DBMSP (DataBase Management System Provider) and associated procedures[1] with managing data along with Telecom Service Providers. Further study is required for the feasibility of such standards in Indian telecom scenario.

GISFI is also interested to carry out the detailed study of potential advantages and the operational efficiency in alternate scenarios when the database is kept distributed within the control of respective Service Providers.

[1] NENA URL: http://www.nena.org/general/custom.asp?page=911DataManagement

4.5 In case of centralized database which agency(one of the designated telecom service provider, a Central Government department or a designated third party) should be responsible for maintaining the database?

Reply:

DoT may keep it under its direct control and responsibility. It could also ask BSNL, NIC to carry our safe and required operations and maintenance of this database. Any external outsourcing organization in private sector may be trusted with well defined matrix of role, responsibility and penalties on non-compliance or operating breach. GISFI will be interested in defining the technical and the operational framework to address this critical aspect.

4.6 What are the technical issues involved in transfer of location of a mobile user in real time?

Reply:

Background:
The technical standards addressing the location identification and transfer in 3GPP mobile communication systems like GSM/GPRS, UMTS and LTE is 3GPP 23.271[2].
Location Service (LCS) specifies all the necessary network elements and entity, their functionalities, interfaces, as well as communication messages, due to implementation of the positioning functionality in a cellular network. The position information shall be reported in standard, i.e. geographical co-ordinates, together with the time-of-day and the estimated errors (uncertainty) of the location of the user equipment (UE) according to specification TS 23.032[3]. The LCS feature utilizes one or more positioning methods in order to determine the location of user equipment. The positioning methods for UMTS, GSM/GPRS are described in TS 25.305[4] and TS 43.059[5] respectively. The LCS Server provides the location service capabilities but the mechanism by which location is reported to an emergency service provider is not standardized within 3GPP.

Response:
Determining the position of a UE involves two main steps:
(i) Radio signal measurements; and (ii) Position estimate computation based on the measurements.
For India, it is recommended that the positioning be done through the network which doesn't require handset specific support. This is due to the low adaptation of enhanced location support features in handsets such as the GPS.

One or more LCS Clients may access a Location Server via its Le interface. Location Servers, resident in the same or different networks, may communicate with each other, indirectly, via the Lg interface to their associated MSC/SGSNs. Optionally, the Lr interface, as specified for direct GMLC to GMLC messaging, may be used for this purpose.

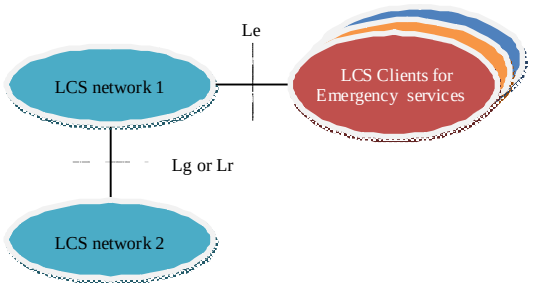

Figure 1 : Generalized LCS Access Interfaces and Reference Points

Response Time is one of the negotiable QoS parameters for Emergency LCS services. For Emergency Services, there may be no requirement to support negotiation of response time. The network shall then provide a response as quickly as possible with minimum delay if dedicated LCS server for Emergency services is provisioned. The Gateway Mobile Location Centre (GMLC) contains functionality required to support LCS. A GMLC is the first node an external LCS client accesses in a PLMN (i.e. the Le reference point is supported by the GMLC).
Network Induced Location Request (NI-LR) applicable to 3GPP cellular standards[6] reproduced for reference.

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[2] 3GPP TS 23.271: Technical Specification Group Services and System Aspects; Functional stage 2 description of Location Services (LCS).
[3] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[4] 3GPP TS 25.305: "Stage 2 functional specification of UE positioning in UTRAN".

[5] 3GPP TS 43.059: "Functional stage 2 description of Location Services (LCS) in GERAN".
[6] 3GPP TS 23.271: Technical Specification Group Services and System Aspects; Functional stage 2 description of Location Services (LCS).

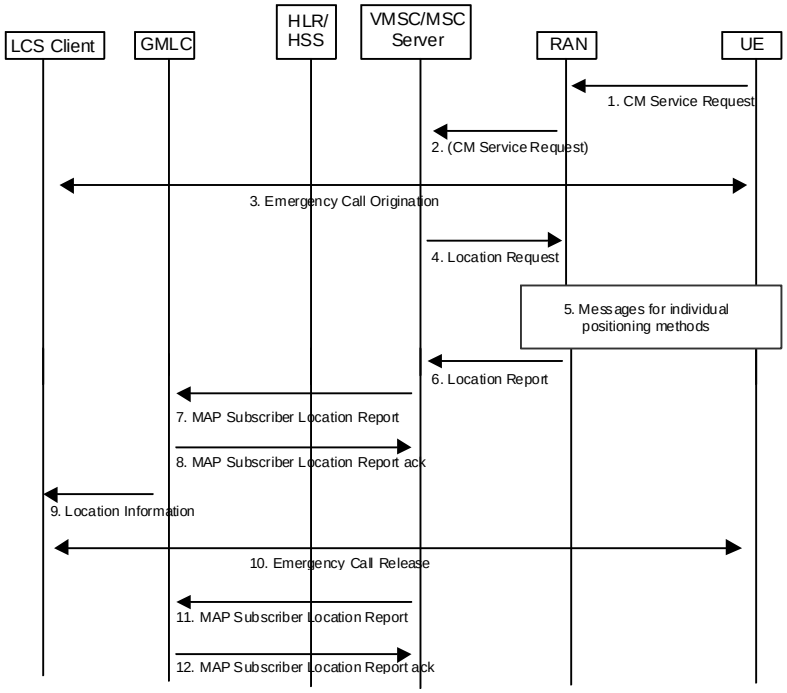

Figure 2 : Generalized call flow to obtain real-time location information from UE during emergency call

Overview of the call flow:

1) An initially idle UE requests radio connection setup indicating a request for an Emergency Service call to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network.

