

**Telecommunications and Internet Protocol
Harmonization Over Networks (TIPHON) Release 4;
Emergency Priority Telecommunications Service (EPTS);
Part 1: Requirements analysis**



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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

The present document is part 1 of a multi-part deliverable covering Emergency Priority Telecommunications Service (EPTS), as identified below:

TR 102 302-1: "Requirements analysis";

TS 102 302-2: "System Description for EPTS in TIPHON Networks".

1 Scope

The present document describes the requirements for emergency telecommunication capabilities sufficient to enable service providers to offer emergency telecommunication services on TIPHON networks that may safely inter-work with existing PSTN services while enabling more advanced services to be subsequently developed. The scope of the present document is limited to the emergency communications between authorities.

The present document forms part of TIPHON Release 4 and defines a set of functional requirements, objectives, and considerations for capabilities to support provisioning of Emergency Priority Telecommunications Services (EPTS) in TIPHON networks.

2 References

For the purposes of this Technical Report (TR) the following reference applies:

- [1] ITU-T Recommendation E.106: "International Emergency Preference Scheme for disaster relief operations (IEPS)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following term and definition applies:

authorized user: user authorized to access Emergency Telecommunications Services

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
EPTS	Emergency Priority Telecommunications Service
IP	Internet Protocol
MESA	Mobility for Emergency and Safety Applications
PSTN	Public Switched Telephone Network
TETRA	TErrestrial Trunk Radio Access
TIPHON	TElecommunications and Internet Protocol Harmonization Over Networks

4 Background to EPTS

Natural and man-made disaster events may occur at any time and in any place, and are by definition unexpected, but not necessarily un-addressed in emergency planning. Immediate response by government officials and emergency response teams to initiate emergency recovery operations is critical to saving lives, restoring community infrastructure, and coordinating government and relief operations. A number of telecommunication capabilities are essential to organize and coordinate initiation and deployment of emergency recovery resources. Initial response during the first hours of the disaster must depend upon public telecommunication capabilities that are readily available, in general, except in the most remote areas. Back up and supplemental capabilities can then be deployed, if needed, but valuable time slips by while they are put in place. In areas that have the benefit of an advanced warning or are identified as a high risk for a potentially serious disaster event, supplemental telecommunications facilities can be planned and put in place early. The requirements analysis provided in the present document addresses specific telecommunications capabilities required to support emergency recovery operations during serious disaster events. This suite of capabilities is identified as the Emergency Telecommunications Service (ETS).

Three types of communications for emergency situations have been identified by the ETSI EMTEL (EMergency TELecommunications) Ad Hoc Group. These are:

- Communication of citizens with authorities/organizations in case of distress (emergency call handling).

EXAMPLE 1: Access to Police, Fire department or Ambulance services by dialling a service code such as 112 (Europe) or 911 (USA).

- Communication between authorities/organizations during emergencies.

EXAMPLE 2: This includes communications between authorized users, and may require preferential treatment on public networks. This may also include the use of private networks of the emergency service.

- Communications from authorities/organizations to the citizens during emergencies.

EXAMPLE 3: Broadcast services (TV and radio) to address the general public.

This component of the EPTS is specifically intended to support communications between authorities to organize and coordinate disaster relief efforts using public telecommunications networks. The provisioning of EPTS in evolving networks includes establishing an interface between IP-telephony services and the traditional PSTN to ensure any existing emergency telecommunication capabilities are preserved in the new network environment. Transparent interoperation between both circuit-switched technology and packet-based network technology is essential, but the present document does not place any requirements on the existing circuit switched technology, e.g. PSTN/ISDN.

The service applications considered for EPTS include, but are not restricted to, speech telephony and enhanced multimedia services, Web access and database interactions, instant messaging and presence, Email, broadcast video, and telemedicine telemetry and video.

EPTS is intended to:

- be available to authorized users only;
- be available irrespective of the technology of the supporting network;
- process emergency traffic in preference to non-emergency traffic; and
- provide capability for multiple levels of signalling (if possible) and traffic priority.

It is recognized that a variety of telecommunication capabilities may be used to support emergency and disaster relief operations. Examples include:

- Public services, e.g. PSTN, TIPHON and 3GPP:
 - Wire telephony.
 - Mobile telephony.
 - Internet.

- Land mobile radio:
 - Trunked Radio Systems, e.g. TETRA.
 - Satellite communications.
 - Mobile broadband systems, e.g. MESA.
 - Amateur Radio.

