Understanding and Improving the ROI of VSAT Networks

4NINES

Teleport operators and technology providers share insights on achieving greater efficiencies and reduced costs in the deployment of VSAT networks for multiple markets.

June 13, 2017

US$1,650, free for WTA members

World Teleport Association
www.worldteleport.org

© 2017 World Teleport Association.
All rights reserved.

Contents

Understanding and Improving the ROI of VSAT Networks **is made possible by the sponsorship of INTEGRASYS and the financial support of WTA's Industry Leaders…**

…And Industry Patrons:

Foreword

The first commercial VSAT systems went on the market in the 1980s, and since then, VSAT technology has proven a durable, flexible platform capable of evolving as speeds, throughput and applications have all grown. In fact, the next few years could be some of the most exciting in VSAT development as our industry continues to innovate to support HTS across multiple frequency bands and new LEO deployments.

One thing that has not changed, however, is customer demand for the highest-quality service at the lowest-possible price. That challenges service providers to manage technology, network design, installation and maintenance for maximum efficiency. The VSAT providers interviewed for this report are looking for ways to reduce labor time and costs of installation and maintenance in the field and in the NOC. And they are looking to achieve this with automated and robust solutions that can reduce both capex and opex while increasing service quality.

Integrasys' Satmotion Pocket is one technology that has proven its ability to save time. It simplifies satellite pointing, minimizes line-up time, reduces NOC support requirements and automates commissioning. With a range of automated and guided procedures, it allows minimally skilled operators to get remotes installed fast and accurately. For more information, visit http://www.integrasys-space.com/satmotionpocket.

This report shares some keen insights from managed VSAT network providers and sheds light on installation challenges and costs, including the significant hidden costs in the deployment of VSAT networks: costs that INTEGRASYS's Satmotion Pocket helps to reduce. We hope that the information in the WTA has collected in this report will help the community of managed VSAT network providers to better understand the potential for improving ROI and thereby help the industry deliver even greater value to customers.

Alvaro Sanchez Garcia Viedma
Sales & Marketing Director
INTEGRASYS
info.sales@integrasys-sa.com

Introduction

VSAT is a fundamental technology for teleport operators serving data and voice customers. Beyond serving as basic hubs for VSAT networks, teleports provide complex managed services on VSAT platforms and integrate them with fiber, wireless and other transmission paths. A teleport may manage dozens or hundreds of individual networks, each comprising anywhere from 20 to 2,000 nodes with its own specific configuration, bandwidth requirements and mission-criticality. Success in this demanding business requires economies of scale: the ability to design, install, operate and maintain networks with the most efficient and cost-effective mix of personnel, equipment and bandwidth. Savings in any of those areas produce a better return on investment for the operator and, if properly implemented, a more efficient and higher quality operation for customers.

99.99

The Four-Nines Project

The Four Nines Project is an ongoing effort by World Teleport Association to promote best practices in teleport business, operations, technology and management. It is named for the technical standard in a satellite or terrestrial transmission of 99.99% availability.

When asked about VSAT network costs, most operators immediately think of satellite bandwidth. This can certainly be optimized through better technology, and multiple technology vendors regularly release new advances. The capex costs at the hub and remotes are also easy to calculate. But the running costs of a network include everything from field installers and satphone costs to travel and hub support staff and are frequently left out of ROI calculations. In *Understanding and Improving the ROI of VSAT Networks*, WTA shares the insights and experiences of teleport operators and technology vendors in achieving greater efficiencies and reduced costs, both capex and opex. It also seeks to improve profitability for VSAT network operators by generating a more robust and comprehensive cost model for network installation, including the often-hidden costs that can be reduced through careful planning and process management.

Methodology

Understanding and Improving the ROI of VSAT Networks is based on a mix of qualitative interviews with teleport operators and quantitative metrics provided by those operators on the cost aspects of network deployment and maintenance. This report includes the major conclusions arising from the interviews and the

average of cost factors for network deployment and maintenance provided by operators, along with a basic methodology for cost calculation.

For this report, WTA interviewed managed VSAT network providers that serve oil and gas, and retail such as banking, corporate enterprise, intranets, energy markets, maritime, governments, NGOs, and satellite operators.

The wide array of applications they support include intranets, internet access, video streaming, retail transactions, SCADA (supervisory control and data acquisition), VoIP, disaster recovery, utilities, airline reservation systems, health and education networks, transportation networks, remote wireless data backhaul, mining connectivity, machine-to-machine communications for asset tracking, and more.

