

Consultation Paper No. 3/2013



Telecom Regulatory Authority of India



Consultation paper

On

Universal Single Number Based
Integrated Emergency Communication and Response System

15th March, 2013

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Stakeholders are requested to furnish their written comments by 5th April, 2013 and counter-comments by 12th April, 2013 to the Advisor (Networks, Spectrum and Licensing), TRAI. The comments may also be sent by e-mail to advmn@traigov.in. Comments would be posted on TRAI's website www.traigov.in.

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CHAPTER -I

EMERGENCY COMMUNICATION & RESPONSE SYSTEM IN INDIA –

CURRENT STATUS & WAY FORWARD

- 1.1 Emergency is any sudden unforeseen crisis (usually involving danger to life or property) that requires immediate response and help by the concerned agencies like police, fire brigade, ambulance etc. In order to provide quick and timely intervention by these agencies, there should be a communication network in place which facilitates the people in distress to access these agencies from anywhere, at anytime and get a proper and immediate response. An Emergency Response System (ERS) should be always active and ready for immediate action. The system should be robust, easily accessible from anywhere and well staffed, so that the person affected can call and get immediate help.

- 1.2 Presently in our country, different emergency communication & response systems are in place for police, ambulance, fire brigade, civil defense, disaster management etc. These systems are accessed through different numbers such as 100(Police), 101(Fire), 102(Ambulance) & 108 (Emergency Disaster Management). A number of states have also notified various helpline numbers for assistance to special category of citizens like “Woman in distress-181(Delhi)”, “Missing children and women-1094(Delhi)”, “Crime against women -1096(Delhi)”, “Anti-extortion - 1097(Delhi)”, “Police Headquarter helpline-1090(Uttar Pradesh)” etc. In addition, a number of private hospitals have also set up their separate help lines for medical emergency. Following table gives some of the emergency numbers notified by these organizations.

short code	Purpose	short code	Purpose
1099	Central accident and Trauma Ambulance service	1056	Emergency medical services in local area
1050xx	Heart Related.	1057XX	Ambulance services
1054	Poison Control Service	1059XX	specialized hospitals
106X	state of art hospitals and medical institutions e.g. 1060 -AIIMS	107X	Emergency Information services - e.g. 1071 is for Air Accident info

1.3 Table above indicates that Number 1099 is for Central accident and Trauma Ambulance service; 1057XX is for Ambulance services of various hospitals e.g. 105724 is for Escorts Heart Hospital; 106X is for state of art hospitals e.g. 1060 is for AIIMS and 1061 is for PGI Chandigarh. Obviously 1061 does not work in Delhi. Similarly, a number of states have started 1091 help lines for women. Existence of so many different numbers for each emergency response system creates confusion apart from remembering so many numbers particularly at the time of emergency. In addition, sometimes help is required from more than one agency. Therefore, there is a requirement for an easy to remember, single emergency number through which one can reach to the desired help agency.

Issues with present system in India

1.4 Presently, the calls made to emergency numbers such as 100, 101, 102 etc. are terminated at certain defined centers which are manned by the concerned departments/ organizations like police, local municipal bodies, health, fire brigade etc. In the existing system, the location information is provided by the caller and the emergency helping unit rely

on this information. In this scenario, if the caller is either not able to convey his location or the location conveyed by him is vague or erroneous, there is a possibility that his request for help is handed over to a responding unit that may not be in the immediate vicinity of the caller resulting in loss of crucial time in the response.

- 1.5 The second problem in the current ERS system is that of jurisdictional issues that again arises out of the lack of location information of the caller. Many a times calls made to emergency numbers land on Police control rooms/Ambulance services that may not have jurisdiction at the location of the caller. Since the location information is not getting communicated in present system and there is no common interface to handle the calls, the caller is asked to contact some other number. This is very common in cases where the caller is using mobile handsets and calling from a place that is at the boundary of a District or State. e.g. if someone is travelling from Delhi to Jhansi, the state jurisdictions changes frequently as he has to pass through Delhi-Haryana-UP-Rajasthan-MP-UP. In such a scenario, if a distress call is made at the border of say UP and MP, when the caller is entering MP, it is likely that the call lands at the control room located in the a town in UP, while the nearest help can be provided from a town located in MP and if the control rooms do not have backend facility to pass calls and information gathered, the response to the caller will be delayed.
- 1.6 Thirdly, as discussed above, there are different numbers for different emergency services. The caller needs to dial relevant number depending upon the type of emergency situation. In case the caller does not know the correct emergency number to dial or is confused between the host of emergency numbers like whether to dial '101' or '102' for fire brigade, he will be either deprived of any help or will get the help after avoidable delay. Time is the essence in such a situation. Whether it is a riot breaking out, or a fire spreading, or a citizen struggling with a heart

attack – the first few minutes are always crucial. Given the low literacy levels in India, it is likely that crucial time may be lost in figuring out what to dial.

- 1.7 Fourthly, there may be a situation where multiple agencies need to be contacted. For example, an accident may result into fire and some persons may be seriously burnt. Such a situation would require calling police, fire as well as ambulance. Getting the right contact numbers and explaining the same situation to each of them result in delay in a situation where one would want instant response.

Brief about Integrated Emergency Communication & Response System (IECRS) in developed countries

- 1.8 Some countries (Australia, New Zealand, UK, USA etc) have put in place an Integrated emergency communication & response system that is accessed through universal single number. For example in USA, number '911' is used; in most of the European countries number '112' has been provided for emergency response. On dialing the emergency number, the call gets routed to a kind of call center, a Public Safety Answering Point (PSAP), located at several places within the country or State. The PSAPs are manned by personnel, who are well trained to seek specific information from the caller and based on the requirement of the caller, and the address information that gets transferred from an Integrated Public Number Database in case of landline calls; or on the approximate location coordinates that gets transferred from mobile networks in case of mobile calls, these PSAPs route the emergency calls further to nearest local emergency responding agencies like medical, fire, law enforcement etc. In case of unavailability of location information, the answering personnel ask the caller for the location information.

- 1.9 Such implementation gives rise to the need for a proper and up-to-date subscriber database to be kept by the service providers. In a centralized emergency response model, one of the key features is transmission of identification and location information by Telecom service providers to the PSAP. Identification information may be the information such as subscriber or company name. Location information in case of wired line connections can be Street name, house number, area or town and postal code at which the telephone is installed. In case of mobile originated calls, the location information transmitted by the mobile networks can be either the address of the cell site closest to the caller or location derived by triangulation method or with the help of GPS. In some countries like USA, there are rules that require the information regarding the latitude, longitude or position of the subscriber's equipment to be transferred from the service provider's network to the PSAP.
- 1.10 The PSAP concept, which is an additional functionality for handling the emergency calls, is an integral design element of IECRS. The biggest advantage of having an intermediary agency like PSAP is that it is agnostic to the geographical location of the caller and the kind of help required. In this framework, the burden of calling the correct number and the correct agency for help shifts from the caller to the PSAP. This brings efficiency and enhanced response, avoiding errors in handling the emergency.

Emergency response system in India - Current telecom regulatory and licensing framework

- 1.11 Presently, the telecom access to emergency services in India such as 100(Police), 101(Fire), 102(Ambulance) & 108 (Emergency Disaster Management) are being provided by Telecom Service Providers (TSPs). As per the National Numbering Plan 2003, these are Category-I services i.e.

these are the mandatory services that are to be provided by all the TSPs. Whereas access to 100, 101 and 102 numbers is Restricted (these are the services to be accessible at least within local area); access to 108 has been defined as Unrestricted (these are the services, which shall be accessible from anywhere, national or international). Access to 108 is Toll free in local areas only.

