TELECOM REGULATORY AUTHORITY OF INDIA

Pre-consultation paper

on

"Priority call routing in Mobile networks for persons engaged in 'response and recovery' work during emergencies"

8th November 2011

Mahanagar Doorsanchar Bhawan
Jawahar Lal Nehru Marg,
New Delhi – 110002

TELECOM REGULATORY AUTHORITY OF INDIA

NEW DELHI

Dated 8th November, 2011

Pre-consultation

Subject: **Pre-consultation paper on "Priority call routing[1] in Mobile networks for persons engaged in 'response and recovery' work during emergencies".**

Under section 11(1)(a) (iv) of TRAI Act 2000 (as amended), Telecom Regulatory Authority of India (TRAI) is entrusted with 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 of TRAI Act 2000 (as amended), TRAI can make recommendations on any matter relatable to telecommunication industry in general.

During recent bomb-blast in Mumbai on 13th July 2011, problem of congestion in the cellular mobile network of Mumbai was reported. In order to facilitate a mechanism wherein important functionaries engaged in 'response and recovery' work during emergencies get the calls on priority, TRAI is contemplating to come up with a consultation paper on '**Priority call routing' in Telecom networks for persons engaged in 'response and recovery' work during emergencies'**. This pre-consultation paper mainly focuses on the network congestion issues and is an attempt to understand, in consultation with the stakeholders, certain basic minimum arrangements that can be worked out and put in place to ensure that the network congestion bottlenecks are soothed out at least for personnel working in government and other organizations who are responsible for

[1] With an aim to improve call completion in a network by providing and/or using routing alternatives, priority service and other enhancements that do not exist for normal calls

'response and recovery' during such emergency situations**.**

Brief background, possible solutions and issues involved in implementation of these systems and international experience on the subject are discussed in the following paragraphs:-

1. Modern telecommunications infrastructure, apart from playing significant role in economic, social and cultural development, has also provided powerful and flexible tools to enable habitations to cope with crisis, and quickly relocate and restore displaced or disrupted social and economic activities. Role of telecommunication has been significant in 'response and recovery' during emergencies. But this critical role of telecommunications during emergencies has been limited by the increased vulnerability to system failures. Whether partial or complete, the failure of telecommunications infrastructure may lead to preventable loss of life and damage to the properties.

2. During disasters, telecommunications infrastructure failures occur through a variety of mechanisms. Primarily there are two elements of communication system failure during a crisis:-

   A) Loss of infrastructure - Loss of infrastructure occurs where some or all elements, of a system are lost to damage or other indirect impacts (e.g. power breakdown or due to inaccessibity to the site due to road blockages) that result in total loss of access.

   B) Overload/Network congestion - Another major cause of telecommunications failures during disasters is network congestion or overload. Overload occurs when usage peaks to a level where systems are unable to cope. Crisis generates intense human need for communication - to coordinate response activities, to convey news and information about affected groups and individuals, and as a panic reaction to crisis. Historically, major disasters are the most intense

generators of telecommunications traffic, and the resulting surge of demand can clog even the well-managed networks. Northridge earthquake of 1994, Terrorist attack in USA of September 2001 and tsunami in Thailand of 2004 are some of the examples in which the cellular telephone networks were effectively brought down/made ineffective by congestion. In India, similar congestions have been observed during bomb blasts in Mumbai in 2006 & 2011, and in Ahmedabad & Bangalore during 2008.

In some of the disasters both loss of Infrastructure and network congestion have also been reported as in recent earthquake in Sikkim (18th Sept 2011). The loss of infrastructure mostly results into network congestion. Sometimes even the congestion in networks can lead to failure of network elements.

3. During emergency situations where 'response and recovery' involve officials from multiple government agencies and multiple jurisdictions, medicos, NGOs etc, the public switched telephone network - both wired and wireless – normally become primary medium for emergency communications. It is observed that this emergency phase of response is most likely to get affected by the network congestions. Congestion because of its transient nature defies diagnosis. 'Telephone networks are not so much destroyed as congested into uselessness.'[2] Congestion in networks during the response phase of emergency situations delay official responses, challenge containment, and delay mobilization of broader relief efforts.

4. After the bomb blasts in Mumbai on 13th July 2011 TRAI has called for the traffic pattern data from various Telecom Service Providers (TSPs).

