

**Terrestrial Trunked Radio (TETRA);
Security;
Lawful Interception (LI) interface;
Feasibility study report**



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Foreword

This ETSI Guide (EG) has been produced by ETSI Project TETRA (EP-TETRA), and is now submitted for the ETSI standards Membership Approval Procedure.

It has been identified in the TETRA Lawful Interception (LI) workplan as an EP-TETRA internal feasibility study that identifies and establishes the basis of liaison in Police Cooperation Working Group (PCWG). It also is intended to review the suitability of the existing TETRA Inter-System Interface (ISI) work (based on QSIG) to the set of internal TETRA handover interfaces T1, T2 and T3. The intended customers of the report are the promoters of the LI work within the European Community (EC) and the members of EP-TETRA.

Introduction

The present document summarizes the environment in which a standard for Lawful Interception (LI) within TETRA exists. It identifies the roles and responsibilities of manufacturers, regulators, and operators (of networks and services) with respect to LI. It also outlines the technical content of the standard and identifies complexities that will be addressed.

The report advises that a detail stage 2/3 description of interfaces T2 and T3 in the form of sub-parts 2 and 3 to EN 301 040 shall be completed for TETRA and that a Technical Report shall be drafted to recommend particular content of the T1 interface.

It is noted that together T1, T2 and T3 form the internal LI interface of a TETRA network. In order to transport the data at each of these interfaces to the Law Enforcement Authority (LEA) a further handover interface should be defined. It is not clear if such an interface will be common to all ETSI standards (e.g. TETRA, GSM) with a technology specific mediation function, or if such an interface shall be an extension of the TETRA specific T1, T2 and T3 interfaces towards the LEA.

1 Scope

The present document identifies and examines the political, technical and environmental factors contributing to the development of a standard Lawful Interception (LI) interface for TETRA. In seeking to address whether or not the publication of such a standard is justified it examines the environment in which it will exist and indicates the actions that need to be taken to reduce the risk of working on the standard.

The document does not address the technical content of the standard itself, nor does it lay down any requirements for the environment, other than by recommendation.

2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] prEN 301 040, V1.1.1: "Terrestrial Trunked Radio (TETRA); Security; Lawful Interception (LI) Interface".
- [2] ETS 300 392-1: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice + Data; Part 1: General network design".
- [3] ETS 300 392-2: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice + Data; Part 2: Air Interface (AI)".
- [4] ETS 300 392-7: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice + Data; Part 7: Security".
- [5] ETS 300 393-1: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Packet Data Optimised (PDO); Part 1: General network design".
- [6] ETS 300 393-2: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Packet Data Optimised (PDO); Part 2: Air Interface (AI)".
- [7] ETS 300 393-7: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Packet Data Optimised (PDO); Part 7: Security".
- [8] prETS 300 396-6: "Terrestrial Trunked Radio (TETRA); Direct Mode Operation (DMO); Part 6: Security".
- [9] ETR 331: "Security Techniques Advisory Group (STAG); Definition of user requirements for lawful interception of telecommunications; Requirements of the law enforcement agencies".
- [10] ETR 363: "Digital cellular telecommunications system; Lawful interception requirements for GSM (GSM 10.20 version 5.0.1)".
- [11] ETSI DES/SEC-002311: "Lawful interception requirements for network functions. Version 1.4.1".
- [12] TS 101 232 V0.2.1: "Telecommunications Security; Glossary of security terminology".

- [13] ETR 330: "Telecommunications Security; A guide to the legislative and regulatory environment".
- [14] ISO 7498-2: "Information processing systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture".
- [15] European ITSEC Version 1.2, June 1991.
- [16] ITU-T Recommendation Z.100: "CCITT specification and description language (SDL)".
- [17] ITU-T Recommendation Z.120: "Message sequence chart (MSC)".
- [18] ETS 300 392-3: "Terrestrial Trunked Radio (TETRA); Voice + Data; Part 3: Inter-working at the inter system interface".
- [19] ETS 300 392-13: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice + Data; Part 13: SDL Model of the Air Interface".
- [20] ITU-T Recommendation Z.105: "SDL Combined with ASN.1 (SDL/ASN.1)".
- [21] TS 301 040, V1.1.1: "Terrestrial Trunked Radio (TETRA); Security; Lawful Interception (LI) Interface".
- [22] ETS 300 414: "Use of SDL in European Telecommunications Standards (Rules for testability and facilitating validation)".

3 Definitions and abbreviations

3.1 Definitions

The normative source for the definition of all security terms is TS 101 232 [12], for ease of reading some of the definitions from this are copied here.

For the purposes of the present document, the definitions given in the following subclauses apply.

3.1.1 Definitions from TS 101 232

content of communication: The information exchanged between two or more users of a telecommunications service whilst a call is established, excluding intercept related information. This includes information which may, as part of some telecommunications service, be stored by one user for subsequent retrieval by another. (ETR 331 [9])

handover interface: A physical and logical interface across which the results of interception are delivered from a network operator/service provider to a LEMF. (ETR 331 [9])

Interception (LAWFUL Interception): The action (based on the law), performed by a network operator/service provider, of making available certain information and providing that information to a LEMF. (ETR 331 [9])

interception interface: The physical and logical locations within the network operator's / service provider's telecommunications facilities where access to the content of communication and intercept related information is provided. The interception interface is not necessarily a single, fixed point. (ETR 331 [9])

interception measure: A technical measure which facilitates the interception of telecommunications traffic pursuant to the relevant national laws and regulations. (ETR 331 [9])

interception subject: A person or persons, specified in a lawful authorization, whose telecommunications are to be intercepted. (ETR 331 [9])

intercept related information: A collection of information or data associated with telecommunication services involving the target identity, specifically call associated information or data (e.g. user-to-user signalling information), service associated information or data (e.g. service profile management by subscriber) and location information. (ETR 331 [9])

Law Enforcement Agency (LEA): An organization authorized by a lawful authorization based on a national law to receive the results of telecommunications interceptions. (ETR 331 [9])

ALTERNATIVE DEFINITION:

A service authorized by law to carry out telecommunications interceptions. (ETR 330 [13])

Law Enforcement Monitoring Facility (LEMF): A law enforcement facility designated as the transmission destination for the results of interception relating to a particular interception subject. (ETR 331 [9])

lawful authorization: Permission granted to an LEA under certain conditions to intercept specified telecommunications and requiring co-operation from a network operator / service provider. Typically this refers to a warrant or order issued by a lawfully authorized body. (ETR 331 [9])

ALTERNATIVE DEFINITION:

Permission granted to a law enforcement agency under certain conditions to intercept specified telecommunications. Typically this refers to an order or warrant issued by a legally authorized body. (ETR 330 [13])

legal interception: The statutory based action of providing access and delivery of a subject's telecommunications and call associated data to law enforcement agencies. (ETR 330 [13])

result of interception: Information relating to a target service, including the content of communication and intercept related information, which is passed by a network operator or service provider to an LEA. Intercept related information may be provided whether or not call activity is taking place. (ETR 331 [9])

security audit: An independent review and examination of system records and activities in order to test for adequacy of system controls, to ensure compliance with established policy and operational procedures, to detect breaches in security, and to recommend any indicated changes in control, policy and procedures. (ISO 7498-2 [14])

security audit trail: Data collected and potentially used to facilitate a security audit. (ISO 7498-2 [14])

system integrity: The property that data and the methods of handling the data cannot be altered or destroyed in an unauthorized manner.

