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Innovative Technologies as Contributing Factor in Increasing Efficiency, Redundancy and Resiliency in Future CTBT Network Operation

Dr Misko Popovic
AIS Engineering, Business Development and Advanced Technologies, United States (misko@aisengineering.com)

New and emerging technologies will have a significant prosperous impact on reliability, efficiency, resiliency, redundancy and robustness in which CTBT network operates worldwide. The purpose of this Paper is to highlight some aspects of this concept. One major innovation is based on the use of High Throughput Satellites (HTS). With a significantly increased throughput per satellite of up to 60 Gbps using an Open Architecture topology, this technology transparently provides the coverage from the same satellite in C, Ku and Ka frequency operations. The main benefits that CTBT network will realize by adopting this technology are:
higher performance (bits/Hz) reduces the cost per bit for the Organization;
enables multiple frequencies aligned to region and application specific requirements;
enables backward compatibility with legacy ground infrastructure and customer-preferred network topology;
forward compatible as ground technology advances;
high efficiency and high availability of HTS enables smaller terminals on the ground;
supports new applications and benefits increasingly data-centric services such as cellular backhaul;
allows full integration into fiber, MPLS and Cloud legacy networks.
CTBT network will directly benefit from this topology as each region coverage will be aligned with at least two teleports enabling full redundancy and resiliency of the network. Also from the QoS standpoint, when coupled with the newest Velocity modem technology, it will be much more transparent to control guaranteed CIR rates within each assigned region to which each remote is specifically assigned. Also, through this new technology, each remote site will be dynamically allocated the Modulation and Coding Scheme for both up- and down-link to offset any environmental and weather changes without compromising service quality. The solution of HTS multi-spot beams in a bent-pipe architecture will significantly benefit the CTBT network through enabling an open network architecture that is fully backward compatible with the Commission's current network infrastructure. This Paper further discusses how this new technology provides seamless transition of the Commission's legacy sites into a new network operations concept based on a full backward interoperability. This future-proof concept will directly benefit the Commission by limiting the hardware investment that needs to be appropriated for the future CTBT network operation with embedded flexibility for the Commission to grow through the blend of higher spectrum throughput and ever increased efficiency of the new Velocity modem platform, translating it directly into better economics through the lower total cost of the ownership.