

White Paper

**Network Management Considerations
For VSAT Technology**

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Advancing a Connected World



Introduction

Network management is a serious aspect of any business, if not one of the most important. It is essential that a network runs efficiently since critical business services depend on it, as does revenue stream. Concurrently, networks grow in size and complexity, with the addition of new devices and technologies, and in response to business growth and demands.

Networks utilizing VSAT as a backbone need a higher level of network management. It is not enough to prevent downtime and performance degradation, but training staff to remain alert for potential issues, such as severe weather, natural disasters or erroneous data entry, could help lessen any impact.

Managing a network ensures that reliability and high-speed, always-on networks can be a reality. Ineffectual network management could invite disaster for an organization.

Network Management Challenges

Traditional Network Management

Most organizations have a dedicated team of Database Administrators (DBAs), but not many have an equivalent number of dedicated Network Administrators to manage the network.

There are hundreds of Network Management Systems designed for terrestrial networks compared to only a handful of database administration tools. These tools are designed to work on LANs and terrestrial WANs, typically characterized by:

- Low latency. Response times less than 100ms.
- Symmetric bandwidth. Upstream bandwidth is the same as downstream bandwidth. There are a few notable exceptions to this such as ADSL.
- Discrete failures. A link is generally working or not working; there are no partial failures (congestion is user-generated and is not a failure of the link).
- Accessible equipment. Network equipment is generally easy to access.
- In-band or out-of-band management. Management traffic can be carried either on the network it is monitoring or on a separate network.

These tools may not be the most applicable for networks that have a portion or all traffic going over satellite, such as VSAT networks.

Network Management and VSAT Technology

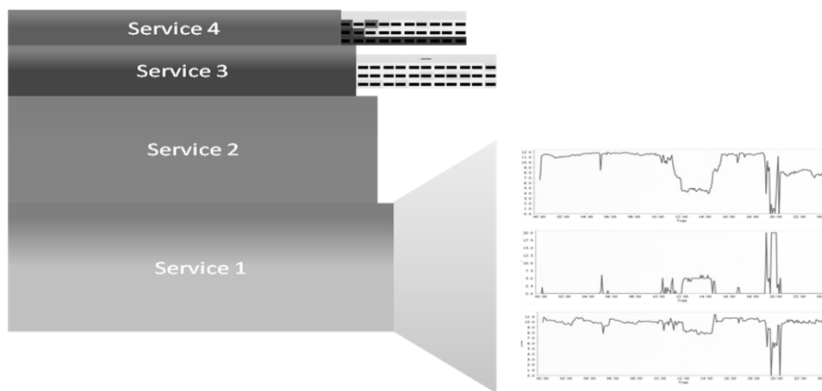
VSAT network management faces several challenges:

1. Increased customer demand for online, real-time and historical reporting with high levels of detail, SLA Reporting, QoS Monitoring and many other complex requirements.
2. Greater sophistication and complexity within the VSAT technologies that make simple monitoring difficult.
3. VSAT technology designed to be standalone and managed using only vendor-proprietary tools.

1. Increased Customer Demand

In the past customers were satisfied to know the status of circuits, traffic volumes, and latency. Recently, the needed range of metrics expanded to incorporate packet loss, jitter and more detailed component parts. Instead of two reports for VSAT and terrestrial, end-to-end monitoring consolidated into a singular report became the demand.

Today, customers want a minute level of reporting, including Virtual Circuits or Service Classes. For example, where there was single metrics per circuit for jitter, latency, and packet loss, customers now want these separately for their VoIP traffic class, sensor and telemetry traffic class and citrix traffic class, similar to this diagram:



Customers expect to have web-based access and have access to real-time and historical information. Ideally they would like to be notified proactively to mobile phones about anything service affecting such as outages, congestion, Voice-over-IP (VoIP) chop and health status of the remote equipment.

2. Greater Technology Sophistication

VSAT network operators and vendors strive for higher performance, lower latency and increased bandwidth efficiency in VSAT networks to match industry growth with increasingly scarce space segment. Automatic power control, advanced acceleration and compression, dynamic QoS and CIR changes and Adaptive Coding and Modulation are examples of these developments and they bring higher complexity to the network management systems. This complexity extends beyond measuring and storing additional data series. Many techniques change the nominal values of several other metrics, so a healthy circuit/network performance one second may be very poor the next. Keeping track of tens or hundreds of metrics, and how they compare to nominal ranges, which are constantly changing, is a challenge to satellite communications and beyond any terrestrial management system.

Another dimension to the technology sophistication is the rate of change. To determine what is required today, how to achieve it and implement is one thing, but by the time this is achieved new technological advances have come out that need managing. The cost and resource required to remain current with advanced technology driven at ever increasing rates by bandwidth scarcity is a major undertaking and difficult to do inexpensively for individual organizations.

3. VSAT Technology

The final challenge with VSAT technology is having an efficient management interface for network management and control. Many organizations believe that by adding a standard management stack e.g. SNMP (Simple Network Management Protocol), management responsibilities are met. The question should be, "Is this the correct management interface". For example, a very common requirement is to obtain data from the remote device (e.g. transmit and receive traffic, temperature, buffer fill levels).

In a typical management scenario there could be 15 of these metrics that need to be collected every 60 seconds. Each of these would likely be a 4 byte counter. However, under SNMP typical packet sizes are around 70 bytes, requiring $70 \times 15 = 1050$ bytes per minute (140 bps) both upstream and downstream per circuit. This is compared to a theoretical minimum limit of 8bps, or even lower if only changes are transmitted. An additional 130bps per circuit may not seem like much, but on large networks this can become significant (126kbps on a 1000 circuit network).

It is widely accepted that since SNMP has been a de facto standard for management of terrestrial networks and components, it is a perfect solution for all networks, but with the scarcity and cost of satellite bandwidth, this is rarely the case for satellite networks.

A second challenge is when a useable system exists, but is not standards-based in terms of network management. This means that an efficient and comprehensive integration is possible, but requires complex and customized integration into a management system. In practice, these systems are possible to integrate into 'standard' network management systems since they generally only support standards based integration.

A final challenge is posed if neither option is available, a useable- or standards-based management interface. On modern VSAT systems this is rare but exists. There are many legacy systems in use and it could be years before these are retired.

These issues are VSAT-specific. However, there are very few pure VSAT networks. Most networks are hybrids, using a wide range of technologies including ATM, Frame Relay, ISDN, VPN, MPLS, and Ethernet, as well as standard networking equipment such as routers, switches, hubs, firewalls and servers. A management system (e.g. SatManage) for such a network must be able to handle all issues, in addition to all the special considerations made for the VSAT element.

Conclusion

End-to- end management is becoming a critical requirement for most customers. Preventable downtime and network degradation is easier with better, easier-to-use tools on the technological forefront. The key is the ability to manage the VSAT components as part of a complex network management system and at the same time provide full end-to-end class-based monitoring. When a network is managed with the correct tools, it creates opportunities for automation, customer satisfaction, lower downtimes and additional business revenue.