system security policy: The set of laws, rules and practices that regulate how sensitive information and other resources are managed, protected and distributed within a specific system. (European ITSEC [15])

target identity: The identity associated with a target service (see below) used by the interception subject. (ETR 331 [9])

target service: A telecommunications service associated with an interception subject and usually specified in a lawful authorization for interception. (ETR 331 [9])

NOTE: There may be more than one target service associated with a single interception subject.

telecommunications: Any transfer of signs, signals, writing images, sounds, data or intelligence of any nature transmitted in whole or in part by a wire, radio, electromagnetic, photo-electronic or photo-optical system. (ETR 331 [9])

3.1.2 Definitions from TETRA domain

(TO) buffer: The temporary storing of information in case the necessary telecommunication connection to transport information to the LEMF is temporarily unavailable.

call: Any connection (fixed or temporary) capable of transferring information between two or more users of a TETRA system.

identity: A technical label which may represent the origin or destination of any TETRA traffic, as a rule clearly identified by a physical communication identity number (such as a telephone number) or the logical or virtual communication identity number (such as a personal number) which the subscriber can assign to a physical access on a case-by-case basis.

LI interface: A physical and logical interface across which the results of interception are delivered from a network operator/service provider to a LEMF.

NOTE 1: In ETR 331 [9] this interface is termed the handover interface. The term handover is used in TETRA systems to describe the maintenance of a call when the mobile party moves between cells.

intercept related information: A collection of information or data associated with TETRA services involving the target ITSI, specifically call associated information or data (e.g. user-to-user signalling information), service associated information or data (e.g. service profile management by subscriber) and location information.

location information: Information relating to the geographic, physical or logical location of an identity relating to an interception subject.

Private Mobile Radio (PMR): A radio system designed for a closed user group that is owned and operated by the same organization as its users.

Public Access Mobile Radio (PAMR): A radio system available to members of the general public generally by subscription. The owner and operator is unlikely to be the same as the user.

Public Network Operator (PNO): The operator of a public infrastructure which permits the conveyance of signals between defined network termination points by wire, by microwave, by optical means or by other electromagnetic means.

NOTE 2: To avoid confusion the term TETRA Network Operator may be used to distinguish the operator of a TETRA system from the operator of a traditional public network.

Quality Of Service (QOS): The quality specification of a TETRA channel, system, virtual channel, computer-TETRA session, etc. Quality of service may be measured, for example, in terms of signal-to-noise ratio, bit error rate, message throughput rate or call blocking probability.

reliability: The probability that a system or service will perform in a satisfactory manner for a given period of time when used under specific operating conditions.

result of interception: Information relating to a target service, including the content of communication and intercept related information, which is passed by a network operator or service provider to an LEA. Intercept related information may be provided whether or not call activity is taking place.

service provider: The natural or legal person providing one or more public communication services whose provision consists wholly or partly in the transmission and routing of signals on a network. A service provider need not necessarily run his own network.

NOTE 3: To avoid confusion the term TETRA service provider may be used to distinguish the operator of a TETRA system from the service provider in traditional public networks.

Target Group TETRA Subscriber Identity (GTSD): The identity associated with a target service (see below) used by the interception subject where the interception subject is a group.

target Individual TETRA Subscriber Identity (ITSI): The identity associated with a target service (see below) used by the interception subject.

Target Terminal Equipment Identity (TEI): The identity associated with a target service (see above) used by the interception subject where the interception target is an equipment.

3.1.3 Additional definitions

AP/NWO/svp administration centre: The administration centre contacted via the port HI1 (which may be partly electronic, and partly paper based depending on circumstances) that is used to setup the interception action on the LEA request.

Internal Intercepting Function (IIF): A function within the access provider's, network operator's or service provider's domain. There may be more than one IIF involved in the provision of interception.

Internal Network Interface (INI): An interface within the access provider's, network operator's or service provider's domain which exists between an IIF and the mediation function.

mediation function: A function which selects, sequences and transforms information, including content of communication when necessary, between a number of IIFs and the Handover Interface (HI). Sometimes the mediation function may be a null function e.g. direct delivery of the content of communication to the LEMF via HI3 with no changes.

wire tapping: The common name given in popular culture to Lawful Interception (LI). It is derived from the classical method of intercepting communications on copper wire hosted communication of breaking into the line and "tapping" off the communication content.

3.2 Abbreviations

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

ACTE	Approvals Committee for Terminal Equipment
BS	Base Station
CTR	Common Technical Requirement
DECT	Digital European Cordless Telephone
DMO	Direct Mode Operation
EC	European Community (of member states)
FIGS	Fraud Information Gathering System
GSM	Global System for Mobile communication
GTSI	Group TETRA Subscriber Identity
IIF	Internal Intercepting Function
ILETS	International Law Enforcement Telecommunications Seminar
INI	Internal Network Interface
ISDN	Integrated Services Digital Network
ISI	Inter-System Interface
ITSI	Individual TETRA Subscriber Identity
LEA	Law Enforcement Authority
LEMF	Law Enforcement Monitoring Facility
LI	Lawful Interception
LS	Line Station
MNI	Mobile Network Identity
MS	Mobile Station
NSO	National Standards Organization
PCWG	Police Cooperation Working Group
PMR	Private Mobile Radio
PSTN	Public Switched Telephone Network
RPDI	Radio Packet Data Infrastructure
SDL	Structured Description Language
SSI	Short Subscriber Identity
STEEP	Social Technical Economic Environmental Political analysis
STF	Specialist Task Force (formerly PT - Project Team)
SwMI	Switching and Management Infrastructure
TBR	Technical Basis for Regulation
TEI	TETRA Equipment Identity
TETRA	TErrestrial Trunked RAdio

4 STEEP analysis

The present document considers primarily the technical feasibility of writing a standard for LI interface in TETRA. However it is considered prudent that the external factors that define acceptance or rejection of the technical standard are also considered. This clause addresses in summary form some of the external issues.

The STEEP analysis considers the impact of the LI technology programme in TETRA from the following perspectives:

- Social;
- Technical;
- Economic;
- Environmental;
- Political.

This is not a detailed STEEP analysis report but is a summary of the findings of the study done.

A communications service provider is required to comply with the laws of the country in which he operates and in addition has an underlying duty of service to those members of the public that use his service. Therefore whilst LI may be required it should be managed within the service provider domain to ensure that the rights of privacy and service accepted by the customer are upheld. To ensure this, and to ensure that the service provider abides with the law, costs shall be incurred by the service provider.

The allocation of costs for LI to the subscriber base, to the target's host (whether service provider or network operator or a combination of both), or elsewhere, is outside the scope of the ETSI work. However the funding of an Specialist Task Force (STF) (formerly Project Team (PT)) by the EC for the sole purpose of defining a standard for LI is one way of ensuring that the cost of original design is withdrawn from the debate. It is clearly stated in ETR 331 [9], ETR 363 [10], DES/SEC-002311 [11] and TS 101 232 [12] that costs shall not be added to, or deleted from, the bill of the target. The size of the interface (capacity for simultaneous traffic interceptions) is a subject of national guidance or law, and may in some instances allow a network operator to charge on a pro-rata or other basis for provision of this service. This is again outside the scope of the ETSI TETRA LI work.