3) The emergency call procedure is applied. The VMSC/MSC server determines based on the serving cell the appropriate emergency services client.

4) At any time after step 2, the VMSC/MSC server may initiate procedures to obtain the UE's location and optionally, velocity. These procedures may run in parallel with the emergency call origination. The VMSC/MSC server sends a Location Request message to RAN associated with the UE's current location area. This message includes the QoS parameters required for an emergency call.

5) RAN determines the positioning method and initiates the particular message sequence for this method.

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server in a Location Report.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6 including the indication received from RAN whether the obtained location estimate satisfies the requested accuracy or not, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE, the information about the positioning method used and the serving cell identity or SAI of the UE.

8) The GMLC acknowledges receipt of the location information. The GMLC shall store the location information for later retrieval by the emergency services LCS client.

9) The GMLC may optionally forward the information received in step 8 to the emergency services LCS client. The GMLC may also record charging information. The client is expected to obtain the location information by requesting it from the GMLC.

10) At some later time, the emergency services call is released.

11) The MSC/MSC server sends another MAP Subscriber Location Report to the GMLC. This message may include the same parameters as before except that there is no position estimate and an indication of emergency call termination is included.

12) The GMLC acknowledges the MSC/MSC server notification and may then delete all information previously stored for the emergency call per national regulation.

It should be noted that, many times the UE may be moving rapidly and may pass through one or more radio cells belonging to one or more network operators. Hence the location of a UE may need updating in real time during the emergency call period.

The protocol operation on Le interface between the LCS clients and the GMLC (Figure 1) has not defined by 3GPP as part of the cellular specifications. However, other standards like those defined by Open Mobile Alliance[7] Mobile Location Protocol (MLP) can be applied on this interface.

[7] Open Mobile Alliance OMA-TS-MLP-V3_2-20110719-A: "Mobile Location Protocol 3.2", 2011

(i) If the Emergency Operator at the PSAP decides to invoke a location request after having received an Emergency Call from a digital PLMN, the Emergency Location Immediate Service defined in MLP is used. This interface operates over the ISUP protocol.
(ii) The first part of the Global Title (identity of SCCP node) identifying the originating mobile network will be used by the IECS network for deciding which network to send the location request to.

Three kinds of location query over MLP are possible on the Le interface[8] and are governed by national standards and regulations.
A. Ordinary Positioning [Support for HLR request]

- A MLP "Emergency Location Immediate Request" is sent from the LCS client of the IECS network to the LCS server in the PLMN. MSISDN and VMSC-identity are transferred.
- The MAP message "Send Routing Information for Location" containing MSISDN is sent to the HLR of the caller.
- The HLR answers by sending IMSI and the VMSC-identity. The HLR must recognize the MSISDN.
- The MAP message "Provide Subscriber Location" is sent to the serving VMSC. The calling terminal is addressed by the calling subscriber IMSI.
- The VMSC answers by sending the MAP message "Provide Subscriber Location ACK" to the LCS server.
- The LCS server sends the MLP message "Emergency Location Immediate answer" to the location client

B. Exclusive Emergency Positioning [Excluding the HLR request]

- A MLP "Emergency Location Immediate Request" is sent from the LCS client of the IECS network to the LCS server in the PLMN. MSISDN and VMSC address are transferred.
- The MAP message "Provide Subscriber Location" is sent directly to the serving VMSC.
- The VMSC answers by sending the MAP message "Provide Subscriber Location ack." to the LCS server.
- The LCS server sends the MLP message "Emergency Location Immediate Answer" to the LCS client.

C. Cell-ID based location request [When UE positioning techniques are not implemented]

- A MLP "Emergency Location Immediate Request" is sent from the LCS client of the IECS to the cell-identity database in the PLMN. MSISDN and cell-identity are transferred.
- The cell-identity database converts the cell-identity to relevant coordinates and answers by sending the MLP message "Emergency Location Immediate Answer" to the LCS client.

Summary of GISFI Recommendations:
1. There are two aspects of transfer of location of a mobile user in real time in cellular networks:
a. Implementation of positioning technology within the cellular network governed by appropriate standards.
b. Standardize and implement the protocols such as MLP[9] for obtaining the location information from the GMLC through appropriate mechanism. Appropriate query and response method over Le interface may need to be standardized to support Cell ID information initially.

GISFI Standardisation Activity:
1. GISFI CSeON WG is working on identifying the relevant international standards that govern the transfer of location information in real-time. Certain gaps are identified in this area with respect to the Indian network scenario and requirements. Further, the WG plans to address these requirements through appropriate technical standards and recommendations.

Abbreviations:

CM	Connection Management
GMLC	Gateway MLC
IMEI	International Mobile Equipment Identifier
IMSI	International Mobile Subscriber Identifier
ISUP	ISDN User Part
MAP	Mobile Application Part
MLC	Mobile Location Center
MSC	Mobile Switching Center
MSISDN	Mobile Subscriber Integrated Services Digital Network-Number

[8] Swedish Standard SS636394, "Positioning of Mobile Terminals at Emergency Calls", A Swedish National Standard for procedures and interfaces for the support of positioning of mobile terminals at Emergency Calls.