- 1.12 As far as telecom service licenses are concern, in the definition of terms & expressions given in the Cellular Mobile Telecom Services (CMTS) license emergency services has been defined as, *“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”*. Further, as per the clause 30.1 of the CMTS license agreement, *“licensee shall independently provide all emergency and public utility services to its subscribers, including directory information services with names and address of subscribers”*.
- 1.13 According to the clause 29.1 of Unified Access Service License(UASL), *“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”*.
- 1.14 As far as the location information of the mobile callers is concerned, the Department of Telecom (DoT), vide its amendment¹ to the CMTS/UAS License conditions, dated 31st May 2011, has mandated telecom service

¹ <http://dot.gov.in/AS-III/2011/as-iii.pdf>

providers to provide location details of their mobile subscribers as per the following –

“(a) The Licensee shall provide location details of mobile customers in the License service area as per below mentioned time frame from the date of issue of this amendment and accuracy. It should be a part of CDR in the form of longitude and latitude, besides the co-ordinate of the cell sites, which is already one of the mandated fields of CDR.

Accuracy in Percentage							
Distance in Meters	Urban (More than 1 million mobiles in a municipal limit)		Sub-Urban & Rural			Remote	
	1 year	2 years	1 year*	2 years	3 years		2 years
50	30	50					
100	60	75		50	60		
300	80	95	50	60	70	50	60
500			60	70	80	60	70

*Applicable for the state of J&K, Assam and NE region.

(b) To start with these details will be provided for specified mobile numbers. However, within a period of 3 years location details shall be part of CDR for all mobile calls.

Depending upon the technological development the limits of accuracy could be modified any time in future.”

1.15 Presently, most of the private service providers are routing calls to the emergency numbers through the network of BSNL/MTNL, as the PSU service providers have connectivity with control rooms of various emergency organisations. For this purpose, interconnection agreements between Private Access Service providers and BSNL/MTNL have required provisions.

Emergency Response System in India – Changing dimensions and new regulatory requirements

- 1.16 A beginning to revamp the existing Emergency Response System has been made in some of the States in India where agencies like GVK-EMRI are operating the emergency response system. These systems are accessed through single number (usually 108). However, these systems do not have the feature of transmission of basic information like location details and subscriber identity by the TSPs to the control room, thus reducing their effectiveness to a large extent. Further, these systems are primarily focused at responding to medical emergencies.
- 1.17 Ministry of Home Affairs (MHA) has also initiated a feasibility study at Hyderabad on an Integrated Emergency Communication System (IECS) involving the Police, Health and Disaster Management Authorities. As part of their modernization effort, MHA has established the Micro Mission: 04 group (MM: 04) under the Bureau of Police Research & Development (BPR&D) which is leading the efforts on Integrated Emergency Communication System. MM: 04 has established the “Dial-100, Anytime Anywhere Policing” vision. This vision addresses the need of leveraging the best IT and communication technology to put in place a quick, effective, and comprehensive emergency response to all reported incidents based on a call-centre model or on the lines of 911 (USA), Chicago Police model or the model of 108-EMRI available in India.²
- 1.18 The issues involved in setting up of Emergency Response System is primarily related to the state governments, as most of the emergency services are being provided by Police, Fire brigade, hospitals etc., which are controlled by the respective state governments. Therefore, one might ask as to what role, TRAI has in this whole framework. Internationally also, the IECS has been set up at the state or municipal level. However,

² <http://bprd.nic.in/writereaddata/linkimages/0800237872-Incident%20Command%20Centre.pdf>

the communication platform required to provide the IECRS has been mandated/facilitated by the respective telecom regulator in association with the Telecom service providers of those countries.

- 1.19 Under section 11(1)(a) (iv) of TRAI Act 1997 (as amended), Telecom Regulatory Authority of India (TRAI) is entrusted with the responsibility of promoting efficiency in the operations of telecommunication services so as to facilitate growth in such services. Further, under section 11(1)(a)(vii) TRAI can make recommendations on any matter relatable to telecommunication industry in general. Therefore, to facilitate the establishment of an efficient and robust IECRS in the country, TRAI has decided to initiate this consultation process.
- 1.20 There will be various agencies and departments of the Government who will be involved in successful implementation of universal single number based Integrated Emergency communication & Response System. It is expected that these government agencies proactively address the probable bottlenecks concerning their jurisdiction. From telecommunications point of view several technical, economical and regulatory challenges need to be addressed in such an implementation. Some of these are; Numbering plan related issues, Interconnection related issues (including IUC), creation and updating of a centralized database of telephone numbers, transfer of location information of the mobile caller in real time etc.
- 1.21 To initiate the consultation process on the issue, TRAI had conducted a workshop on “Issues involved in implementation of Emergency Communication System” on 31st October 2012 at New Delhi. The workshop was aimed at bringing all stakeholders on a common platform and to understand the issues involved. The workshop was attended by speakers and participants from Ministry of Home Affairs, various State Governments, Department of Telecom, National Disaster Management

Authority, Telecom Service Providers, their associations and technical solution providers. Several inputs have been received from the presentations given by the speakers in the workshop and the discussions held. These have also been incorporated in this consultation paper.

- 1.22 This consultation paper has 4 chapters. Chapter II discusses the Emergency Communication & Response Systems available in various countries so as to give a detailed understanding of how they work. Chapter III discusses the issues involved in implementation of universal single number based Integrated Emergency Communication & Response System in India in detail and raises various issues for stakeholders' comments. These issues have been summarized in Chapter IV for the convenience of stakeholders.
- 1.23 Through this consultation paper, TRAI aims at getting the views of various stakeholders on the different issues involved in implementation of universal single number based Integrated Emergency Communication & Response System in India.

CHAPTER - II

INTERNATIONAL EXPERIENCE

- 2.1 In order to understand the issues involved in implementation of Integrated Emergency Communication & Response System in India, TRAI has studied the system and policy adopted in some countries. Same has been summarized in following paragraphs.

USA

Single Number System used: - 911.

- 2.2 The Wireless Communications and Public Safety Act of 1999(9-1-1 Act), designated 9-1-1 as the universal emergency telephone number within the United States for reporting an emergency to appropriate authorities and requesting assistance. This number is to be used by citizens only in case of emergencies in USA and using 9-1-1 for non-emergency calls is against the law.³ Dialing 911 connects the subscriber to a PSAP (Public Safety Answering Point)⁴ where a trained dispatcher routes the call to local emergency medical, fire and law enforcement agencies. There may be multiple PSAPs within the same exchange, or one PSAP may cover multiple exchanges.
- 2.3 The Wireless Telecommunications and Public Safety Act of 1999 mandates that the Federal Communications Commission "shall encourage and support efforts by States to deploy comprehensive end-to-end emergency communications infrastructure and programs, based on coordinated statewide plans, including seamless,

³ <http://www.fcc.gov/topic/9-1-1-and-e-9-1-1>

⁴ The FCC maintains a Master PSAP Registry with information on PSAP names and locations.

ubiquitous, reliable wireless telecommunications networks and enhanced wireless 9-1-1 service."⁵

- 2.4 The '911' networks are created and operated locally by various counties. In some cases the networks are administered by a government public safety team and technically operated by a telecommunications company (the phone company). '911' calls are also provided some degree of priority over other phone traffic.
- 2.5 When a caller dials 911, the call is recognized by the telephone company central office switch and routed to the nearest Public Safety Answering Point (PSAP). At the PSAP, the dispatcher verifies the caller's location, determines the nature of the emergency and decides which emergency response teams should be notified. Initially the dispatcher used to verify caller's location orally but with the introduction of "Enhanced 911" or "E911" the caller's location is automatically available to the dispatcher. With this information, PSAP staff is able to call back if the '911' call is disconnected, and also know where to send emergency services personnel.
- 2.6 The Calling Line Identification (CLI) provided is normally integrated into an emergency dispatch center's system, to provide the dispatcher with an onscreen street map that highlights the caller's position and the nearest available emergency responders. For Wired-line (landline) E911, the location is the address of the caller. For Wireless E911⁶, the

⁵ <http://transition.fcc.gov/pshs/services/911-services/state.html>

⁶ The FCC has divided its wireless Enhanced 911 (E9-1-1) program into two parts - Phase I and Phase II. Under Phase I, the FCC requires carriers, within six months of a valid request by a local Public Safety Answering Point (PSAP), to provide the PSAP with the telephone number of the originator of a wireless 9-1-1 call and the location of the cell site or base station transmitting the call. Under Phase II, the FCC requires wireless carriers, within six months of a valid request by a PSAP, to begin providing information that is more precise to PSAPs, specifically, the latitude and longitude of the caller. This information must meet FCC accuracy standards, generally to within 50 to 300 meters, depending on the type of technology used.

location may be a set of coordinates or the physical address of the cellular tower from which the wireless call originated. The end office recognizes the digits 911 and switches the call to 911 selective router. Based on the calling number and location of the caller, the call is routed to the concern PSAP. The PSAP then hands over the call to the nearest available emergency dispatcher.

