

# Day 5 course

Audit VSAT maintenance  
Regulatory Factors

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## 1- Service Level agreement

Companies operating VSAT , often delegates maintenance to specialized companies that will be responsible of the maintenance of the VSAT.

A contract is then signed between the two companies where an Service Level Agreement (SLA) is stated.

The SLA must be complete to avoid misunderstanding between the two parties and permit an excellent operation of the VSAT.

# 1- Service Level agreement

## SLA Definition

An SLA is a formally negotiated agreement between two parties. It is a contract that exists between customers and their service provider, client or between service providers. It records the common understanding about services, priorities, responsibilities, guarantee, and such — collectively, the *level of service*. For example, it may specify the levels of availability, serviceability, performance, operation, or other attributes of the service like billing and even penalties in the case of violation of the SLA.

# 1- Service Level agreement

## SLA Content

The SLA may include :

- Bandwidth availability
- Response times for problem resolution
- Escalation procedures
- Links performance
- Penalties in case of violation,...

## 2- Escalation procedure

### Escalation procedure

The process set up to define the steps taken when service levels don't meet upon standards. This may involve determining fault for missed measures, reporting, problem resolution within a specified time and -- when the problem still isn't resolved -- executive intervention on both the client and service provider sides.

### 3- Spare Management

#### Spare Management

For ease and fast maintenance it is necessary for customer to have on site some spare parts. The parts have can usually be faulty are kept as spare parts for possible replacement , when there is a problem. They are :

- BUC
- LNB
- Modem
- Feed horn

## 4- Maintenance actions schedule

Generally the maintenance procedure takes from one hour to half a day, depending on the environmental conditions under which the antenna operates.

All the maintenance activities must not only be scheduled in advance with the customer but also coordinated with the different support organizations in the same way installation activities are scheduled.

Reliable and effective maintenance depends upon good test equipment which is regularly calibrated in accordance with manufacturer's recommendations

## 4- Maintenance actions schedule

The lack of a well implemented preventive maintenance program could trigger a wave of problems. An electrical or physical failure could lead to a complete antenna failure, causing downtime or even loss of contract.

A dated log (started from day one) with photographs should be prepared when the antenna (and the other parts of the site) are installed. Entries into the log should be made during each inspection so a complete record of the entire antenna system and its condition is available.

Maintenance logs should be stored with the equipment or within the equipment rack.



## 5- Maintenance process

### Check appearance

Inspect all painted and galvanized surfaces of the antenna and its mounting structures at least once a year; however never paint the coated Prodelin reflector! Note that most of the antenna reflectors do not need much maintenance however a visually pleasing installation helps avoid community opposition to its presence. Local requirements vary among countries but appearance is a factor.

If the main reflectors are made of painted steel, be sure to follow the manufacturer's instructions for preparation of the surface and for paint specifications. Remember that the wrong paint can affect your signal. Darker colors on the reflector's surface absorb sunlight; the resulting higher noise temperatures could cause signal distortion. Paint with too much lead can cause signal loss through attenuation or scattering. Today most of the reflectors are fiberglass with imbedded mesh. Repainting therefore is not necessary.

## 5- Maintenance process

### Check mount hardware

Not surprising, corrosion is the enemy of the nuts, bolts and other fasteners used to assemble the antenna mount. Therefore, it is necessary to inspect the mount hardware, tighten loose bolts and replace missing or badly corroded parts. If loose bolts are found, and if they affect the antenna pointing, contact the satellite operations center and notify them that the antenna needs to be re-pointed.

Repair any damage, even if it is minor

## 5- Maintenance process

### Verify ground connections

The antenna mount and RF unit should be grounded against possible lightning strikes. The grounding for both mechanical and non-mechanical connection must be verified - a ground loop impedance test unit does very well. After checking mechanical ground connections, replace rusted or corroded hardware to prevent a build-up of resistance.

Grounding system performance check means that the original grounding installation must be periodically tested to determine whether resistance is remaining constant or increasing.

## 5- Maintenance process

### Inspect enclosures

Vermin (bees and spider webs, birds, etc) can do unbelievable and costly damages if left unchecked. If equipment is housed in an antenna enclosure at the rear of the reflector, inspect the enclosure for water retention or infestation by insects or rodents. Repair and seal any suspicious openings.