They operate VSAT networks in urban, suburban and rural locations across the Americas, Europe, Asia, the Pacific Rim, and Middle East, as well as offshore platforms, cruise ships, and commercial ships moving around the world. Contributors' businesses ranged in size from small-market independent operators to global providers with scores of teleport partnerships around the world.

Acknowledgments

WTA thanks the following individuals for contributing their time and expertise to the project:

Robert Abarca
Business Development & Service Delivery Director
Elara Comunicaciones, Mexico

David Andres
Business Development Manager
Santander Teleport, Spain

Daniela Albernaz
Technical Director
Telespazio Brasil S.A., Brazil

Mohosin Rob Chowdhury
Deputy Managing Director
ASIX Asia Satellite Internet Exchange Ltd, Hong Kong

Garrett Hill
CEO
X2nSat, USA

Dr. Matthias Riede
Executive VP Technical Operations
Signalhorn Trusted Networks, Germany

Mike Scotto
SVP Business Development
Globecomm, USA

Leanna Smith-Ryland
CEO
Hawaii Pacific Teleport, USA

James Trevelyan
Sales & Account Management Director
Arqiva Satellite & Media, UK

Hank Zbierski
Chief Catalyst
Isotropic Networks, Inc., USA

Steven Wheelis
Chief Engineer
SpeedCast, USA

Executive Summary

According to managed VSAT service providers, the major costs and challenges of network deployment vary as a function of the type of network, size, applications and vertical market being served. Regardless of the market, however, the faster you can deploy, the sooner you can earn revenue, which puts a premium on an efficient installation process. Depending on your contract terms, the pace of installation may also affect profitability, including things beyond your control such as site access problems or last-minute changes in network requirements.

The Challenges of VSAT Network Deployment

Even in locales with excellent electrical and other infrastructure, there are challenges with physical rollout of remote terminals.

Shipping of terminal equipment and logistics management is a major operational issue and becomes more complex the more dispersed the network is. Average shipping cost from WTA's survey for this report were US$1,240 per remote.

For some complex and custom-engineered applications, providers may send their own engineers to perform installations, and this can involve long-distance travel and extended on-site labor hours. The WTA survey found an average travel cost factor of US$1,100 per remote installation for hotel and travel expenses.

Government Challenges

Government customers can have unique network and security requirements, in addition to heavy documentation, reporting and contractual obligations. On secure and defense projects, your service and support teams may need to be "compartmentalized" to different facilities, and limited to individuals who are authorized for access.

Global Network Challenges

International embassy networks highlight the unique challenges of VSAT in a global economy. The mean-time-to-repair can be long when there is only one or two sites in a country. The small number of locations and wide geographic spread can also make space segment costs the highest component.

Another cost challenge with globe-spanning networks is that spare parts can be more expensive to supply, especially when 1:1 redundancy is the required. Differing regional QOS expectations can be a challenge as well: a

customer from one region may have QOS expectations exceeding what the local market can support.

Interviewees describes local regulations as a major challenge, particularly for networks spanning international borders. Hiring a local lawyer, licensing and conducting interference analysis and frequency coordination surveys can be expensive and time-consuming in some locations. Some government and NGO customers can over-specify design components: for example, specifying 1:1 redundancy when 1:N is viable. A North American operator's executive cautions against allowing customers to design the solution for every network contingency.

Optimizing Design to Control Operating Costs

VSAT networks are custom-designed for the needs of customers. But cost-effective deployment means standardizing as many processes and technologies as possible. How do operators optimize the design and engineering of VSAT networks to control the investment of time and resources?

Standardize Equipment

Employing standardized terminal kits offers the potential for price savings, more efficient maintenance and operations, and a better chance that personnel understand the equipment.

Design of the remotes should be driven by the environment in which they operate and the applications they support. For example, a European operator serving maritime markets reports that focusing only on quality products and avoiding sub-tier antenna suppliers is vital to cost-effective operation. Provisioning of the remotes includes not only the equipment in operation but spares that crew members can be guided to install during a voyage.

Standardization helps control costs – but is not always possible. For some operators, their unique value proposition may rely on being innovative and solving problems that others cannot or will not address.

Employ Scalable Platforms

Maximizing return on investment in VSAT systems typically means employing scalable platforms that can share cost infrastructure across multiple customers when possible. Hub systems typically require investments that cannot be amortized with a single customer contract. Network Management Systems, training, and other operational support all bring hard and soft costs with each new technology or system you deploy. All the major VSAT technology suppliers offer such platforms, and they naturally encourage providers to standardize on their technology, which can bring benefits.

Network and Configuration Management

Service providers employ configuration management systems to ensure they capture every aspect of the original configuration in both the field and hub. Network management systems collected data over the life of the network and make it possible to track trends and predict future network behavior.

