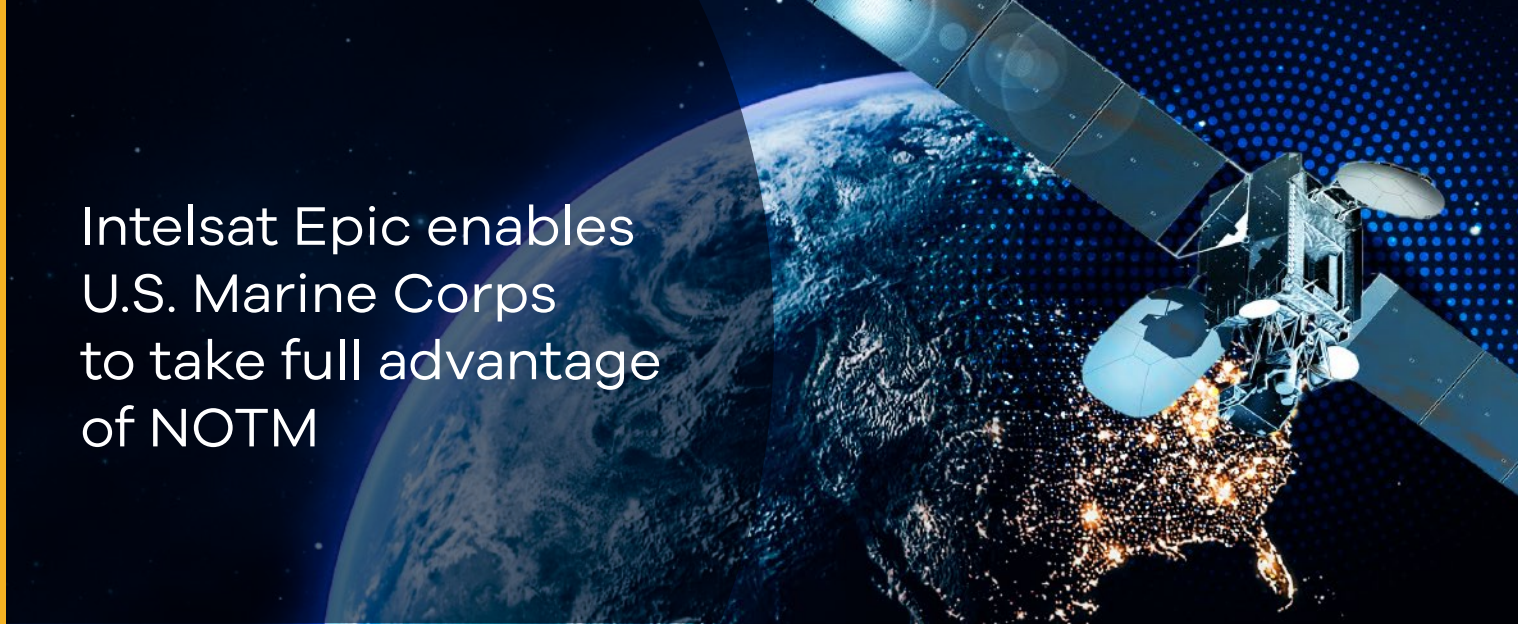
CASE STUDY

Intelsat Epic enables U.S. Marine Corps to take full advantage of NOTM



Developed by the Army Warfighter Information Network-Tactical Program Office (PM-WIN-T), the Network Centric Waveform (NCW) serves as a dynamic waveform that optimizes bandwidth and satellite utilization, providing efficient SATCOM capabilities for WIN-T Increment 1 at-the-halt and for WIN-T Increment 2 while at-the-halt and on-the-move. In October 2016 at Camp Lejeune, North Carolina, the U.S. Marine Corps (USMC) and the Navy's Space and Naval Warfare Systems Command (SPAWAR) conducted testing to evaluate HTS technologies to support Networking-on-the-Move (NOTM) requirements.

USMC typically deploys with two types of key SATCOM assets: the Point of Presence Vehicle Kit (POP) and the Tactical Entry Point (TEP) Modem Kit (TMK) for a 2.4-meter Small Tactical Terminal. NOTM provides access to three network enclaves, Secret Internet Protocol Router Network (SIPRnet), Non-Secure Internet Protocol (IP) Router Network (NIPRnet) and Mission Specific. NOTM incorporates Full Motion Video (FMV), Voice Over Internet Protocol (VOIP), and other data centric capabilities onto these Marine Corps tactical vehicles.

The testing had two phases, normal operations on typical wide-beam satellite (Intelsat Galaxy 3C) and enhanced operations on an Intelsat Epic HTS. Both phases utilized the General Dynamics 20-20M SATCOM-on-the-Move (SOTM) 20-inch antenna and the L-3 Linkabit MPM-1000 NCW modem in the POP and TMK units.

While operating over Galaxy 3C, information rates from the TMK to POP were limited to 1536 kbps and 256 kbps from a POP to the TMK for a nominal aggregate throughput of 1.8 Mbps. Due to the small size of the SOTM antenna aperture, the POP node had to operate at BPSK 1/2 rate and was required to spread the carrier by a factor of 12 in order to establish compliant communications. In the 9.7 MHz allocation, this severely limited the amount of bandwidth available for higher burst rates from the TMK to the POP.

While operating over the Intelsat Epic satellite, USMC users were able to achieve a total simultaneous throughput capacity of approximately 9.0 Mbps utilizing the same 9.7 MHz bandwidth allocation. Using the same, small aperture antenna, approximately five times more throughput was achieved in the same amount of bandwidth than on a traditional widebeam satellite.

Due to the high power of Intelsat Epic satellites, the POP was not required to spread its transmitted carrier as is normally done on a wide-beam satellite. This bandwidth savings allowed burst rates of 3072 kbps between two POPs and the TMK nodes. In

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> **"The challenge for us is that it's not about the technologies; it's the ability to integrate. It's the ability to craft tactics, techniques and procedures, the organization of constructs by which you can do this."**
> **Lt. Gen. Edward Cardon, Army Cyber Command (ARCYBER)**

addition, high link margins on Intelsat Epic satellites enabled the NCW network controller to schedule direct POP-to-POP full-mesh bursts at a rate of 1024 kbps. On wide-beam satellites, hub-assisted mesh mode must typically be utilized to enable traffic routes between two, small aperture, POP nodes. Hub-assisted mesh doubles both the round trip delay and the bandwidth requirements. Transmitting two simultaneous 3072 kbps carriers was also possible using the dual internal MPM modulators at either the TMK or POP node.

SPAWAR made a point to note that the performance of the NOTM MPM NCW satellite network operating on the Intelsat Epic satellite was comparable to the performance observed while operating on a Wideband Global SATCOM (WGS) satellite in Ka-band.

About Intelsat

Intelsat's global team of professionals is focused on providing seamless and secure, satellite-based communications to government, NGO and commercial customers through the company's next-generation global network and managed services. Bridging the digital divide by operating one of the world's largest and most advanced satellite fleet and connectivity infrastructures, Intelsat enables people and their tools to speak over oceans, see across continents and listen through the skies to communicate, cooperate and coexist. Since its founding six decades ago, the company has been synonymous with satellite-industry "firsts" in service to its customers and the planet. Leaning on a legacy of innovation and focusing on addressing a new generation of challenges, Intelsat team members now have our sights on the "next firsts" in space as we disrupt the field and lead in the digital transformation of the industry.

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