Concerns about Realizing the Benefits of eCall that Requires Your Attention and Actions

Date: May 21, 2007

Executive Summary

In standardizing the data transfer technology to be used for the EU's pan-European eCall system, the European mobile network operators concluded that a solution based on in-band modem was the preferred way forward. Accordingly, the 3GPP currently are deciding between the two "flavors" of in-band modem identified, only one of which meets or exceeds all of the requirements. To protect the interests of EU citizens, the European Commission and Driving group eCall, this memo describes the current situation in 3GPP and provides an overview of the main issues impacting this choice. We would like to express our concerns and request your action to help prevent the 3GPP from deciding on a data delivery method without a proper analysis of the choices.

Overview

Over the past 24 months, working groups in the 3GPP have studied eCall and developed service requirements necessary for an effective and future-proof eCall data transport solution. Under these requirements, two varieties of in-band modem are being considered: Cellular Text Telephone Modem (CTM) and Voice-Band Modem (VBM). At the recent S4 working group meeting, several companies attempted to draw conclusions favoring CTM based on only a cursory analysis of the choices, and without giving due consideration to the fact that VBM already exceeds all the requirements specified by eCall stakeholders. In fact, rather than considering both solutions based on the criteria and requirements defined by eCall stakeholders, 3GPP S4 working group is avoiding consideration of the VBM that is designed, optimized and already operational for eCall type application. Instead, the group is in danger of deciding to take the easy way out by tweaking the eCall requirements to fit a sub-optimal solution based on CTM. This short-sighted action seriously threatens ever realizing the benefits of eCall because it would expose the stakeholders to huge liability risk from not providing a proven and optimal eCall solution.

To ensure that the interests and vision of eCall are protected, we urgently request that you help us prevent the premature selection of a data transfer technology that does not fully meet or exceed the eCall requirements. Instead, we ask that you help us ensure "The 3GPP Way" and delay a decision until after a thorough consideration of both technologies. Anything less would fail to ensure an effective and future-proof eCall service, and threaten realizing the benefits of eCall.

Details

Based on the guidelines developed by ETSI MSG and the Driving Group eCall, the following eCall service requirements were specified by 3GPP's SA1 working group. Meeting these requirements is critical to providing an effective and future proof eCall solution. Regrettably, after months of efforts by Airbiquity to ensure that these requirements are upheld in an analysis of possible transport solutions for eCall, no progress had been made and the standardization process is gridlocked.

Specifically, we are concerned about the direction and position taken by 3GPP's S4 working group in favor of CTM, a modem technology created for low bit rate, non-time critical TTY (Text Telephony) text data transmission. S4's refusal to objectively consider other existing commercialized modem solutions that meet and, in some cases, exceed these service requirements is seriously undermining and hindering

the process of standardizing the optimal transport solution for eCall. Below each is an analysis and discussion of concerns.

1. *The Minimum Set of Data (MSD) sent by the In-Vehicle System (IVS) to the network shall not exceed 140 bytes.*

Background:

- SA plenary in SP-050371 noted an MSD size of 140 bytes, which was identified as a requirement by the ETSI MSG (in M-05-035) and confirmed in the April 2006 eSafety final report, "Recommendations of the DG eCall for the introduction of the pan-European eCall."
- This requirement for 140 bytes has not changed, yet there has been discussion in SA WG4 of sending separately a "mandatory" sub-set of the MSD.

Concerns:

- There is serious risk by using such a separate "mandatory" part of the MSD to judge the appropriateness of the more error-prone, slower data transfer method of CTM that was designed and optimized for an entirely different application.
- The advent of improved location capabilities of Galileo promises an ever increasing size of the MSD, so the full 140 byte MSD must still be considered to ensure continued effectiveness and to "future proof" eCall for the lifetime of the vehicle.
- This "mandatory" MSD has not being approved or agreed upon by the eCall stakeholders. Actually, the content of 140-byte MSD needs to be defined by all eCall stakeholders, not by 3GPP alone.