2.7 The Federal Communication Commission's (FCC) basic '911' rules require wireless service providers to transmit all '911' calls to a PSAP, regardless of whether the caller subscribes to the provider's service or not. '911' calls are also allowed from the cell phones having no subscriber identification module (SIM). However, when calls are made from such devices, it is very difficult to determine the locations of these calls. If a caller does not speak English, an interpreter is added in the conversation for his help.⁷ '911' system is not designed to support emergency text messages, except in a few areas where limited text-to-911 trials are underway. Some wireless carriers have announced plans to support text-to-911 starting in 2013, and some '911' centers may begin to accept text messages in addition to voice calls.⁸

2.8 In USA, funding of '911' services is not uniform. Local governments rely on a variety of revenue sources to fund the cost of maintaining PSAPs. A majority of funds comes from end-user surcharges which helps telecom service providers to recover their operating costs. Even the end-user surcharge rates differ from county to county. For example in Kentucky State, fees on landline users range from 50 cents to \$4.25 a month. The fee for wireless phones is \$0.70 per

⁷ <http://www.nena.org/?page=911GeneralInfo>

⁸ <http://www.fcc.gov/text-to-911>

month⁹. Vermont State funds its 9-1-1 system by way of collecting a percentage of retail telecommunication charges as fee. The most common '911' funding approach is a monthly surcharge on landline and wireless phones, but some States use percentages of the monthly bill, percentages of a tax base, or have a universal service fund.

Canada

Single Number System used: - 911.

- 2.9 In the year 1970, '911' was adopted as the national emergency number for Canada. This number is used only in case of emergencies. The working of '911' services is similar to the working in USA, except that, in Canada database containing the location identification is maintained at a national level and CLI & other location related information is relayed to PSAPs along with the telephone numbers.¹⁰ However there are some PSAPs in Canada which still use basic '911' services in which user has to convey his location to the dispatcher. The location related data is revealed to emergency service organizations only in the case of emergency or if consent for doing the same is given by the subscriber. However in case of wireless mobile users, problem of exact location identification still exists but Canadian Radio-television and Telecommunications Commission (CRTC) is encouraging the use of GPS & Cell Triangulation Technologies to find the accurate location details of the caller.¹¹
- 2.10 The CRTC requires wireless service providers to give their customers '911' services wherever these services are available. These services are run by local governments (such as municipalities) in conjunction with

⁹ <http://www.lrc.ky.gov/lrcpubs/rr383.pdf>

¹⁰ http://www.911enable.com/documents/pdf/emergency_routing_service_datasheet_canada.pdf

¹¹ <http://www.crtc.gc.ca/eng/com100/2009/r090202.htm>

the telephone companies, which give wireless providers access to the '911' network. The CRTC has approved the rates that telephone companies charge from wireless service providers for providing '911' network access. End user surcharge is levied on all the subscribers in their monthly bill. In remote areas or rural areas, '911' access is provided on a subsidized rate for which fund is created by telephone companies.¹² Text messaging to '911' services have been started on a trial basis under the guidance of CRTC for the registered hearing and speech impaired persons.¹³

United Kingdom

Single Number System used: - 999; **Secondary Number used:** - 112.

- 2.11 In UK, emergency call service from fixed phones was launched in 1937 and extended to all major towns and cities by 1948. The '999' service was introduced for mobile phone users in 1986.¹⁴ In UK there is two-stage PSAP model. In the first stage, PSAP emergency calls from all service providers are diverted to PSAPs maintained by two telcos, viz. British Telecommunications and Cable & Wireless. After hearing the problem of the caller, stage1 PSAP calls stage2 PSAPs which are maintained by Police, Fire, Ambulance & Coastguard services.¹⁵
- 2.12 The telecom service providers in UK are mandated to provide emergency services to all end users by a free access to '999' or '112' services. It is also the responsibility of the telecommunication service provider to provide accurate and reliable Caller Location Information

¹² http://www.crtc.gc.ca/eng/INFO_SHT/t1021.htm

¹³ <http://www.crtc.gc.ca/eng/com100/2012/r120216.htm>

¹⁴ http://news.bbc.co.uk/local/london/hi/people_and_places/history/newsid_8675000/8675199.stm

¹⁵ http://www.eena.org/ressource/static/files/112_in_uk.pdf

- to these emergency call numbers at no charge to the Emergency Organizations handling those calls, at the time the call is answered by those organizations. The Caller Location Information must include, at least, the Identification of the cell from where the call is being made, or in exceptional circumstances the Zone Code.¹⁶
- 2.13 Funding of ‘999’ services is done partially by State and partially through commercial or interconnection agreements of different telecom service providers with British Telecom, Cable & Wireless and Kingston Communications. In UK, ‘999’ services are absolutely free for end users¹⁷ and have priority over other calls.¹⁸
- 2.14 Making Hoax or fake calls to ‘999’ services is a crime in UK and such callers can be subjected to levy of penalty or imprisonment.¹⁹ Due to increasing number of fake or hoax calls, calls made from cell phones having no SIM card is not allowed in UK.²⁰ However text messages to ‘999’ services are currently provided in UK for the registered hearing and speech-impaired persons only.²¹
- 2.15 “999 Liaison Committee” which is chaired by different officials from Government Departments like Police, Health, Internal Security, and OFCOM) helps in co-coordinating activities related to ‘999’ services.²²

¹⁶ <http://stakeholders.ofcom.org.uk/binaries/telecoms/ga/general-conditions22nov12.pdf>

¹⁷ <http://stakeholders.ofcom.org.uk/binaries/consultations/pecs/statement/999statement.pdf>

¹⁸ <http://www.btplc.com/news/Articles/ShowArticle.cfm?ArticleID=73487E0D-3881-4A16-8804-4E5B806F9AE1>

¹⁹ <http://www.cornwall.gov.uk/default.aspx?page=7167>

²⁰ http://ec.europa.eu/information_society/activities/112/ms/gb/index_en.htm

²¹ <http://www.emergencysms.org.uk/>

²² http://www.ofcom.org.uk/static/archive/oftel/publications/ind_guidelines/regu1101.htm

New Zealand: -

Single Number System used: - 111.

- 2.16 The number that is used in case of emergencies in New Zealand is 111. This number is available in New Zealand since late 1950s.
- 2.17 In New Zealand, ESCAB (Emergency Services Calling Advisory Board), comprising government, emergency services and industry representatives, facilitates overall coordination between government and industry for '111' emergency communication services whereas the Telecommunication Carriers Forum(TCF)²³ takes the lead in developing the voluntary Emergency Calling Code setting out the responsibilities of voice service providers in New Zealand.
- 2.18 There are nine emergency service communication centers nation-wide: three for each of police, fire and ambulance, located in Auckland, Wellington and Christchurch. Police and fire communication centers are co-located and share the same system (but not communication centre staff). These call centers use CARD (Communications & Resource Deployment) system which brings together radio, mapping, telephone and dispatch capabilities and CAD (Computer Aided Dispatch) which helps in dispatching emergency services. The overlay telecom network for '111' services is provided and maintained by TELECOM and in case of congestion at one call centers the calls may be forwarded to another two call centers i.e. if congestion happens at Auckland call may be transferred to Christchurch or Wellington for dispatch of emergency services
- 2.19 When a residential subscriber makes a call to '111' services from landline, the call is routed to Initial Call Answering Platform (ICAP)

²³ TCF - Established in 2002 as the "Telecommunications Carriers' Forum" the TCF is a registered incorporated society. Its objective is to actively foster cooperation among the telecommunications industry's participants, to enable the efficient provision of regulated and non-regulated telecommunications services.

which is maintained by 'TELECOM NZ' -the incumbent telecom service provider of New Zealand. The service quality measures for TELECOM NZ is that each year an average of 85 per cent of emergency calls must be answered within 15 seconds. The name and address of the caller is automatically displayed on dispatcher's screen. Caller's Location Information is automatically available through the TESA (Telecommunications Emergency Services Addresses) database for land-lines. This database is maintained by TELECOM NZ and TELSTRA CLEAR. However TESA does not provide location data for mobile phone users and they have to confirm their location orally. TESA is linked with mapping database which contains several types of maps including regular street maps, aerial photos, topographic maps, marine charts and local council property boundaries. The mapping information helps the dispatcher to accurately pin-point the location where emergency service help is to be sent.