Open Architectures

Another way to control cost elements is to employ open architectures where possible. Different layers of the solution can be relatively open or proprietary. The trade-offs depend on your network architecture, existing customer base, potential customer base, and customer requirements. Open versus proprietary comes down, for most respondents, to how well the features of a system match the long-term requirements of the customer and application.

Remote Control

The more you can design networks to be controlled remotely from the NOC, the most cost-effective they are likely to be over their lifecycle. Some examples are remotely controlled activation and operating features, software-key activated licenses, along with network management tools. A fundamental requirement for remote control is a second communications path to the remote.

Minimizing Installation Costs in the Field and NOC

The capital expense of hardware is straightforward to understand and work into the business model. Whether it is owned by the end-customer or amortized on the service provider's books, its impact is predictable. Much less predictable are the labor and travel cost of the people in the field and in the NOC who will bring that expensive hardware online. What do experienced VSAT service providers do to minimize cost in the field and support time in the NOC support?

Hire Local

The most widely used approach is to employ local installers as subcontractors. Service providers benefit not only from lower travel costs but also from wage differentials between industrialized and developing nations, as well as between urban areas and rural ones.

Smart Planning and Project Management

Enterprise resource planning (ERP) and enterprise performance management (EPM) systems are the high-end, big-company platforms used to manage transaction and resource data as well as performance. Depending on company size, service providers use these systems or simplified versions to help manage and track the status of resources, on-site equipment, conditions, and activities

performed for each location. They can also help monitor and manage communication with site owners and customers about their responsibilities as specified in your sales and service contracts.

Pre-Dispatch Planning

Failure to understand the site, from resources to restrictions, is the top reason for inflated costs and schedule over-runs.

- **Site Surveys.** Service providers exchange information with customers about what is needed at each site to successfully implement service in the timeframe that has been set. Some VSAT network operators report developing detailed manuals for both internal and external use on how to deploy specific services, with site survey information, logistics, shipping, asset tracking, delivery, installation, test, and acceptance procedures.
- **Site Access.** Another item is making sure to anticipate site access authorizations that will be required, particularly in a government facility.
- **Tools and Equipment.** Another important practice is to ensure all technicians/installers have all the required and predefined tools and equipment to do the job.
- **Coordinating and Scheduling NOC Resources.** The work of installers in the field needs NOC support and this must be included in the deployment plan. WTA's survey found an average cost factor of 1.5 NOC persons required to support each remote activation.
- **Pre-Shipment Configuring and Testing.** Pre-shipment configuration and testing can be key to avoiding costly deployment errors. Some operators test over the satellite as well and develop duplicate networks at their own locations that let them replicate problems in the field.

Training Installers and NOC Teams

Along with well-designed internal processes and systems development, ensuring technicians and NOC teams are properly trained on systems is essential to controlling cost and quality. One operator makes sure that NOC staff have hands-on experience with every piece of equipment used in remote sites. Another has supervisors randomly travel to installations in progress to verify proper procedures and quality results.

Minimizing Maintenance Costs

Maintenance issues can have a major impact on the profitability of providing a managed VSAT network service. How do you minimize maintenance costs

while ensuring a high quality of service? It begins with doing a quality installation in the first place using equipment suited for the site and the applications. Once that is in place, according to respondents, cost-effective maintenance comes down to smart deployment of spares and use of monitoring technology.

Managing Spares

The low-profile task of managing spare components has a big impact on overall maintenance costs. One respondents maintains customer premise equipment at forward locations around the country, so that it can be dispatched as cheaply and quickly as possible. Another maintains hub and antenna redundancy at its central locations so that service can be moved to a backup in the event of hub failure while repairs are going forward.

M&C Systems

Network management and monitoring systems with detailed status information can help control maintenance costs in a big way. One respondent continuously monitors sites and uses an automatic reporting system to flag issues and predict problems before they affect service quality.

Modeling the Cost of VSAT Network Installation

Remote terminal technology improves every year – but installing, aligning and turning up a remote antenna is still a time-consuming and demanding job. The cost of the installation is around 90% labor for a typical two-person team, one qualified engineer or technician and one assistant. The remaining expenses are for transportation, lodging, food and materials such as cabling.

VSAT installation sites are typically in non-urban locations, and the average travel might well be above 100 km each way, which also incurs travel labor time. Installation sites are frequently in underserved areas with either poor-quality or missing terrestrial phone service. This can require the use of satellite phones to communicate with a NOC during a line-up procedure. In this situation, difficulties such as dropped calls, background noises, language barriers and frequent interruptions can result in the need to spend a second day to complete installation. In extreme but not unusual cases. installation sites can be in isolated locations, where, for example, the only way to access the site is by using a helicopter or boat. In these cases, it can require several days to install, causing the highest personnel and labor costs.

