Technical Specification Group Services and System Aspects *GTT(01)0003*
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Source : Ericsson[1]

Title: Global Text Telephony BSS location issues

Document for: Discussion

Agenda Item: 5

Summary

This document brings up for discussion some issues around the idea to place the CTM-to-Text Telephony conversion in the BSS located transcoder or close to them.A series of factors indicate that a location in the BSS is less favourable than the originally proposed Core Network location for this function.

1. **A BSS location causes limitations in service level** for text telephone users. Roaming will be limited to networks with physical installations of CTM.
2. **A BSS location causes character corruption and loss**. CTM was designed to cover the A interface gap between CN and BSS. Characters will be corrupted and lost in handovers when CTM is not used over the A interface.
3. **A BSS location causes national fragmentation of the 3GPP solution.** International text telephony support is not realistic to put in the BSS transcoders. National solutions create fragmentation of markets and services.
4. **A BSS location causes practical problems.** The function must be implemented in every voice channel in the access network. That creates practical problems with version handling in many different transcoder models, resource conflicts, resource waste, verification in many different environments etc.
5. **A BSS location is not specified.** No standards specification proposal exists specifying the solution and its characteristics.
6. **A BSS location does not cover the RNS network for UMTS.** Additional standardisation is needed for that case, where the conversion must take place in the Core Network anyway.
7. **A BSS location creates service gaps if combined with a Core Network location.** Applying both solutions for different networks or different parts of a network create service gaps, dropping of service at handover etc.

Proposal: Standardise only the Core Netork location of the CTM conversion for GTT.

Introduction

Real time, character by character text conversation is valuable in distant conversation. The GTT feature specifies how text conversation is introduced in a set of environments. One environment is the voice channel where GTT specifies CTM to be used for reliable transfer of text.

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1 Location of CTM for text telephone interworking

When satisfying the requirements for PSTN Text Telephone interworking with GTT-Voice, a conversion must be placed in the network between the PSTN terminal and the radio interface. The conversion is between CTM, and PSTN type of text telephone protocols. The PSTN textphone protocols are based on different low speed modem technologies and are defined in ITU-T V.18. CTM is a kind of robust, error tolerant modem technology suitable for voice channel transmission of real time text and is defined in 3GPP TS 26.226. The text is coded as specified in ITU-T T.140.

CTM and the conversion to PSTN text telephony was created with the view that it should be placed in a service node in the core network. This was reflected in the draft of 3GPP GTT Stage 2. TS 23.226, version 0.0.4.

A discussion has appeared about instead locating the CTM-PSTN conversion in the transcoders in the BSS. At first view, this looks possible.

However, there are a series of conditions that make the access network placement less favourable or even not feasible.

2 Requirements

The service requirements for GTT are documented in 3GPP TS 22.226 GTT Stage 1. The original requirements are in the annexes to that document.

3 Shortcomings of the BSS location of CTM conversion

The sometimes mentioned transcoder based solution is not documented. It is however assumed that a CTM – Text telephone modem pair is introduced in each voice path in, or in front of, the transcoder, on the BSS side of the A interface in the GSM architecture. It is monitoring the voice path for CTM and text telephone signals, and start its conversion actions when valid signals are detected. This allows voice to pass transparently until text appears. When text appears it is translated to the other form and translated. When text ceases, the channel returns to transparent voice mode monitoring for text again.

