

## ACM Dos and Don'ts

Nowadays ACM is used in practically all professional DVB-S2(X) links for IP networks. The general idea can be considered common knowledge throughout the satellite industry, but there might be a few aspects beyond theory that should be taken care of, especially from a system point of view. This technology brief covers in-field experiences that could help operators during setup, optimization and trouble shooting.

**Prioritize ACM messages:** First of all, the status messages from the receivers have to reach the modulator. As this will be IP based in most cases, correct routing and prioritization in the network for these messages must be assured. Otherwise the link bandwidth will drop not because of lacking signal quality, but because of lost messages.

**Manage outbound IP traffic:** Equally important is the management of outbound traffic, which will face a non-constant available bandwidth. In many cases this turned out to be an unknown scenario to IP specialists, so the interaction between ACM and the IP traffic shaping has to be considered.

**Limit channels based on the symbol rate:** In point-to-multipoint links a symbol rate based traffic management will prevent the IP links from affecting each other during changing conditions. Without this limitation changing one ModCod could have an influence on all present channels, as baseband frames of different modulations require a different length on the carrier (in symbols).

**Consider an Es/N0 offset:** Most links will require a small offset to the theoretical Es/N0 margins, typically 0.5 to 1.0 dB. That offset will cover delay times within the system (i.e. return channel over satellite and time between ACM messages) and the limit in accuracy of the Es/N0 measurement. Without an offset, there might be frame loss when the signal quality degrades. A hysteresis could be used to support link stability.

**Do not only focus on numbers:** Some effects of satellite links are not represented to their full extent in the Es/N0 value, especially nonlinearities or narrow band interference. Changing the offset will help to overcome the influence immediately (i.e. as long as the interference is present) and keep the link up.

**Start conservatively, approach the optimum:** When setting up a link it is wise to start with very conservative settings to have a stable link running in the first place. Even if the "first shot" has not the desired bandwidth efficiency, an incremental approach will be the best way to optimize the link once it is up and stable. Due to numerous parameters and conditions affecting the Es/N0, the best settings will be reached by trial and error and can hardly be predicted beforehand.

**Keep an eye on the environmental conditions:** Even when the link is set up, optimized and running, the ACM controller does not know anything about the places where the remote units are installed. Offset and hysteresis values for the control loop should be configured with a good judgement of the worst case: Snow or dust storms, heavy rain, dish mount stability with heavy winds – all have different influences (i.e. in different frequency bands) on the Es/N0 and therefore the ACM.