Survey Results

The sponsor of this report, INTEGRASYS, has developed a detailed cost model for VSAT network installation, and offers a free analysis to network operators to help them calculate costs accurately and identify ways to reduce them. The

INTEGRASYS model provides industry averages for most of these parameters. To help INTEGRASYS further refine its model, WTA conducted a survey of VSAT network operators to amass more cost data in each of these areas. Highlights of the survey include:

- For a 50-site VSAT high-performance networks, capital expenditure represents 45% of total investment while operating expenses make up 55% of the total.
- Respondents spend an average of US$224,000 on a VSAT hub, $1,225 on a conventional VSAT remote outdoor unit ($9,000+ if equipped with motorized pedestal or high-capacity RF equipment), and $733 for a conventional VSAT remote indoor unit ($1,200+ for the motorized, high-capacity version).
- On average, service providers assign 2.1 installers to each remote installation, who spend 12 hours at work and another 12 hours of travel time. On average, each installer racks up more than US$1,000 in travel and hotel costs per installation.
- Only 5% of installations require an immediate follow-up visit to correct a technology or installation problem.
- On average, 1.5 NOC staff are required to support a remote installation.

Technology Tools for Improving Design and Installation

The managed VSAT network providers we interviewed reported several technology advances that have enabled significant improvements in their network engineering and installation.

Network Design

Most of the VSAT terminal equipment and installation tools today have a web interface that make it easy to enable remote monitoring and operation from the NOC. Management tools from third party suppliers like INTEGRASYS, as well as integrated tools from VSAT suppliers, can do much to eliminate the need to call the NOC.

- **Portable Spectrum Analysis Tools.** Compared to years ago when a suitable spectrum analyzer could cost over $70,000 and weigh a great deal, today's handheld spectrum analyzers make cross pol alignment much easier and cheaper, making them affordable for larger installations.
- **Auto-Align Antennas for Mobile Systems.** Operators that work with transportable and on-the-move systems reported that the introduction of

auto-acquire Ku-Band antennas has made installations easier than in the past. These motorized systems acquire satellites with the push of a button.

Installation and Operation

Before the introduction of SATMOTION Pocket and similar products, installers were completely dependent on NOC operation staff, reached by voice call, to ensure correct pointing, power and signal. Today, many VSAT providers use these tools to do more precise and timely installation with more pointing accuracy, allowing for higher quality in the network.

- **Field Service Management Software.** Logistics and field service management software that works with smart phones is another area that has helped improve deployment costs. As an example, one operator is working on a tool to track the work of its installers through a smartphone app. This system also allows the VSAT provider to identify and record the cause of any delays, and maintain its SLA commitments.
- **Network Management Systems.** The newest generation of network management systems (NMS) let customers see their bandwidth utilization, performance statistics, services and traffic protocols. By providing customers with these tools, service providers reduce calls to the NOC.
- **Adaptive Modulating/Coding and Modem Improvements.** Advances nearly every year let service providers put more power into antennas, gain more rapid re-acquisition and achieve better encryption and authentication. Due to improvements in spectral efficiency one operator reduced the cost of bandwidth to its own customers by 30-50% compared to several years ago.

Shrinking, Speeding, Adapting

The VSAT service providers interviewed for this report paint a picture of network design, engineering and installation that is all about faster installation, reductions in technology size and cost, and increasing ability to adapt as customer demand changes.

The fast rise of HTS has created concerns that traditional VSAT is on its way out, as far cheaper (if less reliable) broadband connectivity via satellite becomes the unified platform for data communications. It seems certain that some erosion will occur as much lower prices, and the growth of flat-panel antennas at ever more competitive cost, lure less demanding applications away. Mission-criticality and service quality, however, will continue to demand VSAT, and continued innovation by technology and service providers is likely to preserve that competitive advantage for years to come.

The Challenges of VSAT Network Deployment

According to managed VSAT service providers, the major costs and challenges of network deployment vary as a function of the type of network, size, applications and vertical market being served.

For **retail applications** such as credit card verification at gas stations, the space segment cost may be relatively low for a 5,000-remote network. The major costs, on the other hand, are in hardware, field service, and maintenance.

In the **cruise ship** vertical market, the biggest challenge is the logistics of getting systems on vessels. Providers of maritime networks reported that it can take days of travel, and months of advanced scheduling for installs to be performed while a ship is in dry dock or a shipyard.