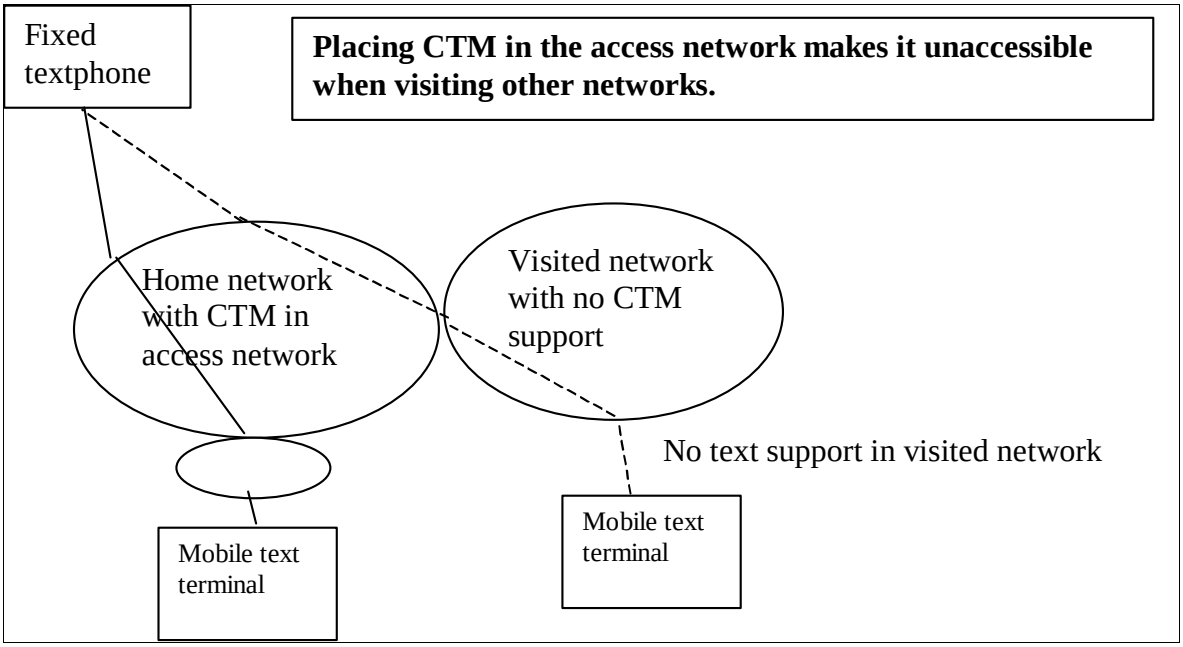
This assumed outline of the BSS location has some severe shortcomings that makes it less interesting for standardisation and implementation.

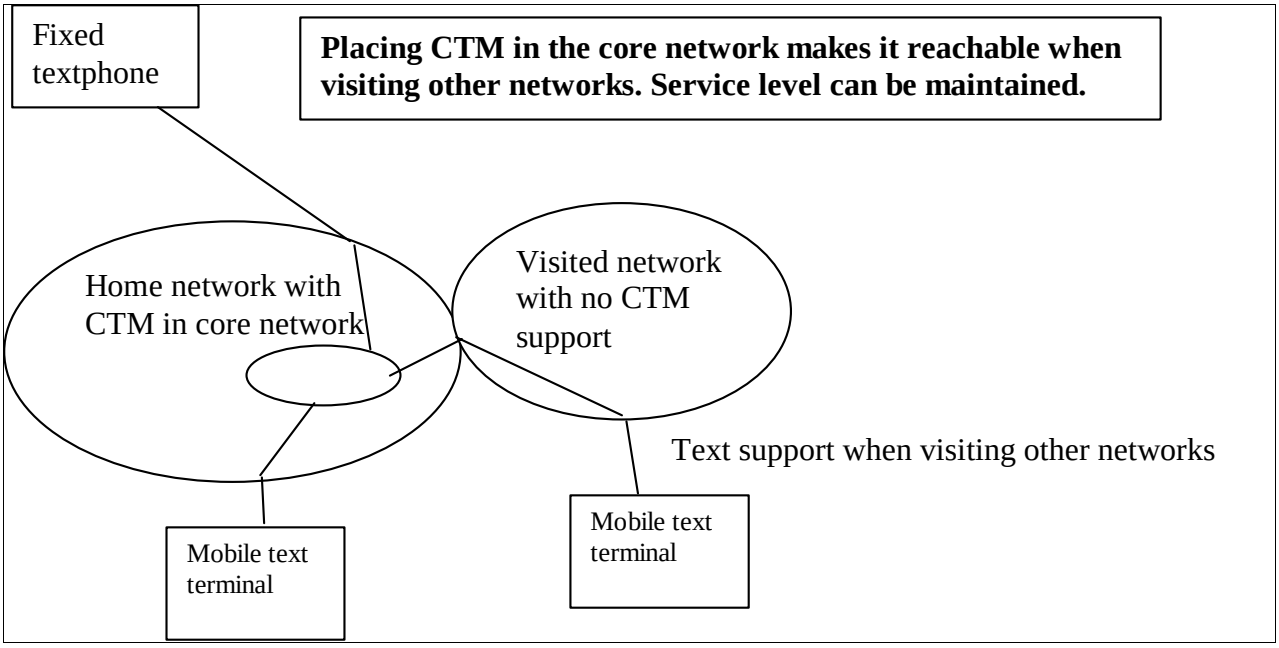
3.1 A BSS location causes limitations in service level for text telephone users.

Roaming will be limited to networks with physical installations of CTM. The result is uneven international coverage.

The BSS located CTM conversion can only act on calls with terminals in the network where it is implemented. This limitation is in stark contrast to the service that can be provided to voice users who usually are provided an opportunity to use the phone in international travel.

