



Код: 10877

E. Barrera, M. Ruiz, R. Melendez, V. Cokonaj, A. Cano, G. Aranguren, P.M. Monje, L. Casado

Structural Health Monitoring Network System with Wireless Communications Inside Closed Aerospace Structures

Дрезден, Германия, 2012 год

9 стр; формат: 23,5 x 16 см; библиографический список: 13 единиц

Structural Health Monitoring (SHM) requires integrated "all in one" electronic devices capable of performing analysis of structural integrity and on-board damage detection in aircraft's structures. PAMELA III (Phased Array Monitoring for Enhanced Life Assessment, version III) SHM embedded system is an example of this device type. This equipment is capable of generating excitation signals to be applied to an array of integrated piezoelectric Phased Array (PhA) transducers stuck to aircraft structure, acquiring the response signals, and carrying out the advanced signal processing to obtain SHM maps. PAMELA III is connected with a host computer in order to receive the configuration parameters and sending the obtained SHM maps, alarms and so on. This host can communicate with PAMELA III through an Ethernet interface. To avoid the use of wires where necessary, it is possible to add Wi-Fi capabilities to PAMELA III, connecting a Wi-Fi node working as a bridge, and to establish a wireless communication between PAMELA III and the host. However, in a real aircraft scenario, several PAMELA III devices must work together inside closed structures. In this situation, it is not possible for all PAMELA III devices to establish a wireless communication directly with the host, due to the signal attenuation caused by the different obstacles of the aircraft structure. To provide communication among all PAMELA III devices and the host, a wireless mesh network (WMN) system has been implemented inside a closed aluminum wing-box. In a WMN, as long as a node is connected to at least one other node, it will have full connectivity to the entire network because each mesh node forwards packets to other nodes in the network as required. Mesh protocols automatically determine the best route through the network and can dynamically reconfigure the network if a link drops out. The advantages and disadvantages on the use of a wireless mesh network system inside closed aerospace structures are discussed.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание

Abstract
Introduction
PAMELA SHM™ software architecture
PAMELA SHM™ communications approach
Conclusions