TSG SA TTY Workshop TTY Workshop (01) 0015
Dusseldorf, Germany 18th – 19th April 2001 Agenda Item: 3

Title: Comments on Operator Requirements and Issues
Source: Ericsson
Date: 18 April 2001
Status: For Action

This document contains the Operator concerns and Issues with comments from Ericsson in the form of changemarked additions.

Introduction

The US Federal Communications Commission's Fourth Report and Order on the Compatibility of Enhanced E911 Emergency Calling Services (Fourth Report and Order) requires US Operators to have obtained all software upgrades and hardware necessary to make our systems capable of transmitting 911 calls from TTY devices by December, 31 2001. The order provides US Operators with a six-month deployment window. Therefore by June 30th, 2002, TTY support for E911 is mandated.

The initial requirement is to support Baudot coding across the network. Enhanced protocols such as Turbo Code (developed by Ultratec) and Hispeed (Ameriphone) were for further study. At TTY Forum 17 in March 2001, TTY manufacturers agreed to default their apparatus to the Baudot code automatically upon connection to a cellular handset. Therefore, US GSM networks are only required to support the transport of Baudot coding.

Ericsson comment: The initial requirement is for Baudot coding in the PSAP end, as required in FCC 20.18. The solution in the Mobile Terminal end seems not mandated. On the contrary, the FCC requirements state that the Mobile terminal equipment may be a totally new design. This is also in line with Telecom Act Section 255 requiring functional equivalence with TTY as the primary option and TTY signal compatibility as a last resort.
This comment does not influence the current CTM location discussion much, but it influenced the design of CTM to allow Mobile Terminals support higher functionlity than plain Baudot terminals and having the Network to make the down-conversion.

This is the initial mandate for wireless emergency service access from section 20.18:

```
   (c) TTY Access to 911 Services : Licensees subject to this section must be
capable of
 transmitting 911 calls from individuals with speech or hearing disabilities
through means other
 than mobile radio handsets, e.g., through the use of Text Telephone Devices
(TTY).
```

End of Ericsson comment.

The Fourth Report and Order re-affirms the operators' need to comply with section 251(a)(2) and 255(b) of the Telecommunications Act of 1934:

Section 251(a)(2)

> *(a) GENERAL DUTY OF TELECOMMUNICATIONS CARRIERS.--Each telecommunications carrier has the duty--*
>
> > *(1) to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers; and*
> > *(2)* ***not to install network features, functions, or capabilities that do not comply with the guidelines and standards established pursuant to section 255 or 256****.*

Section 255(b)

(b) MANUFACTURING.--A manufacturer of telecommunications equipment or customer premises equipment shall ensure that the equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable.

Ericsson comment: Section 255 continues with services and the fallback into compatibility if you cannot provide the initial functional accessiblity and usability.

(c) TELECOMMUNICATIONS SERVICES.—A provider of telecommunications service shall ensure that the service is accessible to and usable by individuals with disabilities, if readily achievable.

(d) COMPATIBILITY.—Whenever the requirements of subsections (b) and (c) are not readily achievable, such a manufacturer or provider shall ensure that the equipment or service is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable.

(e) GUIDELINES.—Within 18 months after the date of enactment of the Telecommunications Act of 1996, the Architectural and Transportation Barriers Compliance Board shall develop guidelines for accessibility of telecommunications equipment and customer premises equipment in conjunction with the Commission. The Board shall review and update the guidelines periodically.

The following is said about "compatibility" in Section 255.

(b) The term *compatibility* shall mean compatible with peripheral devices and specialized customer premises equipment commonly used by individuals with disabilities to achieve accessibility to telecommunications services, and in compliance with the following provisions, as applicable:

(1) External electronic access to all information and control mechanisms. Information needed for the operation of products (including output, alerts, icons, on-line help, and documentation) shall be available in a standard electronic text format on a cross-industry standard port and all input to and control of a product shall allow for real time operation by electronic text input into a cross-industry standard external port and in cross-industry standard format. The cross-industry standard port shall not require manipulation of a connector by the user.

(2) Connection point for external audio processing devices. Products providing auditory output shall provide the auditory signal at a standard signal level through an industry standard connector.