2.20 Calls to '111' services have priority over other calls.²⁴ Other Service providers have a voluntary commercial arrangement with TELECOM NZ which is further coordinated by carrier interconnection agreements. TELECOM NZ's ICAP (Initial Call Answering Platform) or PSAPs costs are met in part through an interconnection charge on other voice service providers and partly by TELECOM NZ itself. Calls to '111' services for end-user are free i.e. no additional fee is obtained from them. Calls to '111' services are allowed from mobile phones having no airtime or prepaid balance.

2.21 Text messages (SMSs) to '111' services are only allowed for registered hearing-impaired persons in New Zealand.²⁵ Of the 2.7 million calls that TELECOM NZ receives approximately for '111' services every

²⁴ <http://www.tcf.org.nz/content/5a625ea9-817b-44a6-9e78-b82d930f0f66.cmr>

²⁵ <http://www.police.govt.nz/deaf-txt>

year, only 36% are passed through to emergency services. The rest, 64%, are non-genuine emergency calls including accidental misdials, hang-ups, children playing with the phone and cell phones being bumped in pockets and bags. Awareness programs are regularly carried out by government agencies on use of '111' services only in case of emergencies.²⁶

Australia: -

Single Number system used: - 000;

Secondary Numbers used: -112, 106.

- 2.22 In Australia, as per ACMA's National Numbering Plan 1997, access to emergency service organizations (ESOs) i.e. Fire, Police or Ambulance, is made by calling the national emergency call service (ECS) numbers 000, 112 & 106. 000 is the primary ECS number introduced in 1961 as national emergency number and 112 & 106 are secondary ECS number. '112' is used for mobile calls made on GSM phones which also provide '000' access. '106' is used for text calls made by hearing impaired persons using text phones. The emergency service provider for '000' and '112' service is TELSTRA. The emergency service provider for '106' service is Australian Communication Exchange Limited (ACE).
- 2.23 Any caller has free of charge access to the ECS from a standard telephone service (fixed line, mobile, satellite, teletypewriter). Calls to ECS numbers are routed with priority in each carrier's network through a system of dedicated lines. Currently there is no SMS based ECS in Australia. Calls to emergency communications service are routed to one of the two national call centers and there is full redundancy or backup capability between call centers which operate

²⁶ http://www.111.govt.nz/calling_111/false_calls.html

as one virtual call center. If one call center becomes inoperative or overloaded due to an extreme event, calls will be answered at the other call center, regardless of the origin of calls. Call dispatchers in emergency call centers are aided by two databases: - IPND (Integrated Public Number Database) and ECLIPS (Enhanced Calling Line Identification Process System). Both the databases are maintained by TELSTRA. IPND is a national repository of customer data including customer contact information (Name, Address and Public Number) supplied by Cellular Service Providers (CSPs). It is the primary source of data for the emergency service organizations. TELSTRA role includes receiving of data from data providers and ensuring safety and security of data. TELSTRA also performs daily updates to IPND. ECLIPS is a national computer system to support the emergency communication service. The ECLIPS database uses information from the IPND. It provides customer service information, logs emergency calls and is the master source of all Emergency Service Organizations and locality information. Carriers or CSPs provides Caller Line Information using the telecommunications switching networks. The ECLIPS system extracts record with the help of this CLI to display the caller's identity and location on ECS operator's screen in real time.²⁷

- 2.24 If call is made from a mobile phone, the caller's location is not known beyond the location of caller's current Standardized Mobile Service Area (SMSA) which is typically a group of mobile cells. Calls from mobiles are handled in the same way as the fixed lines. The caller's phone number, current SMSA and state of origin of mobile calls are displayed on ECS operator's screen. The ECP operator then queries the location details and connects the emergency service organization operator. If a call to 112 is made outside the coverage range of user's

²⁷ http://www.acma.gov.au/webwr/_assets/main/lib310648/ecs_disc_paper.pdf

host network, then the call to ECS will be carried through alternative GSM network if one is in range. '112' calls can be made from a mobile handset even if the mobile is locked. Call to ECS is allowed from a GSM phone even if it does not have SIM but CLI for such calls cannot be obtained and these calls have given much rise to accidental or hoax calls.

2.25 Due to increase in the number of Hoax or malicious calls on ECS because of accidental pressing of digits from mobile phones, ACMA has suggested using Recorded Voice Announcements where extra digits are dialed after triple zero.

2.26 The funding of ECS is done through various commercial agreements between TELSTRA and other service providers. The ACMA regulates and monitors the provision of emergency call services under Part 8 of the Telecommunications (Consumer Protection and Service Standards) Act 1999. It requires the ACMA to make a determination placing requirements on carriers, carriage service providers and emergency call persons (ECPs) with respect to the emergency call service. The Telecommunications (Emergency Call Service) Determination 2009²⁸ sets out the responsibilities and obligations of the emergency call persons, carriers and carriage service providers in relation to the provision of the Emergency Call Services.²⁹

Malaysia: -

Single Number System used: - 999.

Secondary Number used:-112(All mobile calls are routed to 999 system)

²⁸ <http://www.comlaw.gov.au/Details/F2009L04720>

²⁹ http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC_1695

- 2.27 MERS (Malaysian Emergency Response Service) 999 is an integrated system to automate emergency call taking and dispatching via a single number 999. MERS 999 consolidates services from 5 of Malaysia's core Public Safety and Emergency Agencies viz. Police, Fire and Rescue, Hospitals, Civil Defense and Malaysia Maritime Enforcement Agency on a single platform. MERS 999 system can be used only in case of emergencies.
- 2.28 TELEKOM MALAYSIA (TM) is responsible for the creation and maintenance of MERS 999 and maintains three emergency response centers in Malaysia for MERS 999. Two Response Centers at Kuala Lumpur and Melaka are responsible for handling emergency calls for peninsular Malaysia whereas Response Center at Kuching handles 999 calls for regions Sabah and Sarawak. 999 Response Center (PSAP) accepts, verify, filter, analyze and transfer emergency calls to relevant agency. MERS (999) system is equipped with components such as Computer-Assisted Delivery (CAD), Geographic Information System (GIS), Mediator Phone - Computer (Computer Telephone Interface - CTI), Voice Recorder as well as Medical Expert System.
- 2.29 Similar to '911' system in USA, an Automatic Location Database (ALI) is maintained by TELECOM MALAYSIA for the assistance of dispatchers at Response Centers. ALI database works in tandem with GIS. Data to this database is provided by application service providers on call by call basis in the formats prescribed by Malaysian Communications and Multimedia Commission (MCMC). ALI Database displays the name and address of the caller. For mobile callers it displays on the digital map the location of the caller to the nearest base stations.
- 2.30 MERS 999 runs on government allocated funds as emergencies are treated as the matter of national interest in Malaysia. However other

service providers have arrangements with TELEKOM MALAYSIA so that emergency calls are effectively forwarded to emergency response centers. Every service provider of Malaysia is mandated by the direction of Malaysian Communications and Multimedia Commission (MCMC) to provide emergency calls to their subscribers free of cost. Service Providers also have to make arrangements with other service providers in case its network cannot deliver the emergency calls to the emergency response centers. Emergency calls have priority over other calls. Network service providers and application service providers bear their own cost of terminating calls to the emergency response centers. Key Performance Indicators for Emergency Response Center as prescribed by MCMC are – (i) 90% of all emergency calls shall be answered by emergency call dispatcher within 10 seconds, (ii) 100% of all emergency calls shall be answered by emergency call dispatcher in not more than 20 seconds and (iii) in any one hour, not more than 1% of emergency calls should encounter busy signal. The designated emergency response centers should not disclose the caller's information other than to emergency service organizations.