[9] Swedish Standard SS636394, "Positioning of Mobile Terminals at Emergency Calls", A Swedish National Standard for procedures and interfaces for the support of positioning of mobile terminals at Emergency Calls.

PLMN	Public Land Mobile Network
RAN	Radio Access Network
SAI	Service Area Identity
SGSN	Serving GPRS Support Node
SS7	Signaling System Number 7
SCCP	SS7 Connection Control Part
VMSC	Visited MSC

4.7 What accuracy should be mandated for the location information to be provided by the mobile service provider?

Reply:

GISFI appreciate the need for defining stringent locational accuracy requirement in Indian Telecom requirement. We acknowledge that the location accuracy requirement in 3GPP are less stringent than the one required in Indian Telecom Networks. GISFI plans to do feasible study and watch potential technology development to evolve suitable methods to build network capability to determine user location to the accuracy level as recommended by DoT. This enhance network capability will improve operational efficiency of the Emergency Communication and Response System. It will additionally improve the ability to localize unsocial elements as well as provide huge amount of business attractive location based commercial services with higher locational accuracy.

4.8 Should emergency number access be allowed from inactive SIMs or handsets without SIMs? Please justify your answer.

Reply:

Background:

There are three main issues with respect to allowing emergency calls from inactive SIMs or handsets without SIMs:

i. Experiences of emergency service operators in countries where SIM less calls were allowed was that a significant proportion of SIM-less calls are hoax, nuisance, malicious, obscene and predatory calls taking advantage of the anonymity associated with SIM-less mobile phones[10]. This also includes the challenge of non-availability of a Call Back Number (CBN) to the PSAP to verify the authenticity and location of the caller.

ii. Determination of UE identity (since SIM identity is not available) through appropriate mechanism in cellular network during the emergency calls. This includes the challenge of establishing the location information during the emergency call made without a valid SIM card.

iii. Support for emergency calls from phones having inactive or barred SIM cards.

Response:

i. The first challenge outlined above is well recognized by emergency service authorities across the globe (Chapter 2 of consultation paper). The challenge is more a legal and regulatory issue than a technical one. However, solutions to screen an incoming call such as by asking the caller to provide additional inputs (key presses) through an IVRS, educating the public on this issue and legal provisions for punishments in case hoax calls are made are some of the ways to discourage the false calls.

The second challenge is related to the non-availability of CBN to the PSAP authorities to verify the authenticity and location of the caller is a very important one. There are standard compatible technical solutions available for IP Multimedia Subsystem (IMS) compatible core network environments to allot temporary CBNs. However, these solutions may not be available for all legacy networks.

ii. 3GPP TS 22.071 on LCS[11] states "*For Emergency Services (where required by local regulatory requirements), positioning shall be supported for all UEs (i.e. including legacy UEs) where coverage is provided, and also UEs without a SIM/USIM. In such a case, the location of the caller may be determined using the identity associated with the Mobile Equipment (ME) involved in the call.*"

Thus the location identity is linked with the IMEI equipment identifier. However, this leads to an associated issue of availability of a Centralized Equipment Identity Register (CEIR) for the nation, where details of each active mobile handset in the multiple cellular networks is stored. Since, in India the handsets are not locked with the operator network, there is a need of considerable effort to establish such a centralized database.

iii. This issue is a regulatory challenge. Not only is this issue pertinent to Indian citizens with inactive SIM cards, but also can affect overseas visitors to India. According to DoT's guidelines[12], any mobile connection issued to a foreigner should not have validity beyond that of a visitor's visa and to a maximum period of three months. In such situations, the visitor may not have access to mobile phone with active and verifiable SIM card during any possible emergency situation.

Summary of GISFI Recommendations:

1. Emergency calls may be allowed from handsets without SIMs. This may however require additional support from the network to determine the position and equipment identity (which may be linked to user of the equipment) in the current networks.
2. Emergency calls may be allowed from handsets having inactive SIMs. This is to ensure that the stringent measures to reduce the burden of hoax or unintentional calls do not delay the delivery of emergency services to a needy citizen or even an overseas visitor.
3. GISFI understand that the challenges of allowing SIM-less or using inactive SIM for making Emergency communication will be handled adequately with the use of higher localization accuracy, alternate but enhanced mechanism for establishing identity , prompt response in the emergency situation and the associated strict legislation. Once these issues are addressed to a reasonable extent, it will open a huge opportunity to develop innovative personal safety enhancement devices to help in the prevailing not-so-safe environment.

GISFI Standardisation Activity:

1. GISFI is studying the issues (security, location and identity establishment) involved in supporting emergency calls from mobile phones having no SIM and inactive SIM cards.

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[10] ACMA- Draft Amendment to the Telecommunications (Emergency Call Service) Determination 2002 – blocking of SIM-less calls, URL : http://www.acma.gov.au/webwr/consumer_info/sim-less_consultation_paper_oct07.doc

[11] 3GPP TS 22.071: Technical Specification Group Services and System Aspects; Location Services (LCS); Service description; Stage 1.