Since many of the users of text telephony have disabilities, there is an apparent risk that the users will feel discriminated by this limitation and even look for support for complaint from the existing and emerging anti discrimination acts or accessibility regulations.





3.2 A BSS location causes character corruption and loss.

CTM was designed to cover the A interface gap between CN and BSS. Characters will be corrupted and lost in handovers when CTM is not used over the A interface. .CTM was designed to cover the A interface gap.

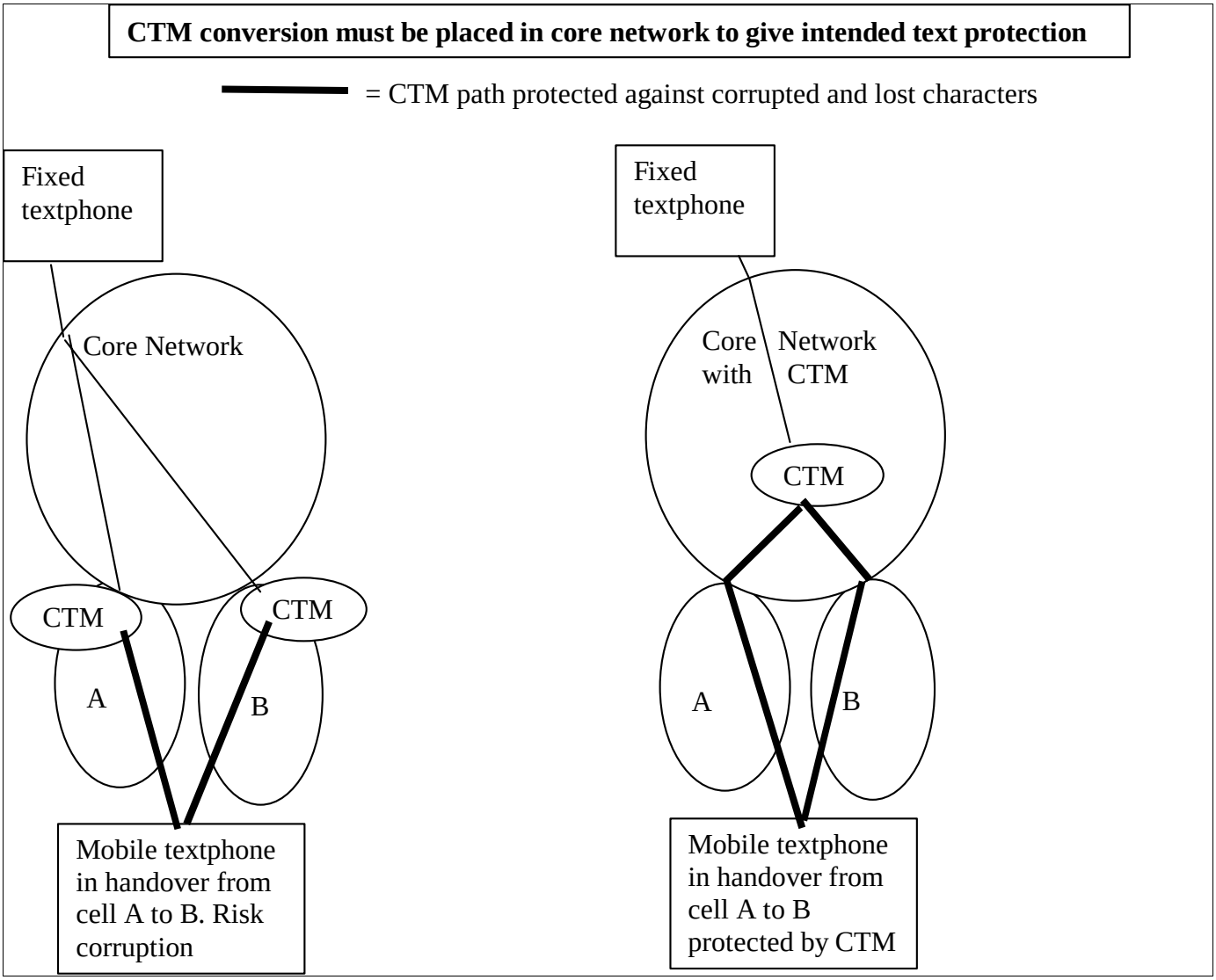
The goal of CTM design was to overcome the risk for character loss and garbling that are inherent to the mobile systems. One source for such distorsion is the handovers when the entities on the BSS side of the A interface are replaced. Letting the PSTN text telephone signals pass the A interface and place the CTM conversion in the BSS misses half the point with CTM.