For energy, oil and gas, challenges relate to getting services on offshore oil platforms. "Sometimes we can catch rigs in a shipyard, sometimes they may be on the Coast of West Africa, so we have many location-challenged sites," explains a global provider's executive.

Multinational and global networks face significant regulatory, location, logistics and cultural challenges.

Regardless of the market, however, the faster you can deploy, the sooner you can earn revenue, which puts a premium on an efficient installation process. Depending on your contract terms, the pace of installation may also affect profitability, interviewees told the WTA. It can be important to try to add contract exclusions covering the delay of installation by things beyond your control, such as site access problems or last-minute changes in network requirements, so that you are not penalized financially.

It is a fact of life that VSAT networking is "always pushing the boundaries," as one provider put it. Rather than deploying the same network over and over again, providers frequently innovate in ways that please customers but place burdens on their business model.

"We have experienced challenging financial models from design to implementation and on-going operation," says one managed network provider,

"so the biggest costs and challenge can vary widely by project." Seemingly trivial matters at the design stage, when not fully understood, can have big negative impact on operating costs.

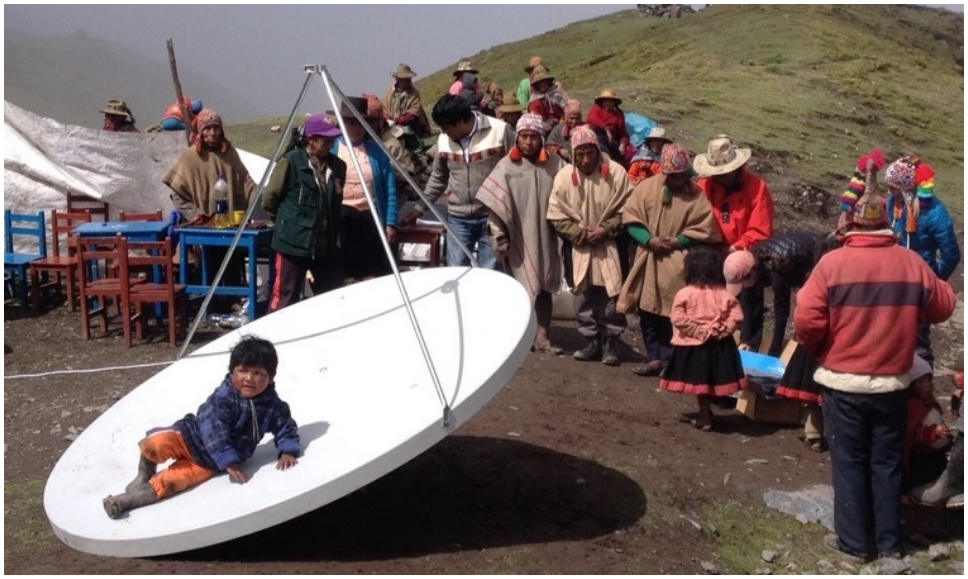
Challenge of the Physical

Even in locales with excellent electrical and other infrastructure, there are challenges with physical rollout of remote terminals. "The physical installation process of "truck rolls", installing cable, conduit, constructing pads, and supplying power and mounting antennas is our biggest challenge," says a North American operator's executive.

Shipping and Logistics

Shipping of terminal equipment and logistics management is a major operational issue and becomes more complex the more dispersed the network is. Average shipping cost from WTA's survey for this report were US$1,240 per remote.

Rural locations may be accessible only via unpaved roads, boat or airplane, or off-terrain transport (helicopter, ATV, etc.) and located in extreme, or harsh environments. For example, an operator in Latin America has sites that are only accessible by river craft in remote rainforest regions. Conflict zones, where satellite frequently offers the only reliable communications, are a particular challenge to logistics managers.



Courtesy: Elara Comunicaciones

Customs presents a "known unknown" problem, to paraphrase a former US Secretary of Defense. Regulations surrounding the importation of telecom equipment, test units and software can be confusing and contradictory.

Customs duties can vary widely and be difficult to predict, and customs processing in some countries may add significant schedule uncertainties and logistical burdens for delivery of equipment.

Travel and Subsistence Costs

For some complex and custom-engineered applications, providers may send their own engineers to perform installations, and this can involve long-distance travel and extended on-site labor hours. An example is installations on large cruise vessels, which can require multiple antennas to access multiple satellites and frequency bands, depending on the ship's seasonal route. Assessing the costs upfront with unknown variables can be challenging, and implementation requires effective project management and controls.

The WTA survey found an average travel cost factor of US$1,100 per remote installation for hotel and travel expenses.