Each of these capabilities has its own features and role in supporting the emergency and disaster relief efforts. On the other hand, no single telecommunications technology may fulfil all of the many aspects needed to effectively and comprehensively fulfil disaster relief requirements. The present document specifically addresses requirements for public telecommunication service capabilities to support communications among authorities for emergency and disaster relief operations. On the other hand, consideration also needs to be given to integration and interfacing with other communication capabilities to provide extended and enhanced coverage for emergency communications for disaster relief operations.

5 Objectives of the Emergency Priority Telecommunications Service (EPTS)

This clause provides a narrative description of the EPTS objectives that will provide effective telecommunication capabilities for emergency and disaster relief operations and mitigation.

5.1 Initial response capabilities

Local radio telecommunication capabilities are generally available immediately in populated areas for disaster recovery services such as, fire, rescue, and police activities. In addition, the ubiquitous public telecommunications facilities provide ready, at-hand services in most geographical areas except the most remote and undeveloped regions. While local mobile radio services have only limited area coverage, the public telecommunication services can immediately provide telephony, wireless, and Internet access to enable disaster relief operations to communicate widely. Therefore, the public telecommunications networks can be used for timely initial response actions to organize and coordinate recovery operations. In the new generation of public network capabilities, a richness of telephony and multimedia services can also be leveraged to help expedite and support emergency operations. EPTS standards will ensure the most comprehensive, effective, and beneficial services are available through public telecommunication networks.

5.2 Priority and traffic loading

The public telecommunication services are often severely stressed during many disaster events. The traffic volume from the general public increases dramatically and often the telecommunications infrastructure experiences extensive damage. The network becomes so congested that neither emergency nor general public traffic can be handled. Under these extreme conditions, local recovery operations and a number of local and national government activities need preferential access to the public telecommunication services. In addition, specifically authorized emergency traffic should be clearly identified and afforded a high probability of success through preferential processing and routing to the designated destination.

The EPTS may be considered a "virtual private network" that expands during an emergency operation to accommodate the immediate demands for communications by the recovery personnel. When the bandwidth becomes limited to the point that both emergency and general public traffic cannot be fully accommodated, non-emergency public traffic may be limited through denial of service. Some networks may also pre-empt public traffic on an optional basis, if and where allowed, to free up resources to support the EPTS traffic.

5.3 Multimedia services

Many different applications need to be supported by the EPTS capabilities in public networks. In addition to the traditional telephony medium-band voice service, a rich menu of multimedia services can be leveraged. These services support wide-band video applications, medium-band audio and data applications, and narrowband messaging and telemetry applications. The ability to select appropriate communication applications will enhance fulfilment of specific operational requirements and provide extensive flexibility in coordinating ongoing disaster relief operations.

5.4 Managing EPTS bandwidth

Under even more severe congestion EPTS communications may experience a degradation of service when the bandwidth cannot accommodate the full demand for emergency traffic. However, the service should be allowed to continue because it is better for emergency communications to proceed even when users experience degraded quality.

With the variety of different services having different bandwidth demands, there should also be a means of managing the use of limited bandwidth to support emergency operations. Three traffic classes can be considered for bandwidth management purposes:

- 1) narrow-band;
- 2) medium-band, and
- 3) broadband.

When the available resources do not accommodate all the demands, certain types of traffic could be terminated by the service provider in coordination with the disaster relief authority to enable additional bandwidth for more critical traffic while maintaining an acceptable quality of service. For example, the broadband video broadcasts from the disaster site could be terminated in favour of less demanding command and control traffic.

5.5 Authorized users

The Emergency Priority Telecommunications Service (EPTS) is intended to be available only for selected authorized users who could potentially be involved in recovery operations and government emergency support activities. Authorized EPTS users would be designated by an appropriate authority and could include fire and rescue resources, police, medical support, electric and other public utilities, telecommunication service providers, and government officials. The users attempting to initiate an emergency communication should be subjected to an authentication process to verify authorization before a communication request is processed.

5.6 Robustness

Public networks supporting an EPTS should be constructed in a manner that ensures robustness under the most severe conditions. These factors include:

- Survivability - the network resources and facilities supporting the EPTS should be able to resist the severe stress that can be experienced during disaster events and enable support recovery communications to continue.
- Reliability - the traffic processing resources should be of sufficient quality to resist failures during peak operations when bandwidth becomes severely congested.
- Restorability - network configurations and flexibility should be engineered to provide rapid and flexible capabilities for disaster relief operations to the level needed to handle the EPTS traffic load.
- Durability - the structural aspects of network equipment and facilities should withstand extreme physical and traffic loads that is often experienced during a serious disaster event.
- Availability - network resources should be flexible and diverse to ensure sufficient supply to support the operational demands of emergency recovery operations.
- Understandability - the inherent network capabilities should be engineered to ensure clear and clean quality of communications with minimal errors and distortion under a variety of network conditions.