The result can be excessive garbling and loss of characters, or even drop of the connection in the handover.

The text telephone modems contain states, and the state information would be lost. This means returning to a default state. It can either take some characters to regain state. (possibly up to 72 characters for the US Baudot text telephone although this high number is very unlikely), or it can mean a drop of connection (for the French Minitel textphone and many US Bell 103 based).

The handover also causes dropouts. The PSTN text telephone methods have no protection for dropouts, while CTM has a certain immunity to dropouts.

In summary, it is a waste of resources to put CTM in BSS where it can not do its full intended job to protect the connection against the disturbances in the mobile environment.



3.3 A BSS location causes national fragmentation of the 3GPP solution.

International text telephony support is not realistic to put in the BSS transcoders. National solutions create fragmentation of markets and services.

Internationally, seven different low speed modem technologies are used for text telephony. They are all collected in the automoding modem standard ITU-T V.18 that is emerging in new text telephones finally breaking the barriers against international calls experienced by text telephone users. A V.18 modem has around 16 different frequencies to monitor for with timings between 0.7 ms and 2600 ms. Even if the tones are simple and the logic is straight forward, it can be too much to expect to perform V.18 functionality in a transcoder initially designed for voice coding. Placing something more appropriate for V.18 and CTM functionality in the BSS seems less suitable, regarding the shortcoming described above, in that the CTM functionality is not fully utilized.

Limiting the functionality to only the initially urgently required US text telephone type Baudot 45 would be

meaningless in the Global Text Telephony environment. Only USA and Canada and some Latin American country have a dominating population of Baudot 45 textphones. Other countries need either full V.18 or other selected sub modes of V.18 for interworking. UK has a mix of Baudot 45 and V.21 based textphones and have decided to move to native V.18.

With native V.18 terminals spreading in PSTN, supporting natural speed of typing, a full character set and two way simultaneous text conversation, the users would feel hampered if the mobile text services put restrictions in these areas.

3.4 A BSS location causes practical problems.

If located in the BSS, the function must be implemented in every voice channel in the access network. That creates practical problems with version handling in many different transcoder models, resource conflicts, resource waste, verification in many different environments etc.

There are many models of transcoders in use. Both integrating the CTM conversion function in them, and attaching a CTM conversion function to them create practical problems to be solved for each model. Some might be old and limited and need to be replaced first to accomodate for the increase in functionality and load.

The development environment in the voice transcoder is sensitive. Any modification has an inherent risk of influencing voice quality for all calls. The projects for introduction of CTM conversion in this environment must be surrounded with time consuming and stringent testing and verification that must be repeated for all transcoder models.

The requirement picture is not completely stable yet in USA. The requirement to interwork with up to 10 year old PSTN textphones may create need for revisiting the design after initial deployment. Each such iteration will create a lot of work and project interaction with introduction of other new interesting features in the transcoders.

All these factors are of a kind that is usually not mentioned in standards specifications, but they can be kept in mind when selecting the solution to be standardised.

3.5 A BSS location is not specified.

No standards specification proposal exists specifying the BSS solution and its characteristics.

A proper specification of the characteristics of a BSS located CTM conversion is of course needed before any acceptance. No discussion has occurred yet in 3GPP for what specifications would be affected or need to be created, except when the same issue was brought up in SP-010174, and influence at least on GSM 08.02 was suggested.