- 2.31 In Malaysia, calls to emergency response centers can be made from a suspended phone account or from mobile phones having no SIM. As per section 233 of Communications and Multimedia Act, 1998, any person found guilty in making Hoax calls or fake calls to MERS 999 system can be fined with a penalty of 50,000RM (approximate Rs. 8,72,900) or can be sentenced to 1 year imprisonment or both.³⁰

³⁰ <http://www.msc.com.my/cyberlaws/ACT%20588%20%20Communications%20and%20Multimedia%20Act%-201998/a0588s0233.htm>

Germany:-

Single Number System Used: - 112;

Secondary numbers Used: - 110 (Police).

- 2.32 '112' is the common emergency telephone number that can be dialed free of charge from any telephone or any mobile phone in order to reach emergency services (Ambulances, Fire & Rescue Service and the Police) in Germany.
- 2.33 When a call to '112' emergency service is made, the call is routed to PSAP which is managed by Competent State Authorities or Local authorities in Germany. Caller Location Information for fixed calls or mobile calls is provided by telecom service provider using their networking or signaling capabilities. The EU Directive E112 (2003) requires mobile phone networks to provide emergency services with whatever information they have about the location from where a mobile call was made. Then these PSAPs inform the emergency service organizations (police, fire and ambulance) which dispatch their units to the rescue areas. PSAPs also provide multilingual support to callers who do not speak English. Calls to '112' emergency service is allowed on a disconnected fixed connections but not allowed from a mobile phone having no SIM. However calls from mobile phones to '112' emergency service are allowed from other service provider network if host's mobile network is not available.³¹
- 2.34 Next Generation 112 implementation is in the pipeline to enable citizens to reach an authority (e.g., PSAP) by calls using VoIP, text messaging, instant messaging, real-time text, pictures and videos. NG112 enables the delivery of calls, messages and data to the

³¹ http://ec.europa.eu/information_society/activities/112/ms/de/index_en.htm

appropriate Public Safety Answering Point (PSAP) and other appropriate emergency entities and makes call handling easier. There is provision of penal actions for giving fake calls or Hoax calls to '112' service in Germany.³²

Philippines

Single Number system used: - 117.

Secondary Number used: - 911 & 112 (for mobile calls).

- 2.35 '117' is the national emergency telephone number for the Philippines. It is managed by the Department of the Interior and Local Government (DILG) and is also referred to by its official name, Emergency Network Philippines (ENP). Depending on the location of the caller, a 117 call will route to any of the sixteen 117 call centers located in various cities in the country. When a 117 call is made from a mobile phone, the call is automatically routed to the nearest 117 call center. '117' emergency service is entirely funded by Government of Philippines and private telecom service providers are invited on voluntary basis. There is a provision of penalty and imprisonment of 15 days to 6 months for illegitimate use of '117' emergency service in Philippines.³³

³² http://ec.europa.eu/information_society/activities/112/docs/cocom2012.pdf

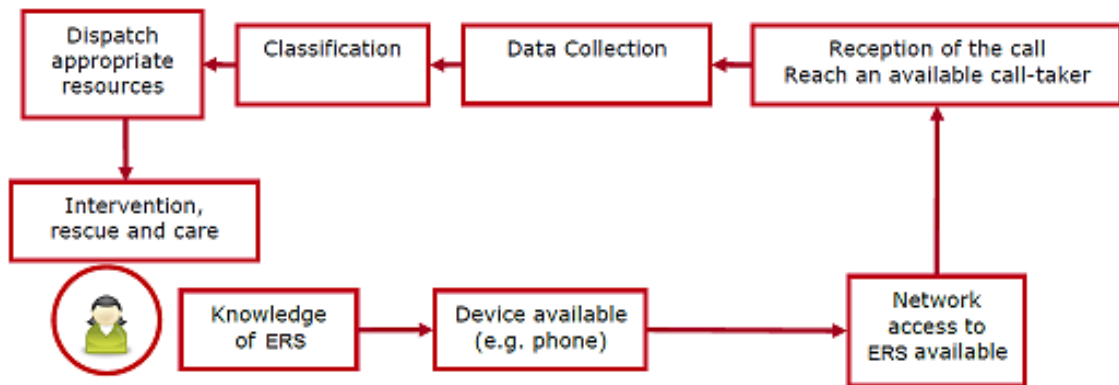
³³ <http://www.senate.gov.ph/lisdata/106589120!.pdf>

CHAPTER – III
IMPLEMENTATION OF INTEGRATED EMERGENCY
COMMUNICATION & RESPONSE SYSTEM IN INDIA
AND ISSUES INVOLVED

3.1 In India different emergency response systems have been in place for police, ambulance, fire or civil defense and disaster management which are currently accessed through different numbers. There is a need to have universal single emergency number so that people need not remember different numbers for different types of emergencies. Following sections in this chapter, discuss in detail, likely issues related to telecom sector that may arise in implementation of universal single number based IECRS and seeks stakeholders' comments on them.

Universal single emergency number

3.2 As discussed in chapter II, most developed countries have put in place Integrated Emergency Communication & Response System (IECRS) in which the emergency service organizations are accessed nation-wide through single universal number. A study of the emergency systems operational in various countries indicates that though there are regional variations in systems across various countries, the process flow is more or less common. A flow chart depicting the design elements and various processes of a generic single number based emergency response system is shown below –



Source – European Emergency Number Association (EENA) <http://www.eena.org>

3.3 A call to emergency services starts a sequence of tasks by different stakeholders in the emergency service chain as indicated in the flow chart above. However, this sequence will be initiated only if the person involved in the emergency situation has the knowledge of the emergency number to dial. Therefore, the first link of the chain is for the caller to know the universal single emergency number and the type of emergencies, which will be handled through this number. In most of the countries, organizations that are accessed through IECRS are Police Services, Fire & Rescue, and Ambulance Services which are also known as emergency service organizations. In some countries Highway police, Coast-Guards security, Traffic Authority or other similar organizations providing assistance to the public in case of emergencies are also included in IECRS. Therefore, for implementing IECRS in India, the first requirement is to decide at the policy level, the type of emergency services which would be handled by the IECRS. This identification will help in further planning and modernization of emergency communication & response system and integrating response teams of all such agencies at the backend with the PSAP.