[12] Instructions on verification of new mobile subscribers (Prepaid and Postpaid) URL: http://www.dot.gov.in/as/2012/DOC181012.pdf

4.9 Should emergency access be allowed through SMS or email or data based calls? If yes, what will be the challenges in its implementation?
Reply:

Background:
There are three issues in the above described question:
1. Emergency access through SMS
2. Emergency access through Email
3. Emergency access through data based calls.

Response:
As outlined above, there are three kinds of possible text mode interfaces to the emergency PSAP. Each of the above three has special requirements and associated challenges that need to be addressed.

1. Emergency access through SMS
SMS messages are sent to a short message service center (SMSC), which provides a "store and forward" mechanism. It attempts to send messages to the SMSC's recipients. If a recipient is not reachable, the SMSC queues the message for later retry. Thus, the delivery of the message is not in real-time thereby making it an unreliable mechanism to convey emergency situations. Also, if location information cannot be known at the PSAP along with the SMS, then it is not possible to provide emergency services.
However, especially for the speech and hearing impaired community, SMS could be the only accessible solution to reach the PSAP. Thus it is recommended that SMS based emergency access be provided to registered subscribers with hearing or speech disability. Further the following issues need to be addressed:
i. SMS to PSAP must be capable of supporting delivery of the message content to both in a text format that is specified by the PSAP. The translation of the SMS message to the format specified by the receiving PSAP is not feasible for providing emergency services on a nationwide basis.
ii. Coarse location information (e.g., cell site location) is available for the determination of appropriate PSAP for routing of the text message content. However, exact location of the needy person should be communicated in the text message.
iii. It is possible that one text SMS may not convey all required information. In that case, the system should support session continuity for exchange of SMS between the PSAP operator and the person in emergency.

2. Emergency access through Email
Email systems are based on a store-and-forward model. Email servers accept, forward, deliver and store messages. The user needs to connect to an email server through an internet capable device, for as long as it takes to send or receive messages. The PSAP would obtain the message in a PULL mode. The service is more reliable than the SMS; however the latency is unpredictable. Also, the location information is not transferred in the email system. Hence, it is not recommended to use Email as a way to access Emergency services.

However, Email is a very well accepted means of personal communication today and also a very reliable means of information dissemination. Especially in the aftermath of disaster situations etc, advisories from authorities can be sent to people in distress as well as to people and authorities in the vicinity of the disaster regions. This aspect of Email communication to provide Emergency related service needs to be considered in more detail.

3. Emergency access through data based calls.
The issue of supporting data calls or session mode text exchange services as a method to deliver Emergency services is being considered at various global standardisation bodies. More specifically, it is termed the Non-Voice Emergency Services (NOVES). 3GPP TR 22.871 Technical Specification Group Services and System Aspects; Study on Non-Voice Emergency Services address the requirements of such data based services. It provides the following use cases for emergency access through data calls –

Use case 1 Session Based Text Message to Emergency Services: A wireless services user with a NOVES device can use Non-Voice Emergency Services to send a message to the PSAP.

Use case 2 Multimedia Telephony communications with real time text to Emergency services: A hearing impaired user with a mobile device with Real Time Text capability can use Non-Voice Emergency Services to call the PSAP for a health problem.

Use case 3 Emergency Communication to PSAP with the Addition of Media: A NOVES call establishes a voice communication with a PSAP to report an emergency situation. The communication includes the transmission of media of an emergency situation to the PSAP using a NOVES device.

Use case 4 Delayed Transmission of Media of an Emergency Situation Associated with Voice Communications to a PSAP: A wireless services user with a NOVES device in an emergency situation can use both Voice Emergency Service and Non-Voice Emergency Service to the PSAP to exactly describe the fire situation in order for the PSAP to take proper actions.

Use case 5 Transmission of Media in a Non-Voice Interaction with a PSAP: Reporting details of an emergency situation where no voice communications is initiated but media of the emergency site is transmitted to the PSAP using a NOVES device.

Use case 6 Communication with PSAP when voice is inappropriate: In hostage situation where the use of a Voice call would endanger the person, one may use Non-Voice Emergency Services to send a message to the PSAP.

Use case 7 Menu / Short Cut service: In an Emergency situation where time or situation does not allow the person to make a voice call or type a message, one may initiate a NOVES Emergency Call (e.g. by use of a menu / short cut as described in 3GPP TS 22.101 Service aspects; Service principles
), with a user pre defined message which may also have location information provided.

Use case 8 Texting application communications to emergency services with one-way RTT: A NOVES user with a mobile device having Real Time Text capability in a potentially dangerous situation can put her phone into silent mode and initiates a Text Messaging session to the PSAP.

Use case 9. Differentiating Emergency Experiences and Adding Media to a Text-Initiated Emergency Call: During an emergency call initiated by the user as text, either the PSAP call taker or the user may wish to add additional media, such as an audio or video stream. For example, based on a text description of the situation, a call taker may want to add an audio stream to be able to hear what is happening. Because the user initiated the call as text, the user should be aware of the addition of other media, and should be able to permit or deny the addition.

Use case 10 Multimedia Telephony communications mainly in Sign Language to Emergency services
Agnes is a Multimedia Telephony communication user with a mobile device with MMTEL capability (Video, Audio and Real-Time Text). Being deaf and preferring sign language communication, she has her service set up so that a Sign Relay service is invoked as a three party call participant in emergency service calls and in calls to audio-only phones. That service translates between sign language and spoken language. She has seen an accident and wants to use Non-Voice Emergency Services to call the PSAP to report.