In provision the costs are in some senses not scaleable and LI will inherently raise the cost of all systems. This should be viewed as an unfortunate consequence of the cost of crime prevention and detection being borne by the innocent and should in no way be taken as a counter to LI provision.

The provision of LI facilities within all public networks is intended to modify the environment by making it hard to plan to commit crime using the telephone. It is widely suggested (see ETR 331 [9], DES/SEC-002311 [11] and ETR 330 [13]) that the provision of LI will make a (significant) contribution to the defeat of serious crime. The provision in any one network technology of a standard (and conformant) interface will further assist this social goal. If many technologies are held and maintained in a single place, as is the case with ETSI and the mobile (GSM, DECT, and TETRA) and fixed network technologies, then it is reasonable to have as much convergence between the technology standards as possible. This is achieved by the splitting to internal data collection/collation standards, such as the one proposed by the present document, and external data handover interfaces, as proposed in ETR 331 [9] and DES/SEC-002311 [11].

The technical considerations of the TETRA LI programme are discussed in more detail in the next clause. However in summary there are no technical impediments to the work although the lack of standards for the Switching and Management Infrastructure (SwMI)/Radio Packet Data Infrastructure (RPDI) side of TETRA, and the lack of a consensus on TETRA SwMI/RPDI implementation, may be a hindrance if disputes arise.

The political impact of provision of LI is considered as well. In summary there are many actors:

- criminals;
- victims of crime;
- law enforcement authorities;
- TETRA network providers;

- telecommunications service providers using TETRA networks;
- network licensing bodies;
- transit network providers;
- national governments;
- lobbyists for rights to free speech;
- international law makers; and so forth.

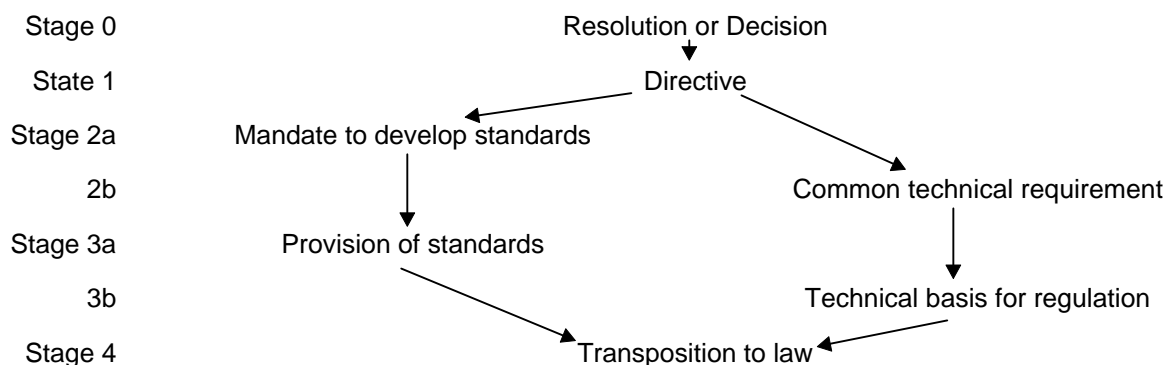
A political acceptance of standards for LI is assisted by common regulatory frameworks and by Common Technical Requirements (CTR). This is often poorly labelled as the CTR/Technical Basis for Regulation (TBR) path for law making and comes out of the European Council pillar II requirement to promote and maintain a common market for the sale of goods and services. Such considerations do not apply in the same spirit for law enforcement and may give rise to trouble in adoption of any standards for LI.

The debate regarding LI has so far been fairly restricted (within Europe). It is possible that by providing standards for provision of "wire tapping" and by making the provision of such facilities mandatory the debate will be widened and the technical arguments will become secondary to the political debate. This appears to have been true of the "clipper" chip debate in the USA. The normal ETSI 2-stage process makes the draft standard available to National Standards Organizations (NSO) who in their turn make it available to interested bodies. The mix of bodies who will be interested in a technical standard for LI may therefore not be restricted to technical bodies but may include political and journalistic groups with different interpretations of security and communication requirements to those considered thus far in TETRA.

5 Standards environment

There is a risk to the standards making process in the way in which LI requirements have been developed.

One conventional path is the following:



Within TETRA/ETSI there appears to have been a jump from stage 0 to stage 3a with stages 1 and 2 missed out and no consideration of stage 3b. This in part reflects the informal relationship of the LEA to the PNO that was common prior to the de-regulation of the telecommunications market.

In order to correct the work pattern and to ensure that all elements exist when provision of LI becomes mandated in European law by the EC, the following actions should be taken:

- 1) Conversion of EC resolution on LI to a Directive for provision of LI.
- 2) Preparation through ACTE of CTR/TBR work programme to provide basis for regulatory framework in provision of LI capability in telecommunications networks.
- 3) Acceptance of a Directive as a Mandate to ETSI to prepare standards for LI (done in principle for TETRA).
- 4) Provision of standards for LI (interfaces T1, T2, T3 plus testing standards for compliance to TBR/CTR).

NOTE 1: The Tn interfaces are broadly equivalent to the Xn interfaces defined in ETR 363 [10] for GSM, and may be considered as mapping through a mediation function to the Handover Interfaces (HIn) described in ETR 331 [9].

NOTE 2: The Tn interfaces are internal TETRA interfaces between TETRA and a mediation function or handover interface is required to map to the HIn of the LEA/LEMF.

The above activities will progressively reduce the risk of acceptance of the ETSI standards. In addition, and possibly introducing new and higher risks, the above actions will take the "ownership" of provision from the PCWG/ETSI to the governments of the EC and its member states.

5.1 Role of type approval and regulation

In proposing a European Norme (EN) as the final product of the LI work programme in TETRA it is fair to question the applicability of the present document if there is no conformance testing and certification of an implementation.

In a "common market" such as exists for the free movement of goods, services, and people in the European Union member states there has been considerable effort in defining common type approval mechanisms by means of the CTR and the TBR documents. These identify the minimum essential features and the tests required to prove their operation or presence of equipments. The regulatory route is often slow but is an essential tool of conformance testing.

In the case of a network with LI capability, proof of a complete and reasonable implementation of the EN shall require more effort than is currently planned for production of the EN.

6 Technical difficulty overview

The internal LI interface lies between the LEA and the TETRA network. The interface is made up of three components:

- T1: The "warrant" interface that identifies the party or parties to be intercepted, the duration of the interception, and the particular data types to be intercepted;
- T2: The call unrelated and call related data transmission interface;
- T3: The call content transmission interface.

The termination by the LEA of the T2 and T3 interfaces is not covered by EN 301 040 [1], nor is the physical nature of the interconnection.

NOTE 1: T1 will not be fully described other than by a draft proforma of data required.

NOTE 2: HI1, HI2 and HI3 are national interfaces and will be the subject of national standards outside the scope of the TETRA LI work.