## 5- Maintenance process

### Maintain cables

Inspect and verify connector weather sealing and all cable tiles. The inter facility link (IFL) cables carry intermediate frequency and monitor and control signals between the roof and the equipment room. If on inspection and you find or suspect any VSWR and/or insertion loss (IF Cable only), check to see whether any cables need to be replaced or repaired. (Are they water proof?) With a simple “home garden and kitchen” multimeter, the cables and the connectors check the conductivity and continuity of the cables. Also ensure that support and routing the cables are consistent with the requirements. Stainless steel cable hangers or clamps are preferable to plastic cable ties for supporting the cable. If plastic ties are used, use only black nylon ultraviolet resistant ones. White or clear ties become brittle and break with prolonged exposure to sunlight.

## 5- Maintenance process

### Antenna moves

Whenever the antenna has to be moved or the IFL cable is disconnected, the antenna must be taken out of service.

Use this opportunity to inspect the antenna

## 5- Maintenance process

### Monitor and control (M&C)

Monitoring and control is an activity of both corrective and preventive maintenance. Regular measuring and recording of essential parameters will help note and identify potential faults.

Verify that the NOC can access the site and check for current alarm conditions on all equipments. Also verify that M&C to radio is connected and functional and that telephone access is available on the roof via the M&C line

## 5- Maintenance process

### Radio, equipment and rack fan

Check to ensure the fan in the radio is operating properly. If not, repair as soon as possible because radios may fail within a few hours if not properly cooled. Check that all filters, if present, are clear and free from dust build up and inspect chassis air passage openings



## 6- Troubleshooting

### WHAT TO DO WHEN THINGS GO WRONG

Obviously, if you need help, the NOC is available. But before you call, please take a bit of time to track down and fix your problem yourself. Ensure you are up to date with your preventive maintenance.

It goes without saying that rebooting computers and checking cables is the most common fix of any Internet Service Provider. Take your time in hunting down a problem and make sure that it's not hardware related.

## 6- Troubleshooting

### WHAT TO DO WHEN THINGS GO WRONG

And don't rule out hardware errors. A great way to test this is to use an alternate bypass such as switching network cables, coax cables, or a different computer when all else fails.

If you are having signal related problems... try to locate the error by checking your dish.

The idea is not to panic and that most problems are normally an easy fix... once the problem is located.

If all does not get well, call the network operating centre

## 7- Regulatory factors

### LICENSING

The ITU Member States have established a legal regime, which is codified through the ITU Constitution and Convention, including the Radio Regulations. These instruments contain the main principles and lay down the specific regulations governing the following major elements:

- frequency spectrum allocations to different categories of radio communication services;
- rights and obligations of Member administrations in obtaining access to the spectrum/orbit resources;
- international recognition of these rights by recording frequency assignments and, as appropriate, orbital positions used or intended to be used in the Master International Frequency Register.

## 7- Regulatory factors

### LICENSING

The above regulations are based on the main principles of efficient use of and equitable access to the spectrum/orbit resources laid down in No. 196 of the ITU Constitution (Article 44), which stipulates that *"In using frequency bands for radio services, Members shall bear in mind that radio frequencies and the geostationary-satellite orbit are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries"*.

## 7- Regulatory factors

### ORBITAL SLOT REGISTRATION

The UN agency that regulates the use of geosynchronous orbitals is the International Telecommunications Union. Regulation of these satellites is necessary, because there are a limited number of places to put them in orbit without the risk of interference with other satellites or collision with space debris. In addition, the “orbital slots” (where the satellites are placed) over industrialized areas are in much more demand than in lesser developed areas.

Slots over lesser developed countries with a location that would give a satellite coverage of industrialized countries are also in demand.

## 7- Regulatory factors

### ORBITAL SLOT REGISTRATION

In 1988, the ITU acknowledged that all countries, including lesser developed countries, have an equal right to orbital slots. However, Article II of the Outer Space Treaty forbids any claim of sovereignty by any country in space, which would not allow countries to establish dominion over the orbital slots above their territory. At conferences in 1985 and 1988, the ITU did give all countries the rights an orbital slot directly over their territory, which would ensure at least some access to these satellites to all countries.

