An IEC-Compliant Field Device Model for Distributed Control Applications

Kleanthis C. Thramboulidis, Member, IEEE, George S. Doukas, and Tassos G. Psegiannakis

Electrical & Computer Engineering, University of Patras, Patras, Greece,
e-mail : {thrambo, gdoukas}@ee.upatras.gr

Abstract—Emerging IEC standards such as IEC61499 and IEC61804, propose an architecture for the development of distributed control systems (DCSs). Reference implementations are expected to demonstrate the applicability of this proposal. In this paper, we present the architecture of a field device that is compliant with the IEC model. Modifications to the IEC model regarding Management function blocks, as well as, Service Interface function blocks are adopted to simplify the function block design model and enhance the performance of the resulting implementation model. A layered approach is adopted exploiting real-time Linux and the publish-subscribe model on top of real-time CORBA. A prototype reference implementation is presented utilizing: a) a real-time CORBA object request broker for the intra-device communication layer, and b) Comedy for the proposed Mechanical Process Interface layer. The proposed model supports the re-configuration of the control application even during run time.

Index Terms—IEC61499, Function Block, distributed control systems, field device model.