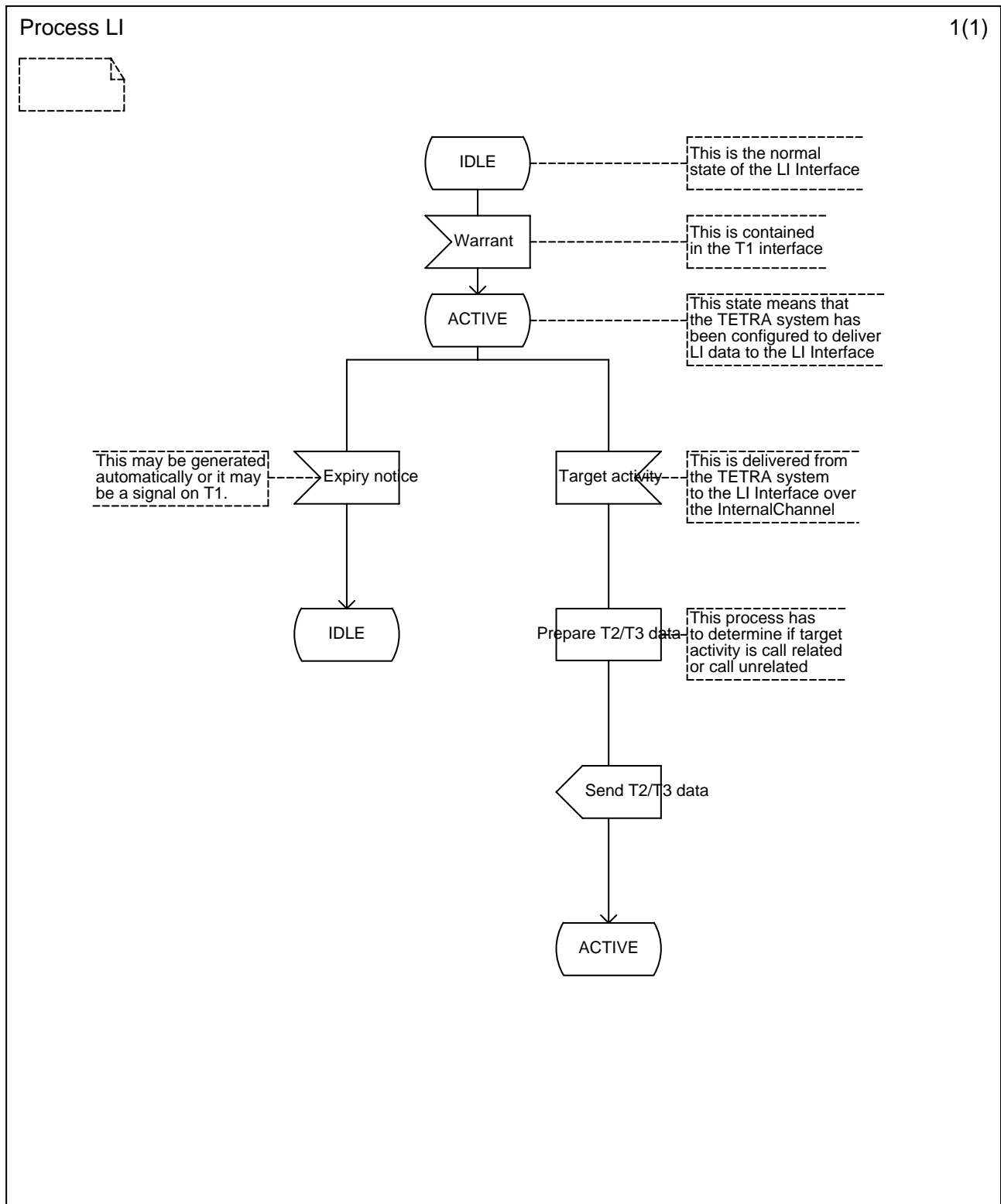


Figure 1: Simple process flow in TETRA LI Interface

Figure 1 shows the simplified flow chart for TETRA LI as indicated in TS 101 040 [21]. The bulk of the technical work is in defining the lower right hand leg of this chart. This is expanded in the extract from the first pass of the SDL description of the TETRA LI interface in figure 2. This shows the relation of this interface to the TETRA system and also shows the summary of the T1, T2 and T3 interfaces.

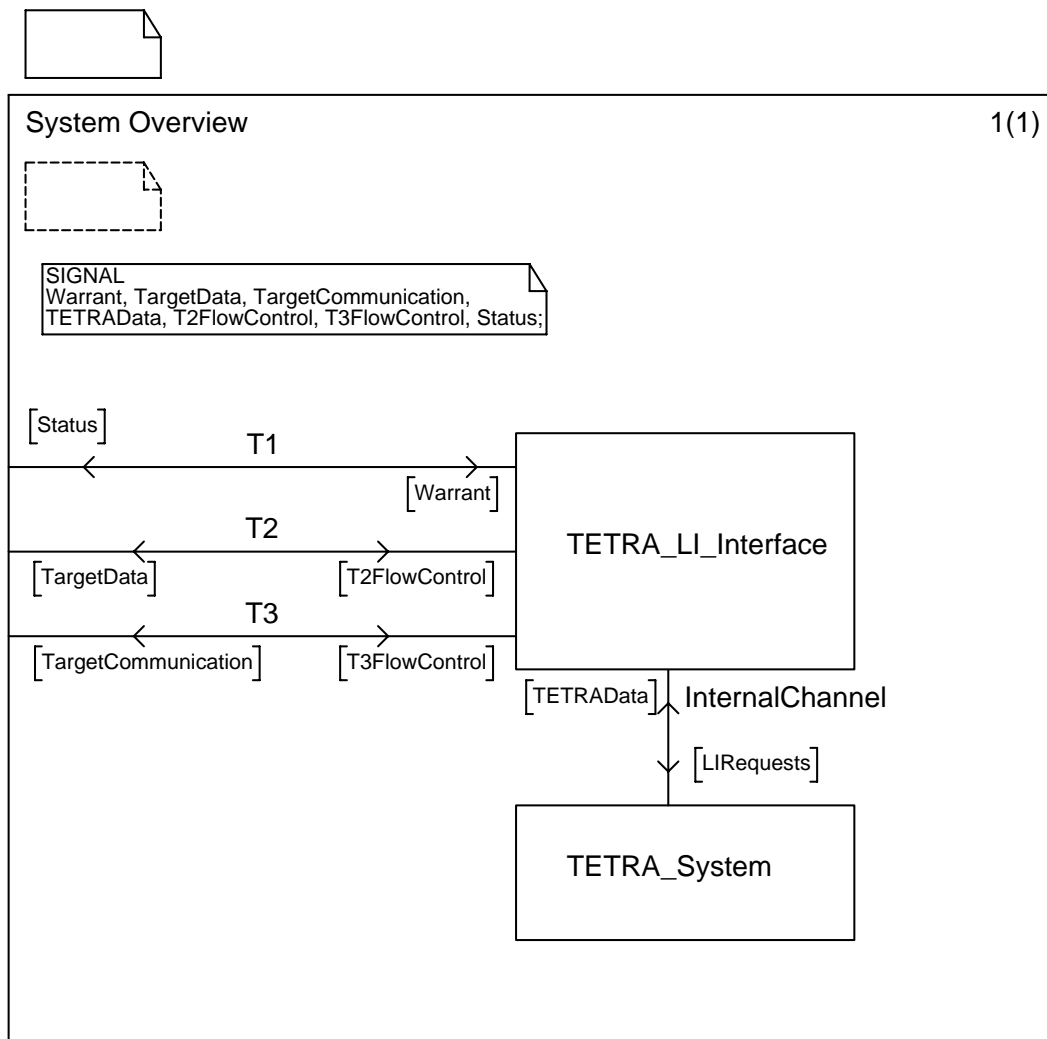


Figure 2: SDL extract showing relation of TETRA LI interface to TETRA system

The link between the T1, T2 and T3 interfaces defined for EN 301 040 [1] and the Handover Interfaces HI1, HI2 and HI3 is then shown in figure 2 (extracted and modified from DES/SEC-002311 [11]).

