

## Background

Satellite Operators frequently experience the following situations with Network Operators and Station Operators when investigating interference events:

- **Network Operators do not know where their customer uplink stations are located, or uplink site relocations are not tracked/known.**

*The customer (who is ultimately confirmed to be the source of interference) sometimes denies having a site at that location.*

- **Network Operators' records are out of date, active sites are not known, and maintenance status is not known.**

*A Network Operator or a particular uplink site may deny they are causing a problem because they don't maintain records or they lack knowledge of operations and maintenance that is eventually determined to be causing the interference.*

- **Information on network sites and antennas is not provided to Satellite Operators.**

*When an interference event is being investigated, the Satellite Operator may have insufficient antenna registration information and network data, and is therefore completely reliant on real-time customer interaction for ascertaining accurate information.*

- **Sites may deny they are the cause of interference because they do not even realize they have antennas that are transmitting or capable of transmitting.**

*The Network Operator or Station Operator is not aware of the operational services and capability of antennas/systems of his/her network or station.*

- **It is assumed that "planned" or "no longer active" sites cannot be operating and so cannot cause interference.**

Occasionally, testing on these systems is done by the Station Operator, or deactivated sites are not turned-off and continue to transmit, and these unexpected transmissions can potentially cause interference.

## Definition of Terms

**Carrier ID (CID):** A unique code inserted on a transmitted signal (as of 2012, applicable to video and data transmissions with capable encoder or modulation equipment), which can be decoded by Satellite Operators with suitable monitoring equipment to identify the uplinker of the respective signal.

**Network Operator:** The central Network Operations Center (NOC) or "manager" of a network of uplink stations; this could be, for example: a VSAT NOC, responsible for a network of terminals; or a broadcaster, responsible for a number of SNG uplinks.

**Satellite Operator:** The owner and operator of a satellite that is affected by interference, whose operations center personnel are responsible for investigating and resolving interference issues.

**Station Operator:** Operations personnel at a teleport or uplink terminal.

**Uplink Power Control (UPC):** A system that may be installed at a transmitting site to automatically adjust the power of the transmitted signal to compensate for signal level degradation due to atmospheric conditions.

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## Operations & Maintenance Guidelines to Minimize



For satellite Network Operators and Station Operators to follow, with the intention of minimizing degraded service and outages caused by interference.

# Guidelines for NETWORK OPERATORS

## *Management of Networks*

- 1** Maintain records of all uplink stations. The information should contain, at a minimum, unique designator, location (coordinates and street address), antenna size, antenna make and model, HPA size, dual or single polarization feed, IF or L-band interface, operational satellite, and emergency contact information. Make this information available to Satellite Operators when requested.
- 2** Register uplink antennas with the Satellite Operator. Update the registration information when changes are made to the uplink stations.
- 3** Maintain up-to-date records of all uplink stations. Have procedures in place to capture any changes on the uplink stations. Run periodic audits on the database to verify the accuracy of the data.
- 4** Do not remove uplink stations from the records when they are deactivated. Keep them on record as “inactive.” Add stations to the database even if they are not activated yet. Keep them on record as “to be activated.”
- 5** Have the capability to sort this data by location (state, city), antenna size, HPA size, but preferably, by any field.
- 6** For non-permanent carriers, keep a log of transmissions including date, satellite, transponder, uplink frequency, start time, and end time.
- 7** Assign priority to interference tracking activities. When a Satellite Operator calls for an interference check, have procedures in place to assist with tracking and investigating the interference.
- 8** Never assume that it is not your network that is causing interference. The better records you have on the uplink stations, the quicker it will be to rule out your stations and proceed to find the actual source.

# Guidelines for STATION OPERATORS

## *Operations and Maintenance of Systems*

- 1** Understand the antennas and systems at your site, and be aware of which antennas have transmit capability. When a Satellite Operator is investigating interference, he/she may ask a site about transmit capabilities and it is important to provide the correct information. It may be helpful to place a placard with the relevant technical information near the phone at the uplink contact point, since the person answering the phone may not be familiar with all site systems.
- 2** Keep detailed logs of uplink maintenance and repairs: uplink location, maintenance performed, date and time maintenance/repair was performed, operational satellite.
- 3** Notify your internal network operations center of any maintenance on the uplinks. (Many hard to catch interference events have been caused by maintenance that only one person knew had been performed).
- 4** Assign priority to interference tracking activities. Have procedures in place to assist with tracking and investigating interference when a Satellite Operator calls for an interference check. Proactively, contact the known network affiliated uplinks to aid in notification of an interference situation and ask the site(s) to check the status of uplink equipment.
- 5** Never assume that it is not your station that is causing interference. If contacted by a Satellite Operator regarding an interference event, begin by assuming that it is your station causing the interference. In operations areas, consider installation of a “monitor and control” (M&C) system or visual indicators showing the transmit chains and annunciating where RF power is detected at the transmit waveguide coupler or other monitoring points. The better knowledge you have of the antennas, uplink capabilities, and operations and maintenance activities at your site, the quicker it will be to rule out your station(s), and proceed to find the actual source.
- 6** Use trained and certified maintenance staff and installers.
- 7** Have experienced and trained operations staff. Ensure uplink operators have experienced backgrounds in RF and are well trained on the site RF equipment and uplink procedures.

- 8** Have basic test equipment on site, ideally including a spectrum analyzer to check transmissions. Use a spectrum analyzer or other equipment to verify that there is, or is not, a signal being transmitted.
- 9** When doing transmissions for maintenance or testing of the station uplink, and transmission over satellite is not required, make sure the antenna is not pointed to a satellite.
- 10** Switch the uplink into dummy load (if equipped) before doing maintenance on the uplink.
- 11** When testing or operating on a satellite, make sure you are pointed to the right satellite.
- 12** Do not perform test or operational transmissions to a satellite without first contacting the Satellite Operator’s operations center.
- 13** When installing IF/RF equipment, make sure all unused inputs/connectors are properly terminated to avoid pick-up and re-transmission of local interference signals.
- 14** When a service or transmission is terminated, make sure the BUC or HPA is powered-off to ensure there will be no possibility of further transmissions. Do not simply remove the input cable to the uplink equipment. Where such power-down steps may not be practical, ensure that a proper HPA inhibit function is in place to avoid any rogue transmission.
- 15** Always use quality cable and connectors for all interfaces.
- 16** Do not simply increase power to overcome low Eb/No or low C/N on your transmission. Investigate why the received level is low. Contact the Satellite Operator if assistance is required.
- 17** Where Uplink Power Control (UPC) system(s) may be in use, be aware of their operation and any associated “beacon” receiver or other method where a failure could overdrive the desired carrier power level.
- 18** Ensure transmissions are encoded with Carrier ID information, if possible.