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IOT-BASED ARCHITECTURE OF INTELLIGENT TEST AND LAUNCH CONTROL SYSTEM IN ADVANCED LAUNCH SITE

Abstract

The test and launch control system (TLCS) of launch vehicle mainly completes the control and testing of the electrical products within a launch vehicle. It fulfills launch mission with the relevant systems of the launch site. In general, these TLCSs are closely combined with a launch vehicle and developed by the manufacturers of launch vehicles for being used at launch sites. These systems greatly differ in technical level and composition. Different types of TLCSs are deployed in the launch sites, which brings the problems of ownership, management, usage, maintenance, storage, upgrade, and others on test and launch control assets. For improving efficiency on testing and launch controlling in launch sites, advanced test and launch control system is critical infrastructure and should be part of launch site infrastructure. The unified test and launch control system is constructed for different launch customers to solve the above problems. And it can shorten launch mission time and enhance launch efficiency. Especially in recent years, space launch missions have increased greatly. The situation may have an adverse impact on the mission success because of frequently switching different TLCS equipment for different launch vehicles in launch site. We propose a unified TLCS of the launch site, which combines intelligent technology to accommodate different launch vehicles and has the functions of automatic and autonomous test and launch control. This mode is an effective technical approach for efficient and safe operation of the advanced launch site. We design the architecture of the intelligent TLCS and work on achieving intelligent interfaces and intelligent configuration. Intelligent interfaces are accommodated to multi-type launch vehicles for an intelligent TLCS. Intelligent configuration is supplied as a platform for testing and launch controlling multi-type launch vehicles. The system implements automatic test, fault isolation, autonomous diagnosis, and control. The architecture is an important part of supporting intelligent launch site. The intelligent TLCS is also the constituent part of the intelligent launch site, which can access an intelligent launch site system through IoT. The paper gives an example to illustrate the practical application of the architecture and the system framework. According to the architecture, we have started to develop the system and shall deploy it in launch sites next several years. Further, the similar work of flight payloads such as satellite and spacecraft will be gradually incorporated into the system.