NOVES as defined by 3GPP focuses on Next Generation Network (NGN) technology and does not include legacy messaging services, such as Short Messaging Service (SMS). Hence, it may not be able to provide support to these services in the initial phase of IECS in India. We recommend, use cases such as those described above be considered for India and appropriate technical standards be evolved and future roll out of such services be considered.

Summary of GISFI Recommendations:
1. It is recommended that that SMS/MMS based emergency access be provided to registered subscribers with hearing or speech disability after due consideration of technical challenges outlined in the above response.
2. Email based access to emergency services should not be permitted due to the issues described in the response.
3. Emergency access through data calls is a topic under consideration at various global SDOs. Some of the possible use cases are outlined in the above response. However, further technical feasibility studies are required to arrive at a concrete service delivery framework and standards.
4. GISFI plan to work closely with ISPs to evolve technical solutions for Emergency communication based on Internet based data services.

4.10 Is it technically possible to get Location information in case of SMS or data based calls on real time basis? If yes, please elaborate the process and technical challenges if any.
Reply:

Response:
SMS is not a session mode service and is implemented as a single store and forward message. Thus, it is not possible to PUSH the location information in real time along with the message. However, the location can be queried based on the TMSI of SIM or IMEI of the handset. This is supported by 3GPP Network initiated-location query procedure.
Refer details of response to Q4.6 where the details for location transfer in case of voice call is provided in detail.

4.11 How to build redundancy in operations of Centralized response centers or PSAPs as they may be vulnerable to attack – both Physical and Application software related (Virus, Malware, denial of service, hacking) or to Network failures or Congestion i.e. Call Overload?
Reply:

Response:

For a given PSAP, security provisioning could be similar to that of any commercial organization with more stringent security requirements. Thus commercially available solutions could be used. This includes (1) secure procedures in organization including security policies for staff, ref ISO 27k including enhancements by DSCI, (2) physical security for PSAP, (3) security for network, (4) security for devices being used in the network and (5) secure communication.

In addition to the above, one can also (1) perform security testing of key network elements to be used in PSAP before deployment, (2) perform regular security audits, (3) deploy sensors in all devices being used in PSAPs to identify any malware and (4) use services of security operations centre.

Redundancy solutions could be developed including fallback PSAPs, for this purpose further study needs to be done.[13]

GISFI Standardization Activity:
GISFI has a Security & Privacy Working Group that is developing security solutions for all standardization activities. Thus emergency telecom services security solution will be developed by the GISFI Security & Privacy Working Group (S&P WG). The S&P WG will study PSAP security issues and develop solutions for gaps where identified. The S&P WG is also working on security testing aspects and plans to start an activity regarding cyber security.

[13] http://transition.fcc.gov/pshs/docs-psap/nenaplan060705.pdf

4.12 Should all the calls made to universal emergency number be prioritized over normal calls? Please justify your answer.

Reply:

From the standards perspective, all the cellular networks based on GSM/ CDMA or 3G Mobile Networks technology as deployed in India, the mobile switching centers have provisions for treating Emergency call as higher priority call over the normal traffic with and without pre-emption. Therefore, it is recommended to treat calls made to Universal Emergency Number with higher priority over normal calls. This emergency calls normally gets routed to the PSAP in the same geographical area as of MSC. Activation of such network feature capability will address the Access part of the call priority. The end to end priority of the call is not addressed by this mechanism. However adequate capacity provisioning between MSC and PSAP would address the need to good extent.

GISFI plans to carry out study difficulties faced by the network service providers in treating emergency calls as priority call at access level and also intend to come out mechanism for addressing the same.

4.13 What legal/penal provisions should be made to deal with the problem of Hoax or fake calls to emergency numbers?
Reply: GISFI has no Comments on this issue currently.

4.14 How should the funding requirement be met for costs involved in implementation of IECRS? Should the cost be entirely borne by Central/State Governments or are there other possible ways to meet the funding requirements?
Reply: GISFI has no Comments on this issue currently.

4.15 Should Key Performance Indicators (KPIs) related to response time be mandated for PSAPs? If yes, what should be the KPIs? Please justify your suggestions.
Reply: GISFI has no Comments on this issue currently.

4.16 Should use of language translation services be mandated for PSAPs?

Reply:

Background:

Yes, especially in the Indian situation where over 22 languages are officially used in the states and many more regional languages widely spoken by people, it is necessary to support the major Indian languages (also few major international languages if necessary) through language translation services for the PSAPs. It would also be necessary to consider how a roaming subscriber in another state would be provided PSAP services. This is because if the primary language used by the PSAP call taker is different from the subscriber's own language used widely in his/her state of origin; then appropriate language translation service needs to be provisioned to support the emergency services.

Response:

As outlined in the background, the following challenges need attention:

a. PSAP Call taker unable to identify the language spoken by the subscriber: If a subscriber of South India has roamed to Eastern or Northern part of India and is unable to converse with the PSAP call taker in the native language of the roamed geography or in national language (Hindi) or in English, it is difficult for PSAP call taker to recognize the language spoken by the subscriber. Hence, the PSAP call taker may not be able to select and route the call to appropriate language translation service. Some possible solutions are:
    i. PSAP call taker can use the caller details like subscriber permanent address information or the Home operator information. Additional challenges occur if user has opted MNP and migrated to operator in the current roamed geography or enough subscriber information may not be available in case of a pre-paid subscriber which makes it hard to detect the subscriber language.
    ii. Employ an automatic language detection system and notify the PSAP call taker about the spoken language so that correct language translator can be involved in this emergency communication.

b. Continued spoken language communication support during service delivery: It may be required that the language translator be available for communication assistance even in the process of service delivery to allow efficient delivery of the emergency service.
    i. This poses challenges on the communication session duration and may reduce service availability for other emergency scenarios. Language translation communication during emergency notification and during emergency service delivery should be handled in different networks may be with same session continuity. The original PSTN/PLMN call may need to be migrated to Trunking call while delivering the emergency service by the rescue team.