Serving Government

Government customers can have unique network and security requirements, in addition to heavy documentation, reporting and contractual obligations. "Balancing competitive pricing with requirements for high availability, resiliency, diversity and network performance, and adherence to information security practices – that's always a challenge," says a managed VSAT network provider's executive.

Government sites require the proper clearances and credentials, "or you'll be sent back from an install trip," explains an executive. On secure and defense projects, your service and support teams may need to be "compartmentalized" to different facilities, and limited to individuals who are authorized for access, explains the manager of a VSAT network serving military locations. This tends to increase the installer labor costs as the pool of employees with proper security clearances will be much smaller.

Global Network Challenges

International embassy networks highlight the unique challenges of VSAT in a global economy. They can have just one or two sites per country spread across many countries around the globe, and the challenges are many.

Repair Access

The mean-time-to-repair can be long when there is only one site in a country. Also, the small number of locations and wide geographic spread can make space segment costs the highest component. Each site can face the added capital and operational expenses of accessing multiple satellites.

Spares

Another cost challenge with globe-spanning networks is that spare parts can be more expensive to supply, especially when 1:1 redundancy is the required or only practical option. "This also requires a local partner for install and licensing," says a managed VSAT network provider.

QOS (Quality of Service) Expectations

Differing regional QOS expectations can be a challenge in international enterprise and other networks. A customer from one region may have QOS expectations exceeding what the local market can support. "For example, in an African country village where utility power is available only half of the day, the expectation of 99.9% availability on the network will not be there on the local side," an executive explains. Often NGOs (non-governmental organizations) operate in rural locations, "so it is very challenging to guarantee an SLA (Service Level Agreement)."

Regulatory

Interviewees describes local regulations as a major challenge, particularly for networks spanning international borders. "Hiring a local lawyer, paying licensing fees, conducting interference analysis and frequency coordination surveys can be expensive and time-consuming in some locations. Local licensing can be difficult," says a North American operator's executive.

According to one European managed VSAT provider, "African countries we operate in are the most challenging in terms of understanding and complying with local regulations and procedures in various countries." In the Asia Pacific, a regional provider said that, in its experience, the regulatory environment is relatively easy in the Pacific Islands but is difficult in Cambodia, Laos, Myanmar and the Middle East.

Redundancy and Waste

Some government and NGO customers can over-specify design components without balancing the cost trade-offs. For example, a network could specify 1:1 redundancy when 1:N is viable. A North American operator's executive cautions against allowing customers to design the solution "for every network contingency." In your bid process, it is worth asking these kinds of questions:

- Will the site spare equipment be properly maintained and power-cycled on a regular basis to verify they are "cold standby," or will they be stored away and potentially misplaced?
- What are the demark lines for site responsibilities between you and your customer?

Respondents suggested that it is highly worthwhile to invest in electronic asset tracking and maintain up-to-date maintenance records to minimize this kind of waste or neglect.

Management and Processes

The intangibles aspects of remote sites can have an impact on costs. For example, according to one respondent, "Customer operations depots and centers with different cultures and workforces can perform at hugely different levels. What works in one locale may not in another and you have to factor your knowledge of that into your bid and cost management."

One practice than can help is employing universal measurement metrics. "We try to use metric-system measurements and uniform power and voltage systems to unify globally," says a network executive. "It's a detail – but one that avoid a lot of errors."

Optimizing Design to Control Operating Costs

VSAT networks are custom-designed for the needs of customers. But cost-effective deployment means standardizing as many processes and technologies as possible. How do operators optimize the design and engineering of VSAT networks to control the investment of time and resources? Providers WTA interviewed for this report described a variety of approaches, depending on the markets they serve.

Standardize Equipment

Employing standardized terminal kits offers the potential for price savings, more efficient maintenance and operations, and a better chance that personnel understand the equipment, compared with having to support multiple brands and flavors of technology. "We have a standard VSAT solution," explains a technical manager, "and that means we know the cost of the systems, know the operations, maintenance and troubleshooting, and our teams are trained to efficiently manage installations."

"We try to have everything operate using the same systems," says a regional teleport operator, "so in case of failure, we have spares at our hub locations and can deploy from there, which minimizes the cost of duplicative spares at each remote."

A company serving maritime customers has standardized on a Seatel Ku-band system with X7 modems, UPS, a switch and, depending on the value-added services, a router. "We know what makes and models we'll buy and provide, and what kind of rack for the customer, dish, and maintenance laptop for troubleshooting. It really helps to standardize."