2. *The MSD should typically be made available to the PSAP within 4 seconds of being sent to the network.*

Background:

- The 4 seconds is considered as a guideline. It includes the time required to transmit the MSD.
- The size of the MSD of 140 bytes has not changed despite serious discussion about a "mandatory" portion of the MSD being sent separately.

Concerns:

- Even if the data is delivered without errors, it still takes CTM more than 13 seconds to deliver 140 bytes of data VBM, on the other hand, meets this 4 second guideline, thereby being fully compliant with the requirement.
- The very purpose of eCall is to speed assistance to crash victims, so it's counterproductive even to consider the appropriateness of the slower data transfer method of CTM.
- While VBM (Voice-Band Modem) already is "tested" in over 6 million vehicles, the required design/optimization/testing of CTM required for eCall likely would add months if not years of further delay until it even can be "programmed" into the various vehicle development schedules – itself a multi-year lead time process.

3. It shall be possible for the PSAP to acknowledge receipt of the data. SA Plenary in SP-050371 (ETSI MSG M-05-035) noted that acknowledgement be done at the transport layers and not the application layers, so that the system is compatible with a PSAP that has not yet implemented the eCall functionality

Background:

- The assumption is that the acknowledgment referred in the stage 1 specification is between the In-Vehicle System and the PSAP. It is assumed that the transmission is reliable enough considering the nature of the eCall.
- Acknowledgement and retransmission is critical for reliable operations utilizing mobile wireless communication systems, and a critical characteristic for emergency communications.
- To effectively provide reliable transmission with the shortest possible delivery time for MSD, *full duplex* capability is essential for realizing this requirement.

Concerns:

- CTM does not provide acknowledgement and retransmission mechanism. It is also important to note that with CTM, there is at least a 25% probability that the delivered MSD contains errors (based on a CTM character error rate of 0.2% over 140 characters). Further, CTM has no way of even detecting that such errors exist. With VBM, there is only a 0.01% probability that the delivered MSD contains errors.
- According to S4's argument, the lack of acknowledgement and retransmission capability can be complemented by making the eCall application support these features. However, that would require standardization of the eCall application in order to support a multi-vendor solution – further delay and complete the entire standardization process.
- Acknowledgement at the application level would not only degrade reliability but also slow down data transfer speed.
- CTM is a half-duplex transmission technology for TTY services where only one side is allowed to transmit data at any given moment. If both sides transmit at the same time, it will result in data corruptions. For a time-critical service like eCall, it is imperative that MSD and/or FSD is transmitted expeditiously without stop gaps in between or risk of data corruption. This "walkie-talkie" like functionality of CTM falls short of fulfilling this requirement.
- VBM is a full-duplex, highly reliable, and field proven solution which provides four key components for MSD data transport: *error correction*, *error detection*, *acknowledgment*, and *automatic retransmission*.

4. Not a requirement but critical to eCall – VBM is a field-proven solution for eCall related applications in commercial telematics services while CTM is not.

Background:

- VBM has commercially proven to be the most reliable solution utilizing existing GSM and emerging UMTS mobile networks for eCall type of applications in more than 6 million vehicles today, and growing, saving thousands of lives in the past few years.

Concerns:

- CTM is known to date being deployed in the USA only for TTY data exchange – not proven to be a real-time critical reliable transport solution for eCall type of applications.

Conclusion

Given the emergency nature of eCall, the ability to transmit the vehicle crash data quickly and reliably is of paramount importance and indeed vital to ensuring the effectiveness of eCall. This memo is meant to show where the 3GPP standardization process potentially has gone wrong by overlooking the stress on ensuring (1) an MSD size of 140 bytes, (2) 4-second data transfer ability and (3) transport layer acknowledgement. Remember, we are talking about saving human lives and preventing debilitating injuries, so this deserves a proper analysis of the choices from a "system" point of view, instead of just cursory consideration of the variables.