The actual orbital slots themselves are dispensed on what could be described as a first come, first served basis with some consideration given to the country making the request. There is no mandatory system to deal with disputes over orbital slots, but there are countries that have entered into an optional method to deal with disputes within the ITU.

## 7- Regulatory factors

### FREQUENCY REGISTRATION

The orbital slots issue is just one of the issues that the ITU addresses. The frequencies on which the satellites broadcast are also regulated by the ITU.

This aspect of the ITU is important, because satellites that broadcast on the wrong frequencies can interfere with neighboring satellites or even radio or television transmissions on the ground.

Currently, the ITU has assigned about 87,000 frequencies to about 600 satellite networks in orbit (some of which are geosynchronous satellites).



## 7- Regulatory factors

### INTERSYTEM REGISTRATION

Another important organ of the ITU is the International Frequency Board (IFRB), which is responsible for intersystem coordination at an international level.

This applies to the coordination of terrestrial systems with satellite systems, and to the coordination of a new satellite system with existing ones or systems simply registered at the IFRB at the time the new system is submitted to IFRB.



## 7- Regulatory factors

### EARTH STATION AND VSAT REGISTRATION

The ITU controls frequency allocations, permitted power levels and modes of operation. These restrictions are intended primarily to prevent interference between all types of systems employing radio communications and to protect some telecommunications services, such as emergency services.

In addition to that, many governments currently impose restrictions and regulations on service providers and users. These national regulations are specific to each particular country.

## 7- Regulatory factors

### EARTH STATION AND VSAT REGISTRATION

Due to the increasing uptake of sophisticated telecommunications systems, that are sold and used in all countries, the licensing regime for end-user equipment (such as VSAT terminals) is becoming simpler and less costly.

You will find the procedures and regulations that rule the installation and operation of VSAT terminals on regulations agencies in the countries or on ITU web site.

# 1- Regulatory factors

## EARTH STATION AND VSAT REGISTRATION

A licence is to be delivered by the national telecommunications authority of a country where any earth station as a part of a network, be it the hub, a control station or a VSAT, is planned to be installed and operated.

The concern reflected here is to ensure compatibility between radio networks by avoiding harmful interference between different systems.

By doing so, any licensed operator within a certain frequency band is recognized as not causing unacceptable interference to others, and is protected from interference caused by others.

In the past, national telecommunication authorities have required licensing of individual VSAT terminals in addition to requiring a network operator's license. Then, the US Federal Communication Commission (FCC) implemented with success a *blanket licensing* approach for VSATs operated within the US.

# 1- Regulatory factors

## EARTH STATION AND VSAT REGISTRATION

With blanket licensing, VSATs are configured based upon technical criteria (power level, frequency, etc.) to eliminate the risk of interference, so a single license can be issued covering a large number of VSAT terminals.

Blanket licensing has since gained interest among national telecommunications authorities all over the world, as a result of equipment manufacturers complying with the recommendations issued by international standardization bodies, such as the International Telecommunication Union (ITU) and the European Telecommunications Standard Institute (ETSI).

Relevant documentation from these bodies is available at

<http://www.itu.int/home/index.html> and <http://www.etsi.org/>.

# 1- Regulatory factors

## EARTH STATION AND VSAT REGISTRATION

A licence usually entails the payment of a licence fee, which is most often in two parts: a one-time fee for the licensing work and an annual charge per station.

The licensing procedure is simpler when the network is national, as only one telecom authority is involved.

For transborder networks, licences must be obtained from the different national authorities where the relevant earth stations are planned to be installed and operated, and rules often differ from one country to another. To facilitate the access to these rules, telecommunications authorities around the world have begun posting data related to their nations' VSAT regulatory conditions on the World Wide Web.

## 7- Regulatory factors

### INTERFERENCE BETWEEN C-BAND AND WIMAX

The “extended” C band frequencies (3.4 to 3.7 GHz) have already been identified by several national administrations for use by new services like Broadband Wireless Access (BWA) and WiMax.

In addition, other administrations are looking to deploy these new terrestrial services in the “standard” C band frequencies (3.7 to 4.2 GHz). In countries where WiMax services have been introduced, there have been significant in-band and out-of-band interference issues and services interruptions for satellite ground stations and their related services.

Some other interferences may occur, it is important to do electromagnetic survey before installation and make sure to have a valid license.

# End of Day 5 course

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