5.7 National and international connectivity

Disaster events could be localized where the EPTS traffic is supported by only one service provider. However, some disasters cover wide areas that will involve multiple service providers. The demand for recovery support resources is often well beyond the capability of the local area where the disaster event occurred. Recovery resources may be required from distant locations within a country or even across national boundaries between countries. Often widely distributed emergency recovery resources respond to assist with recovery operations. Therefore, compatibility and interoperability among telecommunication service providers nationally and internationally needs to be established to ensure effective organization and cooperation for disaster relief activities.

5.8 Network security

All authorized users should be authenticated upon initiation of an EPTS communication. This process should be fast and easy to accomplish.

NOTE: Some existing EPTS applications in the PSTN use a cumbersome authentication procedure. User authentication for new networks should implement improved techniques to significantly streamline the process.

The processing of EPTS traffic needs to be protected against deliberate interference. Measures should be provided to prevent spoofing, injection of unauthorized traffic, denial of service attacks, and protection of content as well as source of certain sensitive traffic.

5.9 Ubiquity and mobility

The public telecommunications infrastructure may serve as a primary medium for supporting disaster relief communications because public networks are readily and immediately available in most geographical regions except the less developed and remote areas. Public telecommunication access may be the only capability at hand during the initial moments of a disaster event. Then additional supplemental telecommunication capabilities could follow through deployment to the disaster area to further support recovery operations. Therefore, additional provisions may also be beneficial for interfacing the supplemental transportable, redeployable, and fully mobile communications capabilities with the EPTS provided by public telecommunication networks. This will provide important flexibility for temporarily integrating various systems together and leveraging the best and most useable media at hand for supporting EPTS communications.

NOTE: In geographical regions where a public telecommunications infrastructure does not exist or in developed regions where the disaster event destroys the network infrastructure, deployable telecommunication capabilities may be the only alternative available for authorities to communicate.

6 Functional requirements for the Emergency Priority Telecommunications Service

This clause defines the requirements for provisions resulting from the narrative analysis in clauses 4 and 5 of the present document.

- Preferential Session Treatment.
- Security.
- Applications supported.
- Inter-domain communications.
- Mobility.

6.1 Preferential session treatment

The requirements for preferential communications session treatment are:

- EPTS signalling and traffic shall be explicitly labelled:
 - the EPTS traffic and label should be standardized; and
 - processing of traffic or signalling displaying EPTS label should be standardized.
- Efforts should be made to complete the EPTS sessions, and can be achieved by provisioning one or more of the following methods:
 - Multilevel priority schemes.
 - Preferential session establishment.
 - Preferential session completion.
 - Pre-emption of non-EPTS sessions.

6.2 Mobility

The authorized users shall be able to access the EPTS services from any terminal at any location.

6.3 Security

The authorized EPTS users shall be authenticated. The authentication method should consider the following:

- The authentication should be performed based on credentials provided by the EPTS users and maintained by EPTS authority.
- The authentication operation should not significantly delay access to communications resources.

An EPTS user may be authorized access to EPTS for a predefined period of time, i.e. an authentication session may encompass many communications session.

The media streams of the ETS traffic shall be protected against eavesdropping and repudiation.

The profiles, facilities and capabilities defined as part of TIPHON R4 shall provide means to protect the calling and connected party identities.

The profiles, facilities and capabilities defined as part of TIPHON R4 shall provide means to protect the location of calling and connected party from exploitation by non-EPTS users.

6.4 Applications supported

Any telecommunications service or application may be tagged (labelled) as EPTS. Applications supported include, but are not restricted to:

- Real-time interactive communications, e.g. telephony, video telephony, whiteboard.
- Non Real-time interactive communications, e.g. Chat.
- Streaming Multimedia services.
- Non-interactive services, e.g. web access, database access.

6.5 Inter-domain EPTS communications

EPTS shall be supported across technology and ownership domains.

Annex A: Bibliography

- IETF RFC 3261: "SIP: Session Initiation Protocol".
- ITU-T Recommendation H.323: "Packet-based multimedia communications systems".
- ITU-T Recommendation H.248: "Gateway control protocol".
- ITU-T Recommendation draft F.706: "Service Description for an International Emergency Multimedia Service".

History

Document history		
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