(3) TTY connectability. Products which provide a function allowing voice communication and which do not themselves provide a TTY functionality shall provide a standard non-acoustic connection point for TTYs. It shall also be possible for the user to easily turn any microphone on and off to allow the user to intermix speech with TTY use.

(4) TTY signal compatibility. Products, including those providing voice communication functionality, shall support use of all cross-manufacturer non-proprietary standard signals used by TTYs.

From Accessibility Guidelines valid for Section 255. http://www.access-board.gov/telecomm/html/telfinl2.htm#39

Definition

Usable.
Means that individuals with disabilities have access to the full functionality and documentation for the product, including instructions, product information (including accessible feature information),

documentation, and technical support functionally equivalent to that provided to individuals without disabilities.
....

End of Ericsson comments.

Support for 711 services (Telecom Relay Services) is under discussion and the Fourth Report and Order brings attention to the support of TRS. With a TRS 711 service, a relay operator will act as the connection between a TTY user and a non-TTY user. In many instances a toll-free number is used by the non-TTY user to set up the TRS call.

While it appears that all network features, functions or capabilities should be accessible to and usable by individuals with disabilities, if readily achievable, the only requirement in the US which has a mandated time element is for the operators to have obtained all software upgrades and hardware necessary to make our systems capable of transmitting 911 calls from TTY devices.

Requirements

E911 Compliant – Most critical to the US Operators
Supports MO/MT TTY calls
Supports TRS service (“one-way” TTY)
Supports in-call TTY/Voice switching (e.g. Voice Carry-Over and Hearing Carry-Over)
Baudot signaling (no proprietary formats)
TTY feature transparency

Technical Solutions

The GSM TTY support solution has focused around the use of Cellular Text Modem (using ITU-T T.140 encoding) as the transport protocol across a standard voice channel. Because TTY terminals, 711 TRS centers, PSAPs and CALEA monitoring centers all use Baudot coding (one of the ITU-T V.18 modes), two CTM to Baudot conversion points are needed. The first conversion is at the GSM handset to allow CTM to be used across the air interface. The second conversion from CTM to Baudot must occur either at the call destination point (e.g. PSAP, 711 TRS, etc.) or within the GSM network.

The GSM technical bodies have opted to handle the requisite CTM/Baudot conversion within the GSM network and have proposed two solutions: 1) a transcoder based solution and 2) a network server solution. The TSG SA Plenary #11 agreed that is was inappropriate at this time to choose a single solution and supported a workshop to develop sufficient technical information to allow vendors to build interoperable equipment in support of either solution.

Transcoder Based

This solution places the CTM/Baudot conversion directly into the speech path within the Radio Access Network (RAN). This solution must be implemented on every transcoder in order to meet GSM TTY support requirements.

Based on discussions with vendors, there appears to be sufficient information contained in the most current versions of the CTM Specifications (3GPP TS 26.230 and 3GPP TS 26.231) to build interoperable equipment for a transcoder-based solution. However, to make the transcoder solution practical, some sort of CTM-enabled-transcoder pooling may be needed. Vendors are asked to comment as to whether it may be possible to put the CTM detection in to all transcoders, but perform a circuit "handover" or reassignment if CTM to Baudot conversion is needed (to a transcoder equipped with CTM to Baudot conversion).

Network Server Based

The network server approach adds a network node to the existing NSS in the GSM core network. All E911 trunks are routed through this server, providing E911 TTY support to any customer with a GSM handset capable of accessing the network. CAMEL is used to support the routing of non-emergency TTY calls from the NSS to the network server.

Most vendors agree that additional information is necessary in the specifications to allow a workable, interoperable server-based solution. Therefore, it is proposed the following issues be addressed at the Workshop.

Issues to be addressed by the Workshop

There are a number of implementation issues that must be addressed in order for the network server to be considered a viable solution. These issues include:

1) **E911 versus TTY support:** The timescales for providing support of E911 only TTY calls and providing full feature support using CAMEL must be evaluated, bearing in mind that the time critical mandate in the US is for making our systems capable of transmitting E911 calls from TTY devices.
   Ericsson comment: The service node is meant to be a rapid and good solution for E911, with one implementation for the whole network instead of different types for each transcoder manufacturer and type.
2) **Scalability:** The scalability of a server solution to handle both E911 voice and TTY calls, along with non-emergency TTY calls is questionable. For example, if all E911 voice calls are routed to the server, then the number of servers grows in proportion to the E911 voice traffic and not to the TTY traffic.