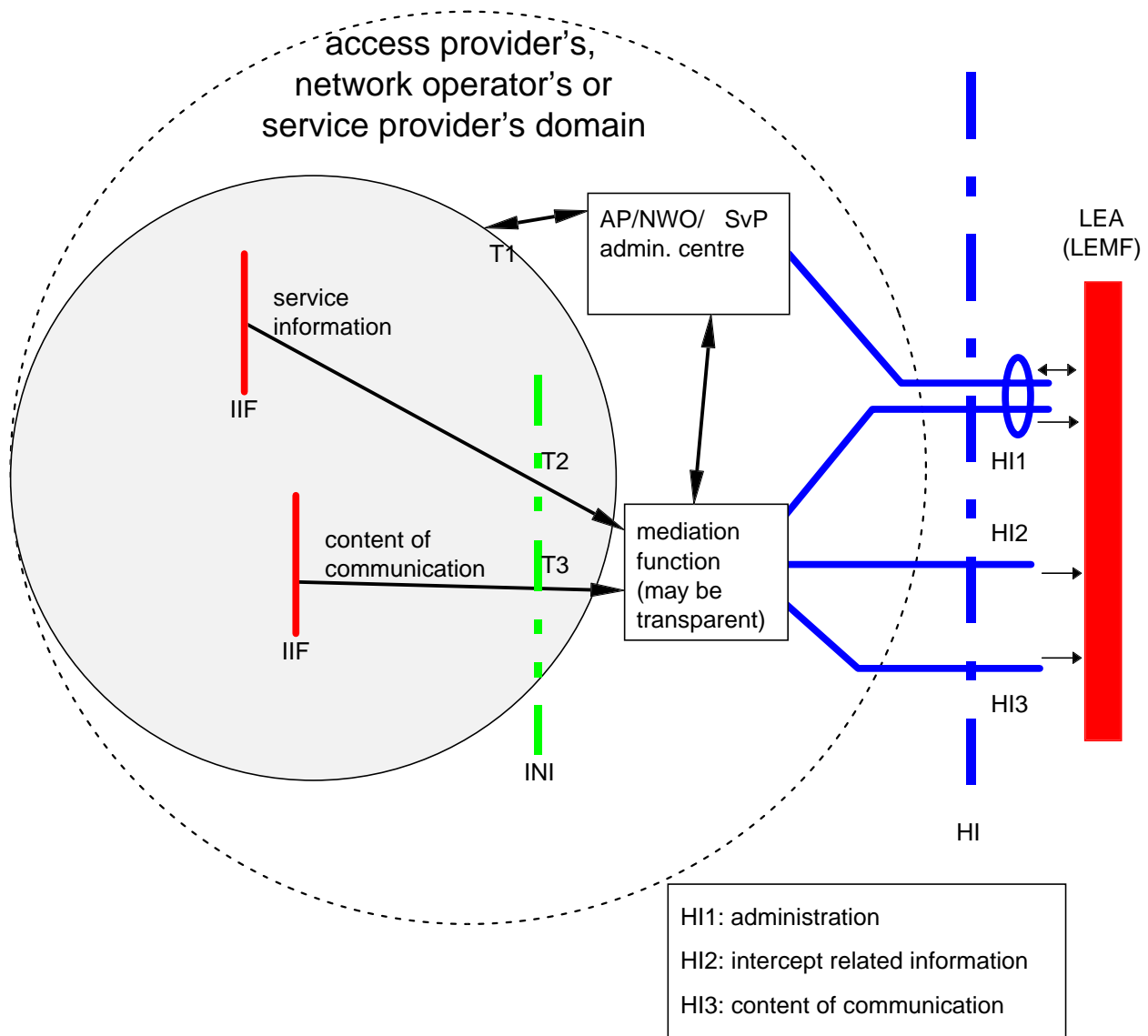


Figure 3: Relation of Tx interfaces to Handover Interfaces

The content of T2 is derived from information relayed over the interface between the TETRA SwMI and a user terminal (Mobile Station (MS) or Line Station (LS)) that allows or directs the user to do some or all of the following (summarized in EN 301 040 [1]):

- register for service;
- move between cells within a network (roaming);
- move between networks (migration);
- modify the service provided (by invocation of one or more supplementary services);
- withdraw from service;
- invoke calls;
- receive calls.

The T2 interface is mapped from the services offered in the C-plane of layer 3 of the TETRA protocol stack.

NOTE 3: The above description applies to both TETRA PDO and V+D systems.

NOTE 4: The above list is not exhaustive.

The content of T3 is derived from the traffic content of calls which may include some or all of the following:

- target communication to the network;
- communications to the target from the network;
- target communication to an end-user (or group of end-users);
- communications to the target from an end-user (or group of end-users).

The T3 interface is mapped from data offered in the U-plane of layer 3 of the TETRA protocol stack and from some data offered to some services in the C-plane of the TETRA protocol stack. In the T3 interface communication may be speech, circuit mode data, packet mode data, or prescribed status (short data) messages. The target may receive several communications concurrently.

NOTE 5: The above also applies to TETRA PDO with the exception of U-plane data as this does not exist for PDO.

6.1 Methods and outputs of technical work

The technical work should be carried out in as formal a way as is commensurate with the complexity of TETRA and with the environment in which TETRA shall interwork. In practice this means that formal or semi-formal description languages and representative models be used. Within the telecommunications domain, and particularly within the standards world SDL (see ITU-T Recommendation Z.100 [16]) is used, as are message sequence charts (see ITU-T Recommendation Z.120 [17]). The use of ASN.1 with SDL to describe data is also recommended (see ITU-T Recommendation Z.105 [20]). The particular use of SDL and associated tools for the production of standards is described in ETS 300 414 [22] to which the TETRA LI interface shall be aligned.

It is proposed that for the TETRA LI work that the SDL models used in the TETRA validation model (ETS 300 392-13 [19]) and in the TETRA ISI models (ETS 300 392-3 [18]) are taken as the basis of the work and extended to describe more fully the operations within the infrastructure required to support interfaces Tn. Of these two areas of work that done for ISI has concentrated on capture of data described in the air interface and considered its use within the SwMI (see also subclause 6.2).

6.2 Existing standards in the TETRA domain

There is a concern that, for development of standards within the TETRA infrastructure (SwMI or RPDI), there has been very little work undertaken to date. The provision of LI within a TETRA system shall explicitly make mandatory some actions of the infrastructure. Standardization of the TETRA infrastructure has, in the main, been avoided by participants in the TETRA standardization effort, and whilst there is no alternative other than describing standard behaviour in the network that hosts the LI interface, there may be some opposition to such an initiative.

6.3 Similar work in Private Mobile Radio (PMR) and other systems

An LI interface is being defined in ETSI project SMG for GSM and UMTS. Whilst there is some similarity between TETRA and GSM, the match is not close enough to ensure inter-changing of LI specifications. However, there is considerable scope for interchange of ideas and development of a common ETSI technical interpretation of requirements.