Standardize by Technology or Service

"Instead of trying to put the same terminal everywhere, we use different kinds of terminals for different applications, based on the service plan, SLA requirements and data rate requirements," a North American operator explains. In this way, the operator designs remotes "by service plan and not by network, so the terminals for remote oil and gas SCADA are different from remote broadband service, or corporate voice connectivity." SCADA terminals would be low bit rate and designed for harsh conditions and even use solar power, while broadband enterprise terminals may be optimized for network bandwidth efficiency, latency performance, management tools and cost within a corporate infrastructure environment.

In short, design of the remotes should be driven by the environment in which they operate and the applications they support. For example, a European operator serving maritime markets reports that "we focus only on quality

product and avoid sub-tier antenna suppliers that use lower quality components, and we suggest to our customers which antennas are recommended and which we don't recommend." Provisioning of the remotes includes not only the equipment in operation but spares that crew members can be guided to install during a voyage. "Maritime antennas need preventative maintenance as well at least once a year," advises a technical manager, "because they have moving parts."

Standardize If You Can

Standardization helps control costs – but is not always possible. For some operators, their unique value proposition may rely on being innovative and solving problems that others cannot or will not address. "You cannot always standardize," admits one operator. A global operator may also face challenges because of its diverse regional customer bases and quantity of legacy customers and networks. "We've made runs at getting VSATs standardized, "says the technical lead for a large operator. "We've tried to 'modularize' components, for example, to allow faster installation. But business requirements change and today's module may be tomorrow's scrap."

Courtesy: Globecomm

Employ Scalable Platforms

Maximizing return on investment in VSAT systems typically means employing scalable platforms that can share cost infrastructure across multiple customers when possible. Hub systems typically require investments that cannot be

amortized with a single customer contract. Network Management Systems, training, and other operational support all bring hard and soft costs with each new technology or system you deploy.

All the major VSAT technology suppliers offer such platforms, and they naturally encourage providers to standardize on their technology, which can bring benefits. The technical manager for a European operator suggested additional ways to make scalability work in the company's favor:

- "First we check if a new customer can be added to our existing platforms. If not, we look to other solutions or new open platforms on satellites we serve and try to re-use platforms and space."
- "We perform network sizing to maximize efficiency and have a lot of experience optimizing networks' commercial and technical parameters. We look for the right technical options, based on what's on the market, examine the pros and cons, and try to standardize solutions."
- "We also look into different technologies. For example, if the network has very little space segment and hardware cost is key, we might look into a lower-cost terminal."

Network and Configuration Management

Knowing your network on an institutional level is fundamental to both quality and cost control. Service providers employ configuration management systems to ensure they capture every aspect of the original configuration in both the field and hub. Network management systems collected data over the life of the network and make it possible to track trends and predict future network behavior, so that the next network you deploy benefits from the organization's experience.

Unfortunately, there is seldom just one management system to rule them all. "There can be ten management systems inside a large end-to-end network," explains a technical manager. "You can't expect just one management system to handle everything."

Open Architectures

Another way to control cost elements is to employ open architectures where possible. "We always prefer an open architecture," says an operator in Asia. "We try to offer solutions that allow customers to switch to any satellite with existing equipment, so the scalability of their equipment investment is worthwhile. We do not run TDMA networks that are semi-proprietary. It could be a short-term advantage for us, but we believe that offering an open architecture solution helps our clients maneuver in the future without getting locked into proprietary equipment, and that they value that flexibility."

Compatibility with your infrastructure and the customer basis can be another important factor. "We deploy tried and tested equipment that is forward and backward-compatible and maximize throughput efficiency," says a European operator of his company's approach to cost-effective designs.

Different layers of the solution can be relatively open or proprietary. The trade-offs depend on your network architecture, existing customer base, potential customer base, and customer requirements. For example, is a 15% improvement in bandwidth efficiency with a proprietary solution worth the savings if your network will depend on terminal gear from a single supplier? It depends. Is a lower cost hub hardware worth it if the management systems and terminals require additional software interface customization, or more expensive terminals? Open versus proprietary comes down, for most respondents, to how well the features of a system match the long-term requirements of the customer and application.

