Ground Station Challenges—Monitoring High Throughput Satellites
By Alvaro Sanchez, International Sales and Marketing Manager, Integrasys

Today High Throughput Satellites (HTS) provide much more capacity than traditional satellite technology, achieved by a high level frequency re-use and spot beam technology which enables frequency re-use across multiple narrowly focused, spot beams (usually in the order of 100s of kilometers).

By contrast, traditional satellite technology uses a broad, single beam (usually in the order of 1,000s of kilometers) to cover wide regions or even entire continents. In the ground station field, HTS brings many advantages. However, HTS also brings complexity to ground station monitoring—Integrasys has been working on building the best ground station solution for HTS.

A fundamental difference to existing satellites is that HTS are linked to ground infrastructure through a feeder link using a regional spot beam that dictates the location of possible teleports. By contrast, teleports for traditional satellites can be established in a wider area, as their spot beam footprints cover remote regions as well as entire continents.

Integrasys has upgraded their ControlSat Carrier Monitoring System for HTS. The ground station is planned using GeoBeam, Link Budget calculation software, and taking into account satellite antenna patterns and possible rain fades. Integrasys’ CMS is able to minimize the investment significantly by using this HTS cost effective solution.

GeoBeam with simple interface allows the operator to provide the best region for monitoring each beam remotely. This is an exceptional tool for designing HTS gateway projects with extreme accuracy. After a location is selected, network, antenna size, C/N and additional necessary parameters can then be calculated for return and forward links before the actual network is deployed. This way, a reliable network design is ensured, one that performs the measurements with maximum accuracy while requiring minimum resources.

When the project is properly planned, Integrasys deploys ControlSat, the fastest Carrier Monitoring System on the market, which has been customized specially for HTS based on the selected areas determined via the GeoBeam calculation. ControlSat is an RF monitoring system using a client/server architecture, which controls all beams from the Network Operation Center (NOC) in real-time.

ControlSat is able to monitor transmission in Ka- or Ku-band, while downlink spot beams are monitored remotely by down converting to L-band, to minimize the investment. This allows the satellite operator to monitor all the downlink beams from the full satellite and all polls simultaneously.
resulting in time and investment savings for the operator.

For providing an affordable solution, Integrasys has decided to monitor multiple, low-cost, spectrum analyzers with good performances from the same location in real time using TCP/IP protocol.

This capability minimizes the cost and installation effort, as many beams will have not any teleport located in that region; the beam is designed to cover remote areas (footprint order of 100s of kilometers). Most of the times, the only way to monitor these beams would be via a remote installation and satellite link; therefore, minimum equipment outlay with maximum performance is required.

With ControlSat installed at the NOC, the frequency plan from the CMS database is read and automatically, or manually, adjusts the thresholds, alarms and warnings, depending upon customer requirements. In case there is any interference or a service failure, ControlSat automatically detects such with a visual and sound alarm as well as email reporting of the incident.

These capabilities allow the satellite operator to offer its customers an accurate RF monitoring in all transponders for service free of interference and failures. Monitoring RF signals using HTS solution is the way to ensure that the spot beams are not affected by rain fades or interferences.

Integrasys has managed to implement the most cost efficient and most reliable Carrier Monitoring Systems for High Throughput Satellites. ControlSat advance capabilities enable Integrasys HTS solutions that are essential for accurate and cost effective High Throughput Satellites downlink and uplink real time Monitoring.

**About the author**

Alvaro Sanchez is the Sales and Marketing Manager at Integrasys, responsible for the worldwide sales and marketing department, and head of the U.S. office. Alvaro is also in charge of the satellite product Line.
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