---

[2] E M Noam and H Sato. 1996. "*Kobe's lesson: dial 711 for "open" emergency communications*" Science.

From the responses received from various TSPs, it was broadly observed that –

- As such the networks did not fail but the call attempts of various operators increased between 2-4 times
- The Call Completion Ratio (CCR) dropped because of increased call attempts.
- The drop in CCR, in few cases, was more on Point of Interconnections (POIs).

5. **International Practices –** The details of International Telecom Union (ITU) recommendations in this regard and some of the implementations of priority call routing in other countries have been provided in **Annexure**.

6. **The possible technical solutions** to the problem of network congestion during emergency situations along with some of the issues involved in their implementation are as below:-

i. **Dimensioning of equipment for handling extra traffic** – This solution consists of dimensioning of core network and/or dimensioning of Points of interconnection (POI) for enhancing the capacity of the network for handling the increased volume of traffic during such emergencies. In this approach the issues will be of setting threshold/parameters for dimensioning networks to work in normal as well as emergency situations. Similarly, in the area of dimensioning of POIs TSPs presently are free to dimension the POIs as per their requirement and as per the practice the numbers of POIs between service providers are normally dimensioned so as to handle the peak traffic while maintaining the Quality of Service parameters as defined by TRAI. One of the solutions could be to look into the dimensioning of POIs so as to handle the burst in traffic during emergencies. However, dimensioning parameters will involve trade-off between the benefits of over-dimensioning network elements and costs involved.

ii. **Priority call routing for personnel involved in 'response and recovery'** – The possibility of giving priority to certain users like Police, Hospital, Heads of departments involved in response to the disasters, Blood banks etc can be explored so as to ascertain that during such an incidence calls to/from certain key agencies and persons get priority on the network. In United Kingdom, the Priority call routing system named as Mobile Telecommunication Privileged Access Scheme (MTPAS) is based on access category/priority that is given for certain users for intra-Operator and inter-operator network calls. Similarly in USA Wireless Priority Service (WPS) and Government Emergency Telecommunications Service (GETS) are the priority call routing systems for certain users that are based on 'access-code' dialing. If similar systems are put in place in India, the capability/possibility of priority call routing in intra-operator and inter-operator network scenario needs to be explored. One of the issues will be identification of the best suited system/mechanism for Indian telecom environment. Other issue could be identification of the organizations involved in 'response and recovery' and personnel working in such organizations who should get priority routing. The structure, role and reporting of the unit that should be entrusted with the responsibility of implementing and monitoring the proposed scheme will be issues that need to be addressed.

7. As mentioned earlier, for the preparation of a consultation on this issue stakeholder's inputs/comments/views/papers are solicited on-

   a. any aspect, in general, of making Indian telecom networks resilient so as to be effective during disasters/emergency situations.

b. In particular, the aspect of 'Priority call routing' in telecom networks for persons engaged in 'response and recovery' work during emergencies.

The response may kindly be emailed to advmn@trai.gov.in by 30th November, 2011. For any clarification on this paper, please contact:-

(Sanjeev Banzal)
Advisor (MN)
Tel: +91-11-23210481
Fax: +91-11-23212014
Email: advmn@trai.gov.in

Annexure

International Practices

A) International Telecommunication Union (ITU)

International Telecommunication Union (ITU) came out with recommendation E.106[3] which describes an international preference scheme for the use of public telecommunications by national authorities for emergency and disaster relief operations. The International Emergency Preference Scheme (IEPS) for Disaster Relief Operations is needed when there is a crisis situation causing an increased demand for telecommunications when use of the International Telephone Service may be restricted due to damage, reduced capacity, congestion or faults. Definition of various terms, technical features if IEPS, details of operational management of IEPS etc have been dealt in the two ITU recommendations i.e. E.106 and E.107 and can be accessed http://www.itu.int

B) United States of America (USA)

I. Government Emergency Telecommunications Service (GETS)

GETS was developed in USA to address the need to ensure routing of calls of Government machinery/personnel and heads of important organizations during emergency situations. Using enhancements based on existing commercial technology, GETS allows the National Security and Emergency Preparedness (NS/EP) community to communicate over existing PSTN paths with a high likelihood of call completion during the most severe conditions of high-traffic congestion and disruption. The result is a cost effective, easy-to-use telephone service that is accessed through a simple dialing plan and Personal Identification Number (PIN) card verification methodology. It is maintained in a constant state of readiness and provides a cost-effective means to overcome network outages through such methods