Summary of GISFI Recommendations:

1. To overcome language barrier for emergency service delivery PSAPs in both roaming and home network should be allowed in the conversation.
2. Automatic language detection seems to be a feasible method but further study and relevant technology analysis is required. (e.g., E911 uses AT&T translation service)
3. Usage of multiple communication channels like PLMN+Trunking with service continuity during emergency notification and emergency service delivery needs to be further evaluated.

GISFI Standardisation Activity::

GISFI CSeON WG is studying the issues on automatic translation service to be introduced for emergency communications and optimal use of telecom network resources during emergency service deliver. GISFI is also establishing collaborative study with the multi-lingual technology expert organizations like CDAC to address this issue in larger perspective.

4.17 In your opinion, what issues related to interconnectivity and IUC may come up in implementation of IECRS in India? What are the suggested approaches to deal with them?

Reply: GISFI has no Comments on this issue currently.

4.18 Should a separate emergency number for differently able persons be mandated in India? How the use of this number be administered?

Reply:

Background:

As per WHO estimates in India, there are approximately 63 million people, who are suffering from significant auditory impairment; this places the estimated prevalence at 6.3% in Indian population. As per NSSO survey, currently there are 291 persons per one lakh population who are suffering from severe to profound hearing loss (NSSO, 2001)[14]. According to WHO, 360 million people worldwide have disabling hearing loss[15]. Around 17% of the affected citizens are from India. Hence, it is necessary to address this population with emergency services.

It is noted that from the Section 2.0 International Practices in the consultation paper that many other nations have special provision for emergency services to hearing and speech impaired citizens. A quick summary is as below:

Nation	Emergency Service Provision for hearing and speech impaired citizens
USA	In 2013, text-to-911 will be rolled out. Currently in trail phase. The universal number 911 is used for this purpose. Here text means SMS.
Canada	Text (SMS) messaging is started on trial basis by CRTC for registered hearing and speech impaired persons. The universal number 911 is used for this purpose.
UK	Text (SMS) messaging is started on trial basis by CRTC for registered hearing and speech impaired persons. The universal number 999 is used for this purpose.
New Zealand	Text (SMS) messaging is started on trial basis by CRTC for registered hearing and speech impaired persons. The universal number 111 is used for this purpose.
Australia	Text messaging is provided for registered hearing and speech impaired persons using Text Phones (TTY). SMS messaging is not allowed. A universal secondary number 106 is used for this purpose. From Jul'13, People with hearing or speech impairments will be able to contact 000 via SMS under a new National Relay Service (NRS) with services in place progressively[16].

Response:

As discussed above it is required that in India we need to address the problem of providing emergency services to differently abled citizens. The following aspects need attention:

1. Emergency services scenarios to be handled[17].
    a. Speak and Read: For citizens who can speak but cannot hear. They can make emergency calls using Textphone/TTY where the PSAP is able to listen to the caller and is responding by text.
    b. Write and Listen: For citizens who can hear but cannot speak. They can make emergency calls using Textphone/TTY where the PSAP is able to read the input text by the caller and is responding by voice.
    c. Write and Read: For citizens who cannot hear and cannot speak. They can make emergency calls using Textphone/TTY, SMS, IM Chat, etc where the PSAP is able to read the input text by the caller and is responding by text.
    d. Difficulty in communication: For citizens who may be unable to communicate effectively due to diseases like cerebral palsy, in which the person's voice is slurred. In this situation, the PSAP may need to support understanding the emergency situation and also involved during the communication with the response team.
    e. Handling incoming call during emergency: PSAP may need to be involved in the communication from an authority to the person with disability during some disaster where the person cannot sense the danger involved. Example, a blast might have occurred in a small area and all citizens in that area are to be alerted.
    f. Communication using Sign language: People should be able to use video calls to make emergency services where they can communicate with PSAP in sign language. Use of visual signage (placard, screens, digital signage) during emergency service delivery is also an effective method like in large public areas (Airports, Railway Stations, etc).

[14] . http://stg2.kar.nic.in/healthnew/NPPCD/part-1.pdf

[15] http://www.who.int/mediacentre/factsheets/fs300/en/

[16] http://www.seniorau.com.au/index.php/more-seniorau-news/3459-sms-access-to-000-for-hearing-and-speech-impaired

[17] http://relayservice.gov.au/

It is important to note that PSAP call taker should possess some special skills to deal with the above scenarios.

2. Availability of devices and relevant communication network for emergency communication in India.
    a. Text Phones/TTY: These devices are not a well known within India. There is no specific communication provider within India offering such services.
    b. Mobile Phones: These devices are available and also capable with real time text facility and SMS facility. They are also affordable. All mobile operators in India support the basic GSM communication network.
    c. 3G Mobile Phones: These devices are available and can be used for video communication using sign language[18]. Few mobile operators in India to provide the 3G services but do not scale beyond the metro cities. These services are not so affordable to public at large.
    d. Computers with Internet connection: Internet applications like IM/Chat can be used to communicate effectively during situations of emergency. Both internet and computer devices are becoming affordable to public at large. There are many ISPs in India who provide internet facilities to Urban, Semi-Urban and partially to rural sectors.