Ericsson comment: This problem is valid for a transcoder solution as well. It also increases in complexity with new types of transcoders coming in, new features competing to enter transcoder space and a new architecture with even new trancoder implementations and architectural issues. An identification on Text Emergency calls would be valuable but it has not yet been open for discussion.

3) **Call Looping:** In order to prevent infinite looping between the CAMEL server and the GMSC, the CAMEL Server solution proposes to modify the Calling Party Number to indicate that it has passed through the CAMEL server. This raises compatibility issues with Phase 1 Calling Number Presentation and also with the working of CALEA. We suggest that on a terminating call, any trunk to the CTM server could have IN suppression added, which will prevent looping. However, this would negate the use of any other CAMEL services the customer may have, and feature interaction needs to be studied.
Ericsson comment: The SCP treatment is changed to use a fixed code mechanism, not touching the Calling Party Number for decision on what part of the treatment it shall do. See proposal for Annex B to 23.002.

4) **Customer Provisioning:** By FCC mandate, all E911 TTY calls will be supported by the network without any customer provisioning requirements. However, non-emergency TTY calls will not be supported unless the TTY customer has requested TTY service from the carrier. This provisioning requirement causes GSM TTY support via the network server solution to differ considerably from the automatic support of non-emergency TTY calls provided by TDMA and CDMA systems in the US. How can non-emergency TTY support be provided for pre-paid subscribers.
Ericsson comment: For CDMA and TDMA international roaming has not been an issue. With Global systems like GSM and 3GPP networks, it is essential to be able to offer the same level of services to textphone users as to other subscribers. A CAMEL subscription was the only mechanism found that works today without any extra implementation requirement in the visited network. This may turn out to be essential for good service coverage also within the US. A lot of good things can be achieved by using subscriptions.

5) **Single Point of Failure:** All E911 calls (whether voice or TTY) are routed through the network server. In most implementations, redundancy of the server and its trunks will be required, adding to the server deployment costs.
Ericsson comment: Yes, the same level of redundancy and reliability is recommended on the service node as on other core network components. The size of traffic through the node is however a very small fraction of the total network traffic.

6) **Callback:** The Phase 1 and Phase 2 E911 standards require that the PSAP is able to call back the E911 caller. In the network server implementation, the caller must be registered as a CAMEL subscriber to be given a CTM circuit. Any inter-working should be done utilizing generic digits in the ISUP messaging (GAP etc.) to store the original called number. The CTM could then reformat the IAM. In this scenario CALEA and CLIP etc. are not affected by the "Interim node".
Ericsson comment: There is a discussion of the callback issue in the "architecture discussion" document for the GTT workshop. Additional mechanisms like the above proposal can be implemented if found required.

7) **Subscription Management:** CAMEL server requires the TTY user to have a known subscription type. It is envisaged that some CTM implementations at the mobile may consist of direct connection to the audio jack, such that a TTY user could use any existing or new mobile subscription.
Ericsson comment: Yes, there should be a convenient way for the user to add the text subscription properties to any subscription. Since the addition is according to standard subscriber data in the HLR it is expected that basic functionality for this exists. Ways to make that modification even easier for the user should be discussed.

8) **Carry-over:** Support of E911, TTY Voice Carry-Over/Hearing Carry-Over, and 711 TRS services may require the user to switch from voice to CTM and back again within the call. It is unclear how this is to be supported in the CAMEL solution.
Ericsson comment: This requirement for alternating text and voice exists also for the regular

user-to-user call. This is implied in the CTM design and described in CTM Description 3GPP 26.226. The principles for alternating text and voice operation is described in informative descriptions in ITU-T H.248 Annex F, referenced from CTM.

9) **CAMEL interaction:** If TTY is provided via a CAMEL mechanism, the changes required to other already deployed CAMEL services such as pre-paid must be assessed.

Ericsson comment: Yes, in CAMEL Phase 1, services with the same detection point interact. A solution is suggested in the proposed Annex to 3GPP TS 23.002.