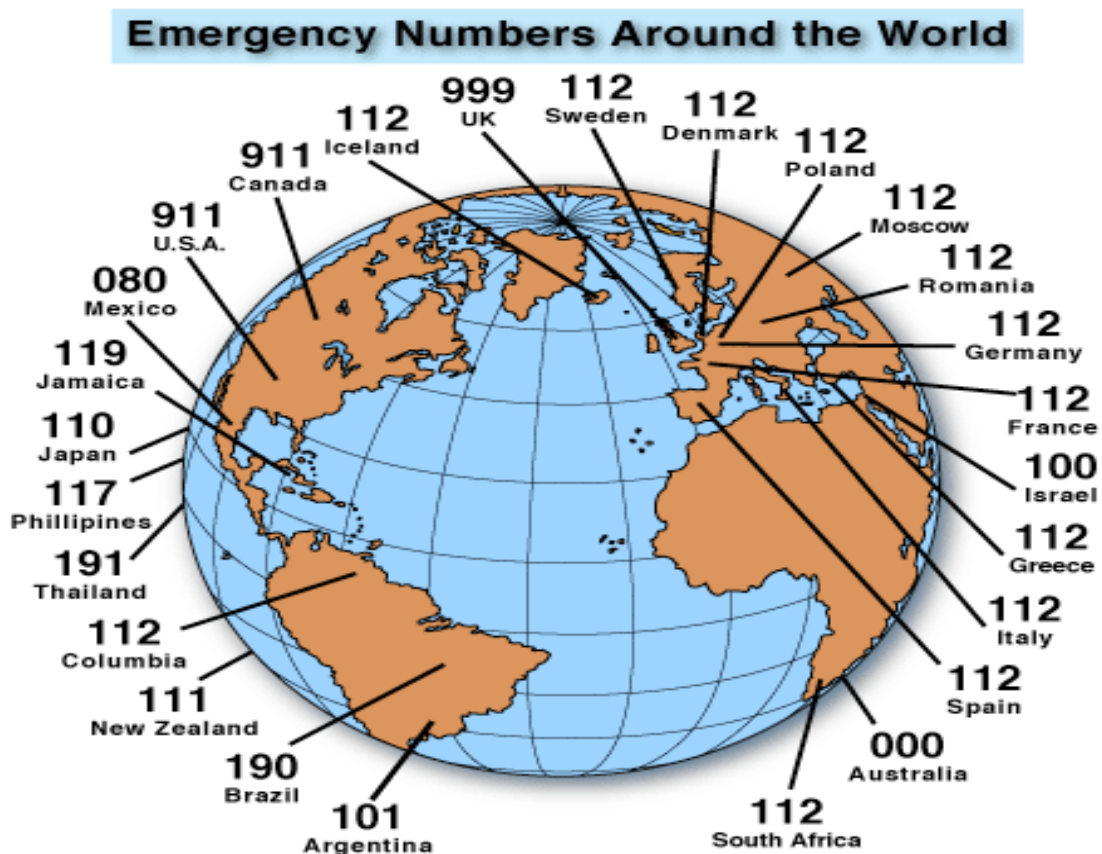
Issues for consultation: -

Q1 What are the types of emergency services that should be made available through single emergency number?

- 3.4 Currently access to emergency services through phone is dealt as per National Numbering Plan 2003³⁴. It has provision for various access numbers such as 100(Police), 101(Fire), 102(Ambulance) & 108 (Emergency Disaster Management). These are mandatory services that are to be provided by all telecom service providers free of cost to their subscribers. National numbering plan (NNP) 2003, lists all access numbers in 1-level series, most of which deal with some sort of emergency or other.
- 3.5 As discussed earlier, existence of different numbers for various emergency response systems creates confusion amongst users. Moreover, it is also difficult to remember so many numbers during an emergency. Another drawback in the present system is that sometimes in an emergency situation, multiple agencies are required to be contacted. It requires a citizen to dial contact numbers of various agencies and explain the same situation to each of them resulting in delay in getting help, whereas the situation warrants instant response. Hence there is a requirement of single number based integrated emergency communication & response system in India. However, the question that arises is what should be that single number?
- 3.6 Presently there are no international standards for an emergency number. Earlier due to greater use of rotary dial telephones, same digits numbers like '999' for UK, '000' for Australia, '111' for New Zealand were chosen as emergency number as these numbers were easy to dial on a rotary dial phone in darkness or in dense smoke. Later with the introduction of push button telephones, use of different digit numbers like '911' became prevalent as dialing numbers like '000' or '999' increases the chances of wrong dialing on push- button telephones or mobile phones. However

³⁴ http://dot.gov.in/numbering_plan/numberplanindex.htm

there is no fixed convention for selecting single number for emergency service organizations. As a result, different numbers are being used to access emergency respond help lines in different countries as depicted below -



Source - http://www.911dispatch.com/911/911_world.html

3.7 Except for the number '112', which is a GSM standard, there has not been any number that has been fixed by any standard making bodies or ITU for use, in case of emergencies. ITU had come out with its recommendations E.161.1³⁵ in 2008 to provide guidance to Member

³⁵ **Single initial Emergency Number** - A Member State that is planning to introduce an emergency number could use either 112 or 911, in adherence with applicable regulations concerning emergency numbers (e.g. the usage of 112 for EU Member States [EU 91/396/ECC]).

States who are in the process of selecting a single emergency number for the first time or selecting a secondary alternative emergency number for public telecommunications networks. In the World Conference on International Telecommunications (WCIT12), held recently in Dubai from 3rd to 14th Dec 2012, a new Resolution³⁶ was tabled inviting the Member States to introduce, in addition to their existing national emergency numbers, a globally harmonized national number for access to emergency services.

- 3.8 In India, number '100' which is reserved for calling Police services is very popular. This makes '100' a suitable candidate for the choice of single number for IECRS. However, '108' Emergency service managed by EMRI (Emergency Management and Research Institute) across more than ten states is becoming popular as an emergency response system. EMRI's "108 Ambulance Service" is a Public Private Partnership model between state governments and Emergency Management and Research Institute (EMRI). Call to the number '108' is a toll free service (in local area) accessible from landline or mobile.³⁷
- 3.9 In addition to a primary emergency response number, a secondary emergency response number also exists in some countries e.g. '112' in UK (in addition to '999'), '112' in Australia (in addition to '000'). Calls from this number are again routed to primary response numbers in these countries. Though presence of secondary emergency number can create confusion but in countries where there exists multiple numbers; because the emergency number was different earlier and was subsequently changed, people still remember them and use them in case of

Selection of a second alternative Emergency Number - 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.

³⁶ <http://www.itu.int/en/wcit-12/Documents/draft-future-itrs-public.pdf>

³⁷ http://dot.gov.in/numbering_plan/nnp2003.pdf

emergencies. In India, a number of calls are made to '911' by foreigners who visit India. Moreover, even if a single number is notified for emergency services, the changeover to the new regime will take some time and till then, people will continue to call present emergency numbers like 101/102 etc. Therefore, it appears reasonable to continue with present emergency numbers also as secondary emergency numbers and re-route the calls made to these numbers to primary emergency number. As mentioned in preceding paragraphs, even ITU recommends use of secondary emergency numbers.

Issues for consultation: -

- Q2 What universal number (e.g. 100,108 etc) should be assigned for the Integrated Emergency Communication And Response System in India?**
- Q3 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?**

Issues involved in transfer of Caller identification and maintaining subscriber database

- 3.10 As has been mentioned earlier, one of the most important features of the state of art IECRS is that of transfer of identification and location of the caller in real time. Transfer of accurate location information via an automated process linked to the communication network used by the caller is essential for an efficient and prompt response, as the availability of caller location information enables dispatching the right emergency resources and reduction in delay. Automatic provision of caller location

is also likely to have a welcome positive impact on the reduction of false emergency calls.

- 3.11 Both in case of mobile and landline phones, the Calling Line Identification (CLI) need to be transferred to the PSAP. Since the caller can be a subscriber of any of the operators, the PSAP should have access to a database from where it can get the credentials of the caller viz. the telephone number and address based on the CLI.
- 3.12 Presently, both wireline and wireless service providers maintain a database of their subscribers which contains the telephone number of the subscriber and his address. However, each service provider has its own database and probably would not like to share the same with other service providers on the pretext of business confidentiality. Therefore, aspects that need to be considered while creating the framework for IECRS are: -
 - i. Centralization or Decentralization: - As each service provider maintains its own database, it needs to be decided whether the PSAPs or a third party will maintain a centralized database having information received from all the individual databases of the service providers or the PSAPs will query the concerned databases whenever required. In the latter case, each PSAP will need connectivity with all the individual databases across the country, which may entail considerable expenses. In case it is decided to have a centralized database, a third party (as has been done for Mobile Number Portability) or one of the wireline service provider can be entrusted with the task of maintaining the database. In some countries there is a centralized database which receives its input from databases of other service providers and this database is maintained by a PSTN service provider like Telstra in Australia, Telekom Malaysia in Malaysia or Telecom in New Zealand. In

Sweden, the emergency service operation as well as updating of database is contracted to SOS Alarm.

- ii. Access to the database: - This would require a query to be sent to the database every time a call is received. Two different methods are used for the provision of caller location information. In 'Push' mechanism, the location of caller is received by the PSAP along with the call. Therefore, caller location identification is available to the PSAPs automatically with every emergency call and is available without delay. In 'Pull' mechanism, emergency call operator asks for caller location information if needed through an electronic request to a database or by making a verbal request to the concerned telecom operator.
- iii. Accuracy of Data: - Regular & periodic update of database is of paramount importance. In some countries, database is updated daily and in some countries it is updated twice a month or once in a month. Moreover, for interoperable and seamless communications, database/ databases should be maintained in a standard format and numbers which are ported should also be included in the database.