    It can be noted that mobile phones (2G/3G) and computer with internet connection may need to be supported for emergency communications for citizens with speech and hearing impairment.
3. Administration of Emergency Services
    a. A large population in India is suffering from this disability and has no effective means of communication amongst themselves or the authorities during emergency. Hence, this population should be addressed with a system specifically designed to offer services and especially during emergency.
    b. The system provisioned to handle emergency communication with people with hearing and speech impairment should maintain the location and identification information separate from others, so that during emergency government is able to deliver emergency services with the same quality and efficiency.
    c. The administration mechanism should be simple like registration through SMS and must include support systems through the programmes from the Ministry of Health and Family Welfare.
4. Single Universal number for emergency communication: Most countries have started to provide emergency communications to the citizens with speech and hearing impairment on a single universal number. Australia has also extended it reach by allowing text communications on “000” besides “106” which is a dedicated network for Textphones/TTY.

Summary of GISFI Recommendations:

1. It is recommended that the national universal number for emergency communication be used for emergency communication services to speech and hearing impaired citizens.
2. It is recommended that a special PSAP/Relay Center be setup to handle emergency communications and be proficient in delivering services in voice, text, video (sign language), visual signage mode. It is also recommended that a database of location and identification be maintained for citizens with speech and hearing impairment availing emergency services. This aspect may need further analysis.
3. It is recommended that emergency communication services for people with speech and hearing impairment be made available on SMS, Voice and Video. Further government can provide these devices and services to this population at subsidized rates under the government schemes supported by the Ministry of Health and Family Welfare, thus realizing the reach of emergency services to this population in India. Provisioning of emergency services using Textphone/TTY requires further study.
4. It is recommended that all citizens with speech and hearing impairment should be able to register for emergency services using SMS, Online registration and authorized agency registration. Example of authorized agency can be government bodies like All India Institute of Speech and Hearing.

GISFI Standardisation Activity:

GISFI CSeON WG is pursuing analysis and recommendation of suitable standards for provision and operating telecom network for delivering emergency services for citizens with speech and hearing impairment.

[18] http://deshgujarat.com/2011/08/20/deaf-and-dumb-people-talk-through-mobile-phone-in-gujarat/

4.19 In your opinion, apart from the issues discussed in this consultation paper, are there any other technical, commercial or regulatory issues that may be involved in implementation of IECRS in India? Please elaborate.

GISFI Recommendations:
In addition to the issues outlined by TRAI in the consultation paper, we feel the following issues and relevant and important to be addressed while formulating the future course of activities:

1. Privacy of emergency callers:
3GPP standards specify that position information shall be provided to the Emergency Services Network as an authorized LCS client. Target UE authorization checks normally performed for value added services are not applicable (privacy is over-ridden). Also, for Emergency Services (where required by local regulatory requirements) Target UEs making an emergency call may be positioned regardless of the privacy attribute value of the subscriber associated with the Target UE (or ME) making the call.

This leads to the issue of guarding the privacy of the subscriber (identity, location details etc) while transferring the information to the PSAP, storing the information at appropriate databases within the IECS network or communicating with the point of contacts within the emergency responder organizations. We recommend that this issue be studied in detail and regulatory as well technical challenges be identified.

2. Issues related to call routing:
As outlined in the Section 1.5 of the consultation paper, the jurisdictional information of appropriate Emergency Responders such as Police, Ambulance, Fire etc need to be considered while routing the call to the PSAPs. The current standards such as NENA in America mandate the routing be carried out based on the geo-location information of the caller. This automated routing if followed in India may raise the issue of call terminating at a PSAP, which routes it to a responder who does not have jurisdictional rights for the area from where the call originated.

For example, on state boundaries a mobile phone frequently gets connected to the operator in the neighboring state and if the call is routed based on the Cell-ID information; the call maybe redirected to the nearest PSAP in the other state. At this PSAP, the call-taker based on visual judgment on the GIS platform may route the call to the Police control room of the neighboring state delaying the service to the needy caller.

We recommend that this issue be studied in detail and appropriate mapping between the location, mobile operator coverage and the jurisdictional details of emergency responders be carried out while designing the IECS framework.

3. Service accessibility:
It is recommended that emergency services be accessed from:
i. Fixed telephones
ii. Mobile telephones
iii. VoIP calls (distinguish between Interconnected VoIP where a VoIP to PSTN gateway resides in the country and Internet based VoIP calls). Though location identification is a challenge in VoIP telephony, emergency services may still be delivered based on information gathered from the caller.
iv. Private EPABX exchanges that connect workplaces. It may be noted that many banks, schools and defense establishments do not permit use of cell phones within the campus in India. So support for calling through multi-line telephone exchanges should be supported.
v. Transport systems such as railways have their own telephony systems. For example, GSM-Enhancement for railways and metro systems. Support to place emergency calls from these networks should be provided.

4. Emergency communication components:
For any IECRS system to be successfully implemented, three communication components are essential:
i. Emergency call processing and delivery through a PSAP. Call dispatch and responder system.
ii. Emergency warning and alert system for public to receive information from authorities during disasters.
iii. Interconnectivity between the IECRS and other appropriate means of mass communication such as TV channels/Broadcast systems/ Terrestrial and Satellite Radio/ FM channels/ Cell Broadcast System (CBS) etc.
The point (ii and iii) above need to be considered for detailed study and analysis for the proposed Indian IECRS system. The broadcast communication media are potent and have higher penetration. Standardized interfaces between the IECRS system and broadcast media to deliver appropriate alerts, messages and guidance with support for Indian languages can play a big role in emergency situations.