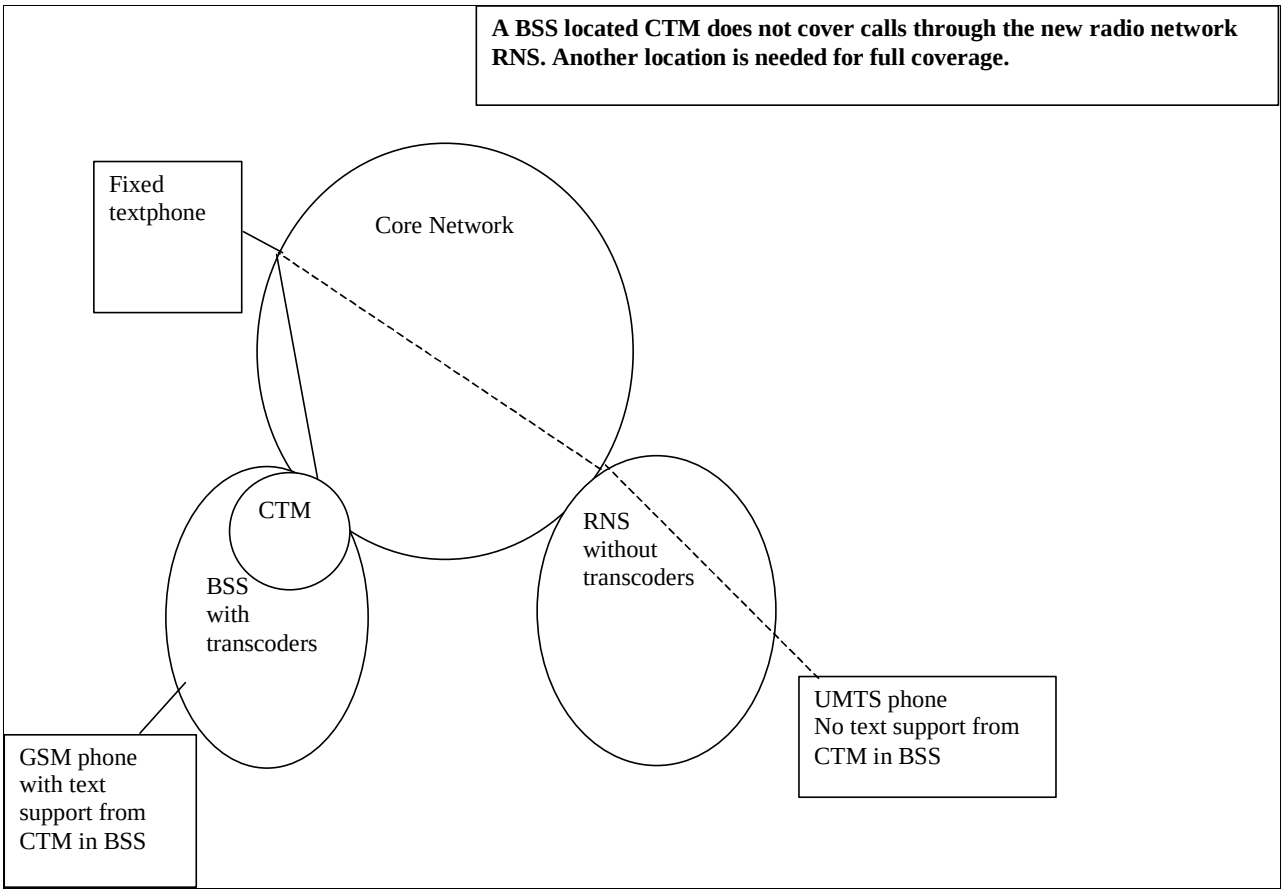
3.6 A BSS location does not cover the RNS network for UMTS.

If the urgent need would be solved by standardisation in BSS, additional standardisation is needed for the calls using the other access network, the RNS for UMTS.

We are aiming at standardisation for 3GPP release 4 or 5. In these environments we have two types of Access networks, the BSS and the RNS. Standardising for BSS would cover only part of the future network. Even if a BSS solution could be applied in early implementations in existing R-99 or earlier networks, standardisation for only BSS would immediately create white spots in service coverage when RNS is spreading. Standardising it for RNS also creates doubled standardisation and implementation work and different solutions because of the different architectures.

When using RNS, the only logical place for a CTM conversion is in the Core Network because the audio is coded for radio transport in the whole RNS and not suitable for analysis and conversion.

Thus, standardisation for BSS location requires also a Core Network location to be standardised.



3.7 A BSS location creates service gaps if combined with the Core Network location.

Applying both solutions for different networks or different parts of a network create service gaps, dropping of service a't handover etc.

Specifying both a BSS location and a CN location is possible, leaving it open for manufacturers or operators to select solutions introduces some risks of reduced service level for the users.

A couple of scenarios can be taken as examples, with the assumption that the CN solution acts as the example in the proposed GTT Annex to 23.002.

- A subscriber from a BSS-only network will only get emergency support in a CN-oriented network. This is because the user need a text subscription to be added to the subscription to get support for user to user calls from the CN-oriented network, and the home network does not provide roaming support for text users.

- In a network with components from different manufacturers, it may look tempting to let the manufacturers decide on the solution for their part. If a network contains both solutions with the CN solution as specified today, the CN solution would come in and act on all text calls, making the BSS solution unnecessary. Double CTM do not hurt the communication, one will go inactive, but it is a waste of resources. It is easy to install it so that emergency calls are handled in only one location, but then there is a risk of dropping service in a handover from a CN-supported area to a BSS-supported area. For user to user calls there is no straight forward way of avoiding double CTM invocation.

4 Proposal

All the described shortcomings of the BSS location of the CTM conversion indicate that a proposal to standardise only the Core Network location of the CTM location is the right way ahead.