[3] http://www.itu.int/rec/T-REC-E.106-200310-I/en

as enhanced routing and priority treatment. GETS provide and/or use routing alternatives, priority service and other enhancements that do not exist for normal PSTN calls. GETS is accessed through a universal access number 1-710-NCS-GETS (1-710-627-4387) using common telecom equipments or wireless phones. A prompt will direct the entry of the GETS PIN and the telephone number. Once a user has been authenticated as a valid user, the call is identified as a National Security and Emergency Preparedness (NS/EP) call and receives priority treatment. Users are required to select from the three major carriers. Routing to the appropriate carrier is achieved through the PIN number. Calls originating from outside the United States are handled in the same manner. Users dial a country code and then the GETS 710 number. The GETS system is available worldwide with the limitation that priority routing is only available from U.S. Carriers who participate in the program.

II. **Wireless Priority Service (WPS)**

The Nationwide Wireless Priority Service (WPS) is a system that allows high-priority emergency telephone calls to avoid congestion on wireless telephone networks. This complements the Government Emergency Telecommunications Service (GETS), which allows such calls to avoid congestion on landline networks. WPS allows high-priority calls to bypass that congestion and receive priority by dialing *+272+DST_NUMBER+send (the 'star' key followed by 272 followed by the destination number followed by the dial key). Although the system is said to ensure a high probability of call completion, it is not without serious limitations. The WPS will not preempt calls in progress, so the user will have to wait for bandwidth to open. It is also not yet supported by all carriers. In order for a call to work, telephone infrastructure must be powered and functioning. Finally, a call that receives priority using WPS does not automatically get priority on landline networks. Therefore, congestion on the Public Switched Telephone Network may prevent the call

from completion unless the user makes additional steps to access the GETS service for landline calls as well. Because of these and other limitations, the WPS explicitly does not guarantee call completion. Different priority levels have been defined for various types of eligible WPS users as follows –

Priority 1 - Executive Leadership and Policy Makers

Priority 2 - Disaster Response/Military Command and Control

Priority 3 - Public Health, Safety, and Law Enforcement Command

Priority 4 - Public Services/Utilities and Public Welfare

Priority5 – Individuals responsible for managing Disaster Recovery operations

C) United Kingdom

Access Overload Control (ACCOLC) & Mobile Telecommunication Privileged Access Scheme (MTPAS)

Access Overload Control is a procedure in the United Kingdom for restricting mobile telephone usage in the event of emergencies. It is similar to the GTPS (Government Telephone Preference Scheme) for landlines. This scheme allows the mobile telephone networks to restrict access in a specific area to registered numbers only and is normally invoked by the Police Incident Commander (although it can be invoked by the Cabinet Office). The emergency services are responsible for registering their key numbers in advance. ACCOLC was replaced by MTPAS (Mobile Telecommunication Privileged Access Scheme) in 2009.

The purpose of MTPAS/ACCOLC (US) is to restrict civilian access to cellular phone networks during emergencies. This actively prevents civilian usage from congesting the cell networks, thus allowing emergency services personnel priority for communications. It also serves to control information flow in and out of a declared emergency area in case of an incident.

Reliable access to the mobile networks, even during times when an exceptionally large number of calls are being made, is achieved by installing a special SIM (Subscriber Identity Module) card in the telephone handset. Special SIMs is available only to the entitled users within the emergency services community and not to the public. If networks become congested, handsets installed with a privileged access SIM will stand a much higher likelihood of being able to connect to their network and make calls than other customers.

In UK, ordinary cell phone users have numbers in the range 0 - 9. Higher priority users are allocated numbers 12-14. During an emergency, some or all access classes in the range 0 - 9 are disabled. If the overload condition continues, mobiles with access classes level 10, 11, then 12 and so on may also be disabled by the cellular network operator. In the United States Verizon Wireless uses access classes 0-1 for emergency as well as Government-privileged use.

As ACCOLC can has a limitation that in case of network overload normal network users are not able to make calls and therefore in UK this system is normally initiated after careful consideration. It may be noted that not all regular mobiles calls are prevented. Calls to an emergency services number (911, 112, 999) will get through. MTPAS is only available to Category 1 and 2 Responders (as defined in the Civil Contingencies Act 2004) and partner organizations which directly support them at the scene of an emergency incident.