5. Transport emergencies:
Transport systems (railway, roadway, air, inland and sea maritime transport) in India are prone to accidents, sabotage and terrorist attacks. It must be mandated in the IECRS system to provide support to transport emergencies through appropriate standardized interconnections between the communication networks used in transport systems such as the GSM-R for railways and PSAPs. There have been many incidents in past, where the people in emergency situations in transport systems (for example: fire in

railway coaches) could not reach help because of poor cellular coverage and lack of institutional framework to address such emergencies.

6. Interworking with other networks:
There have been numerous initiatives by governments to modernize the policing infrastructure (CCTNS project, POLNET), disaster management (NDCN network) etc. there is a need to define interfaces from the PSAPs to these regional or national networks for appropriate transfer of information amongst emergency responders.
Government of India is currently working on the National e-Government Plan (NeGP). As part of this initiative, to provide citizen services through mobile phones, the Government has notified the three digit number 166 for single number access of all non emergency government services. Further, the NeGP standards on data exchange, service localization, mobile governance framework and Mobile Service Delivery Gateway (MSDG) are being evolved.
In the context of single number access for non emergency services, a number of common requirements for ETS are being addressed by NeGP standards such as the local language support and data exchange formats. Also, some of the reference applications hosted by the m-Governance App Store by the Government of India overlap with the Emergency Telecom Services[19].
For instance, Rakshak[20] is a mobile application hosted by the m-Governance portal that can be used in case of emergency where-in; on click of a button this application will send SMS having current location to 4 different (Relatives/Friends) numbers and will also initiate a voice call to an emergency number. The numbers can be specified by the user at the time of installation and can be updated. Thus, it is important to identify common requirements of the m-Governance framework and ETS services to evolve interoperability between the two service delivery platforms.

7. National Security issues:
Since the IECRS network would be critical national infrastructure for dealing with emergencies and disaster situations; it would be crucial to identify the national security implications of this system.
In light of contemporary challenges of terrorism and threat from adversaries facing the nation, it is important that the emergency telecommunication services be designed to deal with such disasters. Certain countries, such as the USA have a separate program that authorizes national security and emergency preparedness (NS/EP) organizations to receive priority treatment for vital voice and data circuits or other telecommunications services.
Further the PSAPs may be a target of sabotage during terrorist operations, cyber espionage and attacks on critical infrastructure of the country. Centralized response systems can be vulnerable to:
1. Attacks – Physical or application software related (virus, malware, denial of service, hacking etc)
2. Network failures due to infrastructure damage, power failures, software/hardware problems etc.
3. Congestion - Call overload due to sudden surge created in event of disasters.
4. Hoax calls to generate panic and misdirect the emergency response systems
These requirements must be appropriately addressed in the PSAP standards.

In appropriate situations, it may also be required to provide critical users the ability to eliminate the capture of call detail records and caller identification, making calls non traceable. Further, emergency services delivered to Indian citizens may be differentiated to those delivered to visitors to India from other countries. Also, existing networks setup by various stakeholder organizations in the country such as the Crime and Criminal Tracking Network & Systems (CCTNS) setup by Ministry of Home Affairs (MHA) needs to be integrated with the emergency telecommunication services through appropriate interfaces. National Emergency Telecommunications Standards need to be developed to address these above described special requirements for national security on the lines of NENA standards.

8. Machine Initiated Emergency Calls
Human initiated emergency calls for availing emergency services like Police, Fire, Ambulance, Natural Disaster, etc. may be a REACTIVE method. In the REACTIVE method, the damage is already initiated and the time for providing the emergency service to the human gains utmost importance to rescue the human in emergency. There is a need for JIT (Just-In-Time) and PROACTIVE methods for initiating emergency calls. These types of emergency calls are beyond the detection capabilities of human. Hence, machines need to be involved in such cases.
The following examples illustrate the benefit of machine initiated emergency calls.

a. Fire breaks out due to short circuit in a high rise building: A human is able to detect and react to this emergency after considerable damage has been done. If machines are designed to detect emergency situations based on Fire Sensors and Electrical Relay states and communicate the same to the IECRS network, the emergency services can be quickly provisioned. In the former case, even though emergency services are delivered, it still results in considerable human and economic loss. Whereas the latter can further minimize this loss to a greater extent.

[19] Framework for mobile governance URL: http://deity.gov.in/content/framework-mobile-governance
[20] Rakshak, Mobile App, URL: http://apps.mgov.gov.in/descp.do?appid=274&action=0

b. Vehicle Accidents: These are the most common emergency situations in India and many lives are lost due to delayed delivery of emergency service. The delay is usually accounted in several hours. Most of these emergencies are detected by humans who basically pass by this emergency situation. To improve efficiency of service delivery to these emergencies, machine initiated emergency calls are very crucial. In Europe, a project called eCall[21] is being developed to handle this particular scenario.

It is further recommended that Indian IECRS should focus on interfacing with machine initiated emergency calls to improve efficiency of emergency service delivery. GISFI CSeON and IoT WGs will conduct study and recommend or develop standards on this topic.

[21] eCall URL: http://ec.europa.eu/information_society/activities/esafety/ecall/index_en.htm