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RC64 – MANY-CORE COMMUNICATION PROCESSOR FOR SPACE IP ROUTER

Abstract

RC64, a novel rad-hard 64-core signal processing and communication-processing chip targets both high-end DSP performance and high-speed packet processing for future communication missions. RC64 technology enables on-board IP Routing at ISO/OSI Level 3. It leads to advanced payloads capable of providing IP services such as data, voice, and IP-based high-definition video, similar to terrestrial networks. This implementation of IP-Router on-board Satellites (IPRoS) technology would improve the space segment access efficiency, providing directly "on the sky" the ability to route IP traffic, shortcutting the need for routing data through ground station hubs or gateways before accessing the space segment. Data traffic throughput is improved, latency is reduced thanks to avoiding double hops, and flexible bandwidth-on-demand applications between users without pre-assigned or fixed configuration are enabled. Extending the IP network into the space allows also an improvement in creating a seamless, global satellite networks supporting a continuity of operations more useful for emergency communications in crisis areas and also in mobile condition as in the military theatres. This capability can be further increased integrating the IPRoS access with the overall IP ground network infrastructure wired and wireless. RC64, thanks to its full reprogrammability, enables in-orbit configuration and management by Network Operation Centres. The on-board router may be configured, QoS policy can be managed, security features at router protocol (IPSec) and satellite (anti-jamming) level are readily enabled. The high performance and flexible on-board processing capability of RC64 enables additional features such as advanced packet processing, deep packet inspection, encryption, intrusion and attack detection and prevention, billing and virtual private networking. Satellite On-Board Processing (OBP) payloads enabled by RC64 offer, beyond IP routing, compatibility with various standards such as ATM, MPEG, IPv4, and IPv6. Furthermore, compatibility with evolving ground segments for the entire satellite lifetime is enabled by full reprogrammability. Key concern regarding flexible high performance OBP relates to mass and power budget requirements at payload level. RC64 chip provides very high performance at low power and low mass, compared to all pre-existing solutions. It combines hardware and software solutions for all layers of the ISO/OSI model, including filtering, multiplexing, modems, routers. It enables high bandwidth inter-chip connectivity over high speed copper/optic serial links consuming very low power, for payloads combining tens of RC64 chips.