

# RESPONSE TIME ANALYSIS OF MESSAGES IN Ve.N.I.C.E ARCHITECTURE: THE CASE STUDY

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## ABSTRACT

The CAN (Controller Area Network) (Lawrenz, 1997) it is a standard in fact for the applications distributed in automotive systems. Its increasing use in the automotive industry is motivated through the economic benefits technician and where it later induced the standardization for SAE (Society of Automotive Engineers) and ISO (International Organization for Standardization). With the success gotten in the automotive applications, the community of the industry of processes and transformation did not execute in also adopting it in definitive industrial applications.

The architecture of automotive net Ve.N.I.C.E of the FIAT Automobiles S/A, uses net CAN to establish connection the ECUs (Electronic Unit Control) in the cars of stroll as float, Siena and Palio Weekend. A mapping of messages content signals of physical largenesses as speed, temperature and others in accordance with pass through under slide bars CAN the functional and secular requirements of the involved applications. The CAN network has capacity in supporting traffic of messages in real time with attribution of fixed priority under the map of messages and all analysis can be carried through based in the theory of schedulability of real time for tasks in a processing resource, as presented in (Tindell et al., 1994). An analysis of schedulability of the messages based in the time of reply in the worse case (WCRT) in normal readinneses is presented in this work and condition of error. We develop an analysis schedulability under the map of messages of the Ve.N.I.C.E architecture, under different conditions of taxes of transmission and error. The analysis gives to the designer conditions to verify the secular requirements of the messages and signals in project time.

The architecture of automotive net Ve.N.I.C.E consists of a net CAN as system of communication, composed for four computational we in accordance with the functional specification and technique of the Auto FIAT. Figure 1 presents the applied Venice-Put architecture in automotive systems of FIAT Automóveis S.A, with four computational we having a power of processing in function of the requirements of the applications.

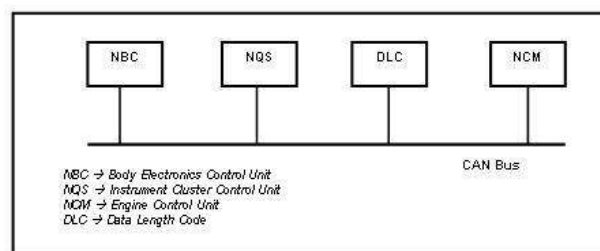


Fig. 1. Ve.N.I.C.E architecture

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The functional specifications of we of the Ve.N.I.C.E architecture are given by: NBC (Body Electronics Control Unit): it is responsible for the electric part of the car, in which it says respect to the comfort of its users. Examples: electric glass, electric constraint, conditional air, to air bag, sound, etc; NCM (Engine Control Unit): it is responsible for the central office of injection and control of the engine. It carries through and transmits to the others we them four times of the engine that are: admission, compression, expansion and expulsion; NQS (Instrument Cluster Control Unit): he is responsible for the visual part of the car, that is, it shows in the panel of the car all the contained data and that they are passing through in the data base of the net. Examples: fuel, speed, count turn (rpm), etc; DLC (Data Length Code): it is responsible for functions of management of the automotive system for management and maintenance. To the level of the characteristics and properties for the transmission and reception of messages under a net CAN in the Ve.N.I.C.E architecture, the specification of the Auto FIAT defines some specifications under the net such as: Frame: it is the structure (body) of a message, and only identifies the structure of the message, and not it its content. Message: it is a set of structures of signals, added and transmitted for a knot, identifying the structure and the content. Signal: it is a simple part of code of information, changed between two we representing analogical and digital largenesses. Any knot that is present in net CAN can in such a way be sent in the recognized frame and in the field of indication of recognition (ACK) with the standard format as in the format extended.

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