Within public TETRA systems, there is very likely to be a requirement for billing systems and for engineering fault tracking systems. In both cases the data collected is very similar to that required for the T2 interface, i.e. it identifies what a subscriber is doing, where, when and for how long. However LI is not data logging but real time data reporting with constraints of security to access and delivery. Data structures and data access mechanisms will in all probability exist in some form within a TETRA design that will be able to fully support the LI interface defined by ETSI.

The use of intermediate network and data link layer protocols is not fully defined within a TETRA SwMI. The ISI protocols are built upon QSIG. However the purpose of the mediation function is to take some arbitrary (but defined) TETRA LI data and to deliver it over one of a set of standard HI physical interfaces. To minimize the work required in the mediation function the T2 and T3 interfaces should fall closely into line with a standard link protocol such as QSIG, or Intelligent Network Application Protocol (INAP), and the encoding rules for T2/T3 data should be considered in this light.

The suite of GSM standards in this area GSM 10.20 series, ETR 363 [10], and the work of TC-Security in ETR 330 [13], ETR 331 [9], and under work item DES/SEC-002311 [11] shall be carefully considered in the drafting of EN 301 040 [1] to ensure as far as possible ETSI wide convergence at the HIn point.

6.4 Summary

All data required for T2 and T3 exists. The mapping of the available data is complex but achievable. From a technical viewpoint the work is feasible, as such there are no technical grounds for not continuing with the work.

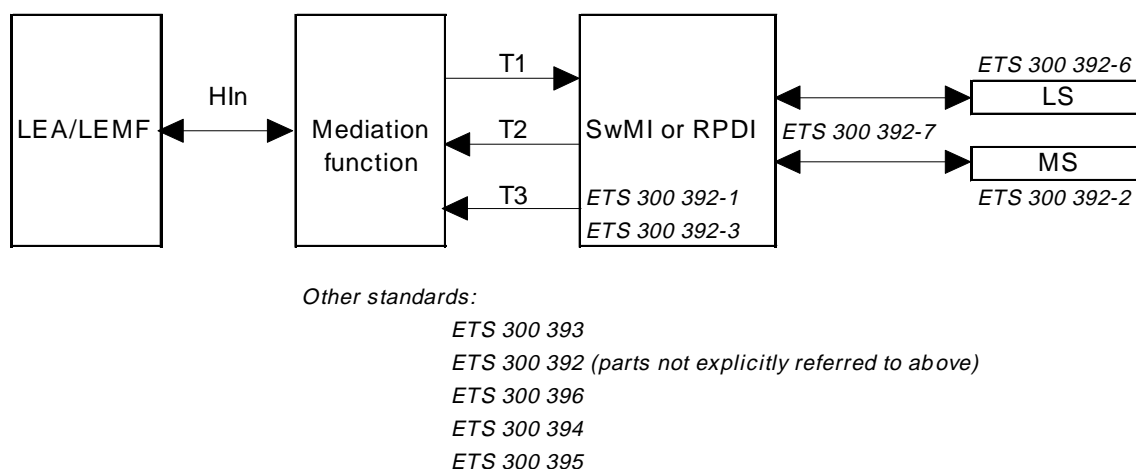


Figure 4: Interfaces and standards considered for LI interface

7 Customer identification

The "customer" of LI is the LEA, and perhaps more specifically the LEMF of the LEA. However the provider of the LI interface is one of:

- the network operator;
- the service provider;
- the network operator and the service provider in tandem.

This is by far the most complex part of the LI interface, however it should provide no impediment to standardization when the following actions are taken:

1) Appointment of PCWG coordination officer:

- the role is to ensure that the technical nature of the Tn interface as defined within EP-TETRA is known to PCWG who shall act as the only representatives of the "customer" for EN 301 040 [1]. In addition requirements of the "customer" to ensure that EN 301 040 [1] does not exclude or prohibit any existing (and desirable) requirement should be passed to ETSI through this officer.

NOTE 1: Rupert Thorogood of the UK-DTI was elected to this role during the second meeting of the LI working group (August 12th, 1997).

2) Appointment of TETRA MoU coordination officer:

- the role in this instance is to ensure that the TETRA user, manufacturer, and operator community is briefed on the implications of having a LI interface provided within a network. Where appropriate this officer should lobby TETRA-MoU to advise national and European governments of implications for licensing or to seek clarification of licensing issues.

NOTE 2: There is no security group within the TETRA-MoU to liaise with at the time of writing. It is recommended that such a group exists to fulfil the liaison role.

3) Appointment of TC-Security liaison officer:

- this officer shall ensure as far as possible harmonization of EN 301 040 [1] with similar standards from other parts of the ETSI community.

NOTE 3: Robin Gape of BT was elected to this role during the second meeting of the LI working group (August 12th, 1997).

It should be noted however that if the suggestions of clause 5 are taken that there may be a revision of "customer" and a requirement for the above roles to be reduced in scope and other coordination roles to be defined.

8 Assessment of support

The TETRA LI interface has the following support:

ETS STF112, 1 full time expert for 9 months

In addition support is required from a number of organizations to formalize EN 301 040 [1], to act as coordination or liaison officers, and to support the STF and ETSI for clarification of technical and/or political matters.

The following list indicates those EP-TETRA members currently supporting the work by attendance at working group meetings:

- BT (part time);
- Dutch Police Telecommunications Office;
- KPN Research;
- Motorola;
- Nokia;
- Simoco;
- UK DTI;
- UK Home Office.

PCWG are represented in this group by the attendance of the DTI and of the Dutch police.

8.1 Non-ETSI member participation in work

Not all of the members of PCWG are members of ETSI yet they may act as customers and as drivers for the standard.

The rules of ETSI suggest that members, having agreed to the work-programme, will not undertake to work on competing national standards. This means that for example in TETRA manufacturers working on the standard shall not work through their NSO on a competing standard. If however a member of PCWG attempts to have a local standard adopted by their NSO in Europe that attempt shall fail.

The NSOs are each members of ETSI and have the role to transpose ETSI standards written in a common regulatory environment into national standards. The available LI directives from Germany and from the UK do not come from the NSO (DKE - Deutsche Elektrotechnische Kommission in DIN und VDE, and BSI respectively).

It is recognized that the PCWG have taken a very positive stance towards ETSI on matters relating to standardization of LI measures. There has been established, since a meeting in Amsterdam in July 1997, both formal and informal liaison between ETSI and the PCWG. ETSI further recognizes that the geographical scope of PCWG's work is wider than Europe and shall make reasonable allowance for this in the expectations of their involvement.

It is important that all contributors to the TETRA LI work are aware of and conform to the rules of procedure of ETSI. It is also important for ETSI to extend invitations and welcomes to non-members to help with this work.

NOTE: The TETRA standard refers to only T1, T2 and T3 which will be driven in the technical areas primarily from the STF (see subclause 8.3) and with manufacturer and operator support. End users, in this instance the LEAs who may not all be ETSI members, will be primarily addressing requirements and acceptance.

8.2 Availability of appropriate documentation

Some of the scenarios discussed and taken into account in the technical realization of the final ETSI standard may be of a sensitive nature either nationally or politically. Whilst it is clear that it is a TETRA standard that should be published in an open way (i.e. without restriction to particular readers or nations) some of the source material required for consideration may be contained in restricted documents which should be released to ETSI, or to the project team, for assessment.

8.3 Further support within TETRA

The TETRA project has a number of Specialist Task Forces (STFs) and the TETRA-LI project will be able to call upon their technical expertise when appropriate. This will be of particular benefit in understanding or interpreting the existing standards.