3.13 An important aspect that needs to be taken care of is maintenance of confidentiality of the user data and location information. The agencies that will collect or get the personal information like contact details and location will have to be refrained from using this personal information. In this regard, laws in USA and Canada mandate that Caller Location Information or user data should be used by emergency services or telecom operators providing CLI only in case of emergency and that this data can be used by authorized persons only. In any other case, a written permission is required from the desired person to use his caller location

information. In some countries where two tiered PSAP works, caller location information is pushed to one PSAP only and the other PSAP has to obtain the same from the caller or first PSAP.

Issues for consultation: -

- Q4 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?**
- Q5 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?**

Location information in case of mobile users

- 3.14 As far as calls from mobile phones are concerned, as the caller is moving, pin-pointing the caller's exact location is a major challenge. However, depending on the available technology, service providers can identify the location of a caller on the basis of Cell-ID or Sector-ID. The Cell ID is the identity number associated with a cell, which is designated by the network operator. The operator knows the co-ordinates of each cell site and can therefore provide the approximate position of the concerned mobile. However, Cell ID positioning considers the location of the base station to be the location of the caller. Therefore, accuracy of this method depends to a large extent, on the size of the cell, which can vary from a few meters in urban locations to 10 to 20 Kms especially in flat countryside or near water surfaces. Two technologies - cell site triangulation and GPS - have the potential to provide more accurate

caller location information to Emergency Service Providers. Cell-triangulation determines the location of a caller on the basis of signal strengths received from three BTS towers in the proximity. Global Positioning System (GPS) uses radio signals from satellites. Cell site triangulation is not quite as accurate as GPS, especially in rural areas where density of cell phone towers is currently quite low. But this method is comparatively less expensive and can locate a call even inside buildings. On the other hand, GPS uses network resources and satellites to determine the location of the mobile. Therefore, a GPS receiver can find the location of a moving caller more accurately and more precisely than any other technologies. However, there are challenges in GPS systems viz. in poor network/signal conditions or in cities with multi-stories where signals from a GPS receiver faces multipath propagation. Further, cost of a GPS chip and satellite services are comparatively higher.

- 3.15 GPS capable handsets are capable of transferring very accurate location information that may have average accuracy of even 10 meters. But for other mobile users the average location accuracy may be much lower. To tackle this problem, some countries have defined Key performance indicators (KPIs) for the location information accuracy that the telecom service provider should provide. For example in USA KPIs for network-based location solutions mandate 100 meters accuracy for 67 percent of calls and 300 meters accuracy for 95 percent of calls. Similarly for handset-based location solutions 50 meters accuracy for 67 percent of calls and 150 meters accuracy for 95 percent of calls is mandated.
- 3.16 In India, at present, penetration of GPS enabled handsets is not good and hence the location information accuracy has to depend on other methods like cell-Id, triangulation etc. However, as discussed in the first chapter, the Department of Telecom, has mandated telecom service

providers to provide location details of their mobile subscribers as per certain accuracy (For details please refer to para 1.14).

Issues for consultation: -

Q6 What are the technical issues involved in transfer of location of a mobile user in real time?

Q7 What accuracy should be mandated for the location information to be provided by the mobile service provider?

3.17 In some countries emergency calls from pay-phones, temporarily suspended account, or calls from cell phones having no SIM card are allowed e.g. Sweden, South Africa. However, in case emergency calls are allowed from cell phones having no SIM, location of the caller cannot be determined by push method i.e. where location information is pushed to the receiver of the call. Service Provider has to depend upon the caller response to get the location information. One of the challenges in such cases is identification and locking of the network to a telecom service provider. Additionally these types of calls have given rise to large number of fake calls or hoax calls and some countries like UK, Germany have discontinued the facility of calling to emergency response system from a SIM-less mobile phone. Even in ITU recommendations E.161.1, it has been left to the Member State to decide whether the public telecommunications network accept emergency calls without the SIM/USIM/ISIM. In India, the facility of calling emergency number from a handset without SIM is presently not allowed.

3.18 Another issue which needs to be considered is the mode for communicating with the IECRS. In case only voice based communication is permitted, then it will not be of help to people having hearing or

speech impairment. To address this problem, some countries have the facility of sending data calls through text phones or text messages through mobile phones to emergency response system for registered users only. However some countries like Australia, Hong-Kong maintain different numbers for these types of calls and in these countries such calls are routed through voice relay center to normal PSAPs or directly to emergency service organizations.

- 3.19 In situations like kidnapping or eyewitness reporting, making a voice call to emergency services can alert the offenders, putting the persons involved, to even more risk. In such situations, accessing emergency services through SMS can be a more sensible approach. Benefit of using SMS service is that the caller does not need any special device to send SMS as it can be sent through a mobile phone. Further, even in situations where signal strength is weak, SMS to emergency response system may still work. However, one of the major drawbacks is that transmission of SMS is based on Store & Forward technology i.e. the sent SMS first goes to the Messaging center (SMSC) and then to the PSAP which induces delay in communication and SMS cannot be prioritized like voice calls. Moreover, Automatic Caller Location is not included in the standards for SMS and the caller will have to provide his location information through the SMS to PSAP operator. SMS services to emergency response system for general public (registered users) have been started on trial basis in UK and USA.

Issues for consultation: -

- Q8 Should emergency number access be allowed from inactive SIMs or handsets without SIMs? Please justify your answer.**
- Q9 Should emergency access be allowed through SMS or email or data based calls? If yes, what will be the challenges in its implementation?**

Q10 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.

Resilience and security of Emergency response services

3.20 Integrated emergency communication and response centers are centralized response systems for citizens and are vital from internal security point of view. Imagine what will happen if such a system becomes unavailable for any of the reasons like flood, earth quake, hacking attack etc. Even if the entire network does not fail, partial failures can result in call overload or network congestion. During a major disaster many people may end up calling these numbers and lines can get congested.

3.21 In view of above it is necessary to have disaster and contingency plans for PSAPs. Standardized guidelines/operating procedures are required to be put in place so as to maintain normal operations during disaster situations. In the event of an evacuation of the Communications Center/PSAP, alternate means for call receipt, entry, dispatch and monitoring should be available. Various telecommunication related aspects for network resilience, disaster and contingency plans for PSAPs are as follows: -

- i. **IT Security:** - PSAPs must carefully protect their information technology components from hackers, intruders and from inadvertent user errors. Availability of a PSAP can be directly impacted by any of the aforementioned threats and as such an in-depth approach to IT Security is required. Any Contingency or Disaster Recovery Plan should include appropriate IT security measures.

- ii. **Redundant Systems:** - Another important issue that needs to be addressed in implementation of such systems is that of redundancy. Any issue which hinders the ability to receive, process, dispatch and monitor emergency calls must be quickly handled with minimal disruption. Redundant telecommunication systems are needed to continue operation when a failure causes the loss of a needed resource. One of the ways of building redundancies can be by mandating connectivity through multiple access technologies like wire-line as well as wireless. In USA, additional trunk lines are provided to PSAPs and calls to PSAPs are controlled by selective router switches.
- iii. **Prioritizing emergency calls** - In some countries like New Zealand and Australia calls made to emergency numbers are prioritized over normal calls.
- iv. **HOAX call filtering** – Experience of most of the countries where such systems are implemented is that almost half of the calls made to the emergency numbers are non-serious in nature. European Union has asked the member countries to educate the citizens for use of these numbers as valuable time and resources are wasted in dealing with such infructuous calls. Australia has tried to minimize such calls by asking the caller to dial extra digits. In many countries, legal provisions have been made to deal with the problem of Hoax calls. For example making Hoax or fake calls to ‘999’ services is a crime in UK and such callers can be subjected to levy of penalty or imprisonment. Similarly in Malaysia, any person found guilty in making Hoax calls or fake calls to MERS 999 system can be fined with a penalty of 50,000RM or can be sentenced to 1 year imprisonment or both.