In addition EP-TETRA has a number of dedicated working groups available either through formal liaison or through the EPT plenary sessions to assist and review the work of the group.

9 Conclusions and recommendations

The following conclusions are reached:

- 1) there are no technical impediments to the work;
- 2) the structural framework to the standards work is incomplete;
- 3) support exists within EP-TETRA and in PCWG for the work.

In light of the above the following recommendations are made:

- 1) EP-TETRA to write to ACTE asking for guidance on CTR/TBR status of TETRA-LI;
- 2) EP-TETRA to appoint a liaison officer to TETRA MoU for matters relating to LI;

NOTE: This may require that EP-TETRA encourage the TETRA MoU to establish a security group.

- 3) endorse the decision of EPT.6 to continue on steps 2 and 3 of the technical work.

Annex A (informative): Workplan - text

NOTE: This annex has been taken from working paper EPT.6 LI(97)07 and maintains the use of the word "shall" which would normally be considered normative. In the context of this annex however it should be read as supporting information to the main text.

A.1 Manpower

The project shall be staffed from members of the ETSI community, in particular those members having an interest in TETRA, security and regulation. Consistency of personnel is crucial to the project and changes in key personnel (for example loss of expertise from the ETSI STF) may be damaging to the success of the project.

As befits the nature of the work the project structure is inherently "chaotic" with much of the work being done by isolated groups with occasional contact by e-mail, document exchange and face-to-face meetings. Such groups need a rigid reporting framework to work in the best interests of all participants. In the particular case of LI in TETRA the roles, authorities, and key personnel are as outlined below.

A.1.1 Project authority

The project shall be managed by STF 112 on behalf of the EP-TETRA Security working group. The authority for production of deliverables to EP-TETRA shall lie in the management. The content of all deliverables shall be approved by the LI subgroup of the EP-TETRA security group prior to EP-TETRA member approval. Approval of deliverables by EP-TETRA shall release documents to the ETSI 2-stage approval process of public enquiry and vote.

NOTE: STF 112 co-ordinates its activities through the ETSI TETRA Project Co-ordinator.

The normal method of approval of deliverables within ETSI is by consensus and where this cannot be achieved voting shall be used as per the relevant ETSI rules.

A.1.1.1 Project liability

The deliverables of the project shall be published by ETSI but liability for the content of the deliverables shall be accepted by EP-TETRA following the approval cycle given above. Corrections and amendments to any of the published deliverables shall be addressed to EP-TETRA for consideration and action.

A.1.2 Key personnel

Scott W Cadzow	Project team expert to the TETRA security programme since June 1995.
Gert Roelofsen	Chair of EP-TETRA security group, chair of TC-SAGE at direction of ETSI, chair of TC-Security TTP group.
Rupert Thorogood	UK-DTI representative to Police Co-operation Working Group.
Robin Gape	Editor of TC-Security generic handover interface description.
Others	Members of EP-TETRA project teams 29, 91, 92 and 93 to assist in SDL and TETRA protocol comprehension.

A.2 Timescale

The project result (the standard for LI in TETRA) has immediate application. However, given the requirement to write a publicly approved standard of reasonable quality that reflects and maps directly to TETRA, the project is to be split into a number of phases.

Table A.1: High level WBS of TETRA-LI project

<i>Step</i>	<i>Start date</i>	<i>End date</i>	<i>Deliverable</i>	<i>STF effort</i>
1	August 1997	September 1997	Feasibility study	1,5 mm
2	October 1997	January 1998	Stage 2 and 3 requirements and solutions	4 mm
3	February 1998	May 1998	Stage 2 and 3 standard	2 mm
4	August 1998	September 1998	Resolution of Public Enquiry comments	1,5 mm

Step 1:

An EP-TETRA internal feasibility study that shall identify and establish liaison points in PCWG. It shall also review the suitability of the existing TETRA ISI work (based on QSIG) to the set of internal TETRA handover interfaces T1, T2 and T3. This will result in an initial report to the EC.

Step 2:

Output will be an EP-TETRA TS giving detailed requirements and solutions for the Stage 2 and Stage 3 descriptions of the TETRA LI. During this stage detailed requirements for each of T1, T2 and T3 will be discussed and approved with PCWG, TC-SECurity and SMG-10 where appropriate.

Step 3:

Collation of the output of stage 2 into a formal ETSI EN, and submission to Public Enquiry.

Step 4:

Post Public Enquiry resolution and preparation for NSO Vote and adoption.

A.3 Budget

There are 9 man-months of direct STF support to ETSI for this work. Additional budget of 9 months for development of the ACTE liaison documents (CTR and TBR), for development of a test specification (ATS, TTCN), and any other documents and/or liaison efforts, should be provided from ETSI members either by means of voluntary effort or by direct funding of an ETSI-STF.

The feasibility study report suggests that provision is made for regulatory use of the LI standard (and to allow type approval and conformance testing). This will require the following additional documents:

- PICS (possibly as an annex to the EN);
- Abstract Test Suite (ATS).

The latter will add of the order of a further 9 STF months to the project cost assuming that the tools and platforms described below are used optimally.

A.4 Tools and platforms

The project shall be undertaken using readily available PC tools. In particular the following tools are to be used:

- MS-Word;
- MS-Excel;
- Telelogic - Tau (SDT, ITEX).

Given that the nature of the work may involve storing nationally sensitive data, it is recommended that project data (documents) be stored on removable media. This media should be a Jaz-drive (as produced by the Iomega corporation) and can be hosted on any PC (or Mac) with a SCSI interface. This will incur a cost to the project as shown in table A.2 and shall consist of the following items of equipment:

Table A.2: Additional hardware items for TETRA LI Project

Item	Approximate cost (ecu)
Jaz drive (external)	460
Jaz cartridge (3 pack)	320
Adaptec AHA 2940 AU PCI SCSI controller card	260
Total	1 040

NOTE: ETSI has no facility to publish classified documents other than through the SAGE committee mechanisms and the above measure is seen as precautionary only.

The stage 2 and 3 descriptions of the LI interface (T2, T3 interfaces) shall be completed using SDL and MSCs as well as in descriptive texts. This shall facilitate more straightforward conversion when required to test purposes and test cases for any regulatory work.

A.5 Deliverables

The principal deliveries of the project shall be:

ETSI Guide	Step 1	Feasibility study report of LI interface in TETRA
TS 301 040 [21]	Step 2	Description of essential requirements, stage 1, 2 and 3 description of LI interfaces T1, T2, T3 in TETRA
EN 301 040 [1]	Step 3/4	Description of essential requirements, stage 1, 2 and 3 description of LI interfaces T1, T2, T3 in TETRA

In addition there shall be a number of regular and ad-hoc deliverables which shall include:

- Summary reports of all TETRA LI meetings;
- Session summary reports of PT progress.