Issues for consultation: -

- Q11 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?**
- Q12 Should all the calls made to universal emergency number be prioritized over normal calls? Please justify your answer.**
- Q13 What legal/penal provisions should be made to deal with the problem of Hoax or fake calls to emergency numbers?**

Funding of IECRS

- 3.22 As discussed earlier, implementation and maintenance of necessary infrastructure for state of art IECRS in India would be primarily the responsibility of the respective state governments. However, for setting up the telecommunication network alongwith the databases for address and location information and sending the same in real time, the Telecom Service Providers will be required to incur additional Capital Expenditure (Capex) for feature implementation/ Network Capability enhancement and recurring operation expenses (Opex).
- 3.23 Provision of Capex/Opex to emergency response system differs from country to country. In USA and Canada there is end user surcharge which is levied on the subscribers in their monthly bills. In USA or Canada PSAPs are maintained by local municipalities or counties hence these user charges are shared with these agencies. However, unlike India, the USA and Canada markets are predominantly post paid number markets. India has more than 95% prepaid users of mobile.

Therefore, if such a fee is to be introduced, a mechanism for deducting such fees from pre-paid customers needs to be defined. In Australia and New Zealand, PSAPs are managed and operated by their incumbent PSTN provider like Telstra and Telecom NZ respectively. These operators have commercial agreements and interconnection agreements with other service providers. In these countries other service providers are mandated by law to provide emergency services to general public. Therefore these telecom service providers pay to Telstra and Telecom NZ. Some funds are also provided by Government. Calls to emergency response system to general public are absolutely free in these countries. In countries like Philippines and Malaysia, emergency response system is completely government funded.

Issues for consultation: -

Q14 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?

Other technical and social obligation related issues

3.24 **Response time related KPIs** - Some countries have also introduced response time related key performance indicators for the service providers or PSAPs to improve quality of handling emergency calls. For example, in Malaysia key performance indicator for Emergency Response Center as prescribed by Malaysian Communication and Multimedia Commission (MCMC) is that 90% of all emergency calls shall be answered by emergency call dispatcher within 10 seconds, 100% of all emergency calls shall be answered by emergency call dispatcher in not

more than 20 seconds and in any one hour, not more than 1% of emergency calls should encounter busy signal.

- 3.25 **Mandating language translation services** - In India, different languages are spoken in different states. This may pose problem to call handler. For example, if a person from Karnataka, who does not know any other language, visits Tamil-Nadu and makes an emergency call, it may be difficult for PSAP call handler to understand what he is trying to communicate. Therefore interpreters are required to be provided to such callers who speak languages other than the local language. This problem is faced in many other countries as well. In Europe, either interpreter is provided or call is transferred to a PSAP which can handle such calls. In USA, most PSAP use third party conferencing services for language translation for calls from users who can't speak English. Language translation services are provided by AT&T and are used by other service providers on chargeable basis.
- 3.26 **Technology up-gradation and PSAP compatibility** - In USA and Western European countries, Next Generation 112 (NG112) implementation is in the pipeline to enable citizens to reach an authority (e.g., PSAP) by calls using VoIP, text messaging, instant messaging, real-time text, pictures and videos. NG112 will enable the delivery of calls, messages and data to the appropriate Public Safety Answering Point (PSAP) and other appropriate emergency entities and will make call handling easier. In view of the future technology adoptions, it would be prudent to built new PSAPs and gear-up the existing ones so as to be compatible with the technical advancements.
- 3.27 **Interconnectivity and interconnection usage charges (IUC)** - The connectivity of a PSAP will be normally taken from one or two service providers. This means that all other service providers will be required to hand over their calls to these service providers. This routing and handing

over of the Emergency Service calls will give rise to issues that are related to interconnectivity and interconnection usage charges (IUC) amongst different operators. However this would depend on the model adopted for implementation in India. As has been discussed in previous sections, if a monthly user surcharge is applied then the operators can bill and keep a certain percentage of these charges. If the Australian approach is followed, where the PSAPs are handled by certain designated operators, calls from all other service providers will be handed over to these designated operators. In such a case, the other service providers will be required to pay some IUC to the designated operators.

- 3.28 **Separate number for emergency access for differently able persons** - Another social obligation related issue is whether there be a separate code for differently able persons like deaf and dumb who cannot use voice calls. For example ACMA in Australia has come out with a determination that mandates use of number '106' for persons who are deaf or have a speech or hearing impairment and use text-phones to connect to emergency services. However, to counter the issue of identification and location of such callers, most countries allow such use to be restricted to certain registered users only. Users of such devices in India may be few, however, with time and increased awareness, penetration, availability, and affordability of such devices will definitely improve in future.

Issues for consultation: -

- Q15 Should Key Performance Indicators (KPIs) related to response time be mandated for PSAPs? If yes, what should be the KPIs? Please justify your suggestions.**
- Q16 Should use of language translation services be mandated for PSAPs?**

- Q17 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?**
- Q18 Should a separate emergency number for differently able persons be mandated in India? How the use of this number be administered?**
- Q19 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.**

CHAPTER-4
SUMMARY OF ISSUES FOR CONSULTATION

- 4.1 What are the types of emergency services that should be made available through single emergency number?**
- 4.2 What universal number (e.g. 100,108 etc) should be assigned for the integrated emergency communication and response system in India?**
- 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?**
- 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?**
- 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?**
- 4.6 What are the technical issues involved in transfer of location of a mobile user in real time?**
- 4.7 What accuracy should be mandated for the location information to be provided by the mobile service provider?**
- 4.8 Should emergency number access be allowed from inactive SIMs or handsets without SIMs? Please justify your answer.**

- 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?**
- 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.**
- 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?**
- 4.12 Should all the calls made to universal emergency number be prioritized over normal calls? Please justify your answer.**
- 4.13 What legal/penal provisions should be made to deal with the problem of Hoax or fake calls to emergency numbers?**
- 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?**
- 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.**
- 4.16 Should use of language translation services be mandated for PSAPs?**
- 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?**

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

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.

List of Abbreviations Used

ACE	Australian Communication Exchange Limited
ACMA	Australian Communications and Media Authority
AIIMS	All India Institute of Medical Science
ALI	Automatic Location Identification
BSNL	Bharat Sanchar Nigam Limited
BTS	Base Transceiver Station
CAD	Computer-assisted Dispatch; Computer Aided Dispatch
CAPEX	Capital Expenditure
CARD	Communications & Resource Deployment
CDR	Call Data Records
CLI	Calling Line Identification
CMTS	Cellular Mobile Telecom Service
CSPs	Cellular Service Providers
CRTC	Canadian Radio-television and Telecommunications Commission
CTI	Computer Telephone Interface
DILG	Department of the Interior and Local Government
E911	Enhanced 911
ECLIPS	Enhanced Calling Line Identification Process System
ECPs	Emergency Call Persons
ECS	Emergency Call Service
EMRI	Emergency Management and Research Institute
ENP	Emergency Network Philippines
ERS	Emergency Response System
ESCAB	Emergency Services Calling Advisory Board
ESO	Emergency Service Organizations

EU	European Union
FCC	Federal Communications Commission
GIS	Geographical Information System
GSM	Global System for Mobile Communications
GPS	Global Positioning System
ICAP	Initial Call Answering Platform
IECRS	Integrated Emergency Communication & Response System
IECS	Integrated Emergency Communication System
IEEE	Institute of Electrical and Electronics Engineers
IPND	Integrated Public Network Database
ITU	International Telecommunication Union
IUC	Interconnectivity and Interconnection Usage Charges
KPIs	Key Performance Indicators
LINZ	Land Information NZ
MCMC	Malaysian Communications and Multimedia Commission
MERS	Malaysian Emergency Response Service
MERS 999	Malaysian Emergency Response Service 999
MSAG	Master Street Address Guide
MTNL	Mahanagar Telephone Nigam Limited
NANP	North American Numbering Plan
NG112	Next Generation 112
OFCOM	Regulator of UK Communications
OPEX	Operation Expenses
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
SIM	Subscribers Identification Module
SMS	Short Message Service
SMSA	Standardized Mobile Service Area

TCF	Telecommunications Carriers Forum
TESA	Telecommunications Emergency Services Addresses
TM	TELEKOM MALAYSIA
TRAI	Telecom Regulatory Authority of India
TTY	Tele Type
UAS	Unified Access Service
VoIP	Voice over Internet Protocol
WCIT 12	World Conference on International Telecommunications 12