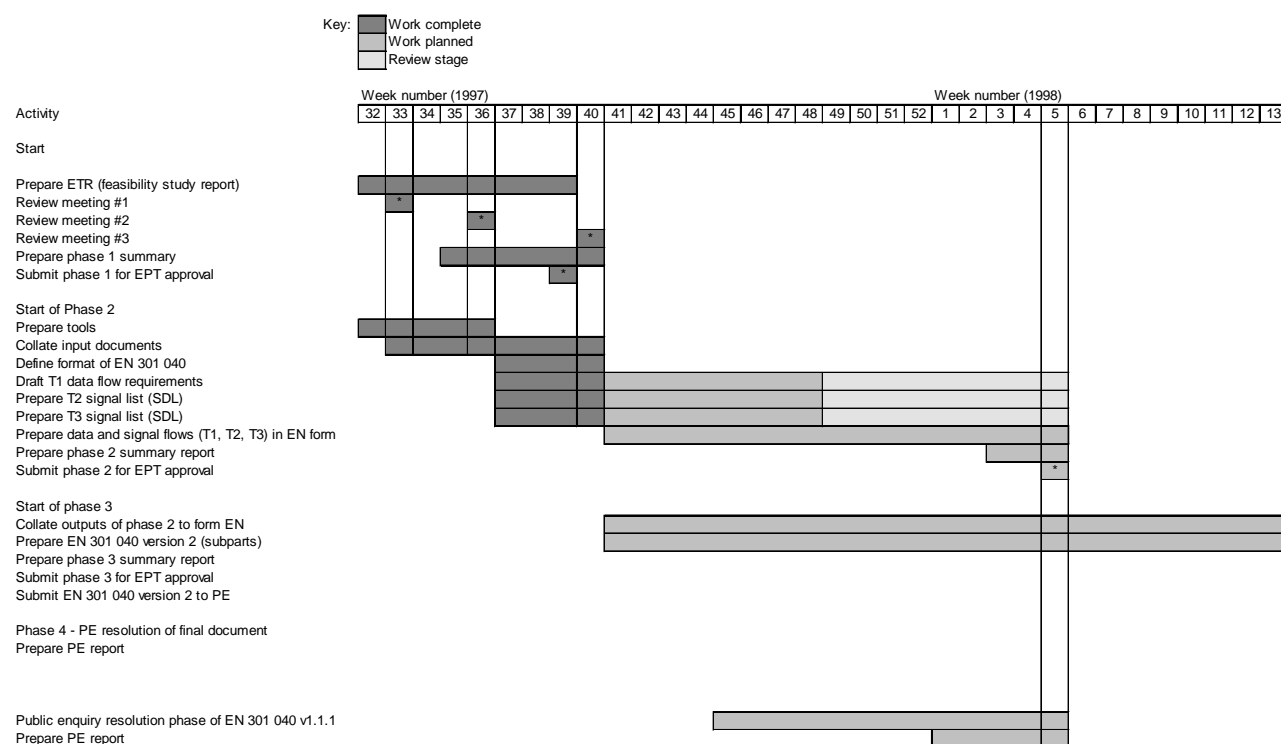
A.6 Change board

Any changes to timescale, deliverables, or context, shall be advised through the project authority to the security group of EP-TETRA. If any action has to be taken as a result, it shall be approved by this group and passed for ratification to the membership of EP-TETRA. In exceptional cases the full membership of EP-TETRA may be bypassed and decisions made on their behalf by the EP-TETRA Management Committee.

Annex B (informative): Workplan - Gantt chart

The Gantt chart below is an example of how the work is structured. It shows considerable paralleling of tasks to speed up the work. Updates of this plan will normally be reviewed during TETRA LI working meetings.

Project progress plan (Gantt chart) for TETRA LI, 09-October-1997



NOTES:

Milestones are marked by an asterisk and indicate also which documents will be reviewed at meetings

Annex C (informative): Terms of reference of STF-112

1997 TERMS OF REFERENCE FOR PROJECT TEAM 112 on TETRA Lawful Interception standardization

Detailed description

1. **Subject Title :** TETRA Lawful Interception Interface standardization
2. **Reference WB:** ETSI Project TETRA
3. **Other interested TCs:** TC-Security, SMG-10
4. **Duration:** The Project Team will work in 1997 and 1998 as follows;
 - a) stage 1: 1997 = Feasibility study.
 - b) stage 2: 1997/8 = Stage 2 and 3 requirements and solutions.
 - c) stage 3: 1998 = Stage 2 and 3 standard
 - d) stage 4: 1998 = Resolution of Public Enquiry comments

5. Necessary Manpower:

- Stage 1: 1,5 man months.
- Stage 2: 4 man months.
- Stage 3: 2 man months.
- Stage 4: 1,5 man months

Continuous co-operation will be maintained with the EP-TETRA Project Management Committee and the Working Groups. Primary reporting will be to the Security group of EP-TETRA (TETRA.6) with formal liaison to TC-Security and to SMG-10. The project team shall be drawn from the current group of TETRA security experts.

6. Context of the study:

In light of the Council Decision on Lawful Interception for all publicly accessible communications systems to provide lawful interception facilities it is required to provide a full and detailed description of the Lawful Interception interface in TETRA.

NOTE: In recognition of the nature of the work, involving as it does, access to national security procedures, it is suggested that some or all of the following security precautions are taken:

- 1) Data to be held on removable media (e.g. Syquest or Jaz drives);
- 2) Data to be stored when not in use in a secure (locked) environment;
- 3) Computers, where work is undertaken, are to be configured as standalone (i.e. to have no connections to internal or external networks which may be exploited).

In light of the above suggestions it may be required to provide the PT Expert(s) undertaking the work with two PCs. The final document (EN) may be unclassified (to be determined by the relevant customer bodies (PCWG et al)).

Stage 1:

An EP-TETRA internal feasibility study that shall identify and establish liaison points in PCWG. It shall also review the suitability of the existing TETRA ISI work (based on QSIG) to the set of handover interfaces HI1, HI2 and HI3. This will result in an initial report to the EC.

Stage 2:

Output will be a EP-TETRA Technical Report giving detailed requirements and solutions for the Stage 2 and Stage 3 descriptions of the TETRA LI. During this stage detailed requirements for each of HI1, HI2 and HI3 will be discussed and approved with PCWG, TC-SECurity and SMG-10 where appropriate.

Stage 3:

Collation of the output of Stage 2 into a formal ETSI EN, and submission to Public Enquiry.

Stage 4:

Post Public Enquiry resolution and preparation for NSO Vote and adoption.

7. Related activity in other bodies and necessary co-ordination of the schedules:

Co-ordination is required with STF29 (TETRA Project Co-ordination) and with the technical STFs of TETRA (STF91, STF92, STF93).

8. Scope of the terms of reference and relevant study of items:

- a) to assist EP-TETRA in the production of reports on digital trunked systems;
- b) to assist EP-TETRA in the generation of prEN(s) and Technical Reports;
- c) to assist EP-TETRA during the public enquiry.

9. Reference specification(s) and document(s):

- a) output documents of EP-TETRA and its working groups;
- b) ETS 300 392, ETS 300 393, ETS 300 396, ETR 300, EN 301 040 (TS 101 040).

10. Expected output(s):

- a) Whilst the project team is active, it shall produce progress reports to the EP-TETRA Project Management Committee;
- b) Initial Report for the EC;
- b) EP-TETRA Technical Report (DTR/TETRA-06033);
- c) EN for LI in TETRA (REN/TETRA-06029)

11. Proposed milestones:

Stage 1: September 1997 to mid October 1997

Stage 2: mid-October 1997 to January 1998

Stage 3: February 1998 to April 1998

Stage 4: August to September 1998

History

Document history		
V1.1.1	January 1998	Membership Approval Procedure MV 9810: 1998-01-06 to 1998-03-06