Remote Control

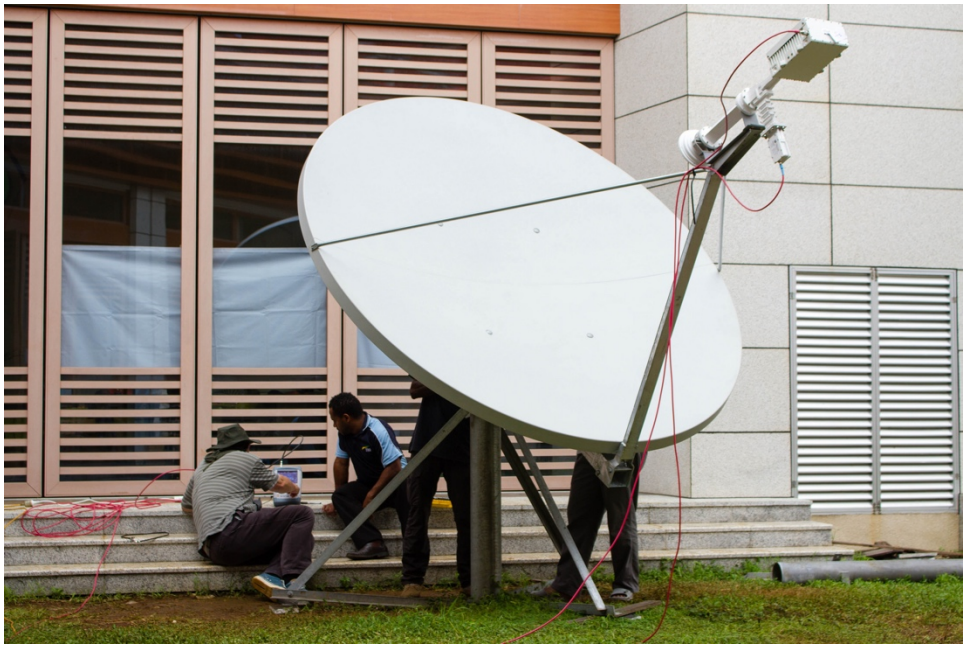
The more you can design networks to be controlled remotely from the NOC, the most cost-effective they are likely to be over their lifecycle. Some examples are remotely controlled activation and operating features, software-key activated licenses, along with network management tools.

A fundamental requirement for remote control is a second communications path to the remote. For example, a maritime VSAT provider's out-of-band systems use Iridium to allow onsite technicians and the NOC to dial in and see what's going on with remotes globally even if they cannot access the VSAT. "On each system, we have a terminal service/router allowing us to see consoles for each device or an in-band overhead channel. That is low-priority traffic, which allows us to get into the network, and it gives us things we cannot achieve using the out-of-band dial-up link."

With a second communications channel, installation and maintenance problems lose some of their power to add to costs. One VSAT network provider makes sure they can remotely control the modems during installation. "Even if the remote site has no VSAT or IP network, we can activate modems and uplink power control, we can remotely change the frequencies and polarity, and sometimes change the data rate, via control from our NOC."

Minimizing Installation Costs in the Field and NOC

The capital expense of hardware is straightforward to understand and work into the business model. Whether it is owned by the end-customer or amortized on the service provider's books, its impact is predictable. Much less predictable are the labor and travel cost of the people in the field and in the NOC who will bring that expensive hardware online. What do experienced VSAT service providers do to minimize cost in the field and support time in the NOC support?



Flickr Creative Commons: ICTD Forum VSAT Day 4-5

Hire Local

The most widely used approach is to employ local installers as subcontractors. "Because the cost to send our own installers would be way too expensive, 99% of the time we depend on remote parties around the world," says an operator in Asia. For large managed networks across wide geographies, service providers may run an entire network of installer contractors in many regions, both for initial deployment tasks and ongoing maintenance and field support. Service providers benefit not only from lower travel costs but also from wage differentials between industrialized and developing nations, as well as between urban areas and rural ones.

Beyond this Business 101 approach, companies have found multiple ways to increase the efficiency of their processes to reduce the costs of installation.

Smart Planning and Project Management

One network manager summarizes: "We provide a very clear sequence of procedures that installers must follow to implement changes or installations to VSATs including LAN, voice, power supply, cabling, and so on. We train our installers and give each person on the team specific tasks onsite. We also ask installers to request quick site access. For example, if a bank manager is not available, the installers know that if they are made to wait, this delay is tracked to the customer as cause, and the installer can escalate this item."

Enterprise resource planning (ERP) and enterprise performance management (EPM) systems are the high-end, big-company platforms used to manage transaction and resource data as well as performance. Depending on company size, service providers use these systems or simplified versions to help manage and track the status of resources, on-site equipment, conditions, and activities performed for each location. They can also help monitor and manage communication with site owners and customers about their responsibilities as specified in your sales and service contracts. The right systems make it possible to track all steps through an online portal.

Testing the Network

"We configure and test everything at the NOC using the satellite, including remote terminals and electronics through our hub and troubleshoot," says an executive in North America. "We flesh out problems there to ensure it is mostly plug-and-play before equipment is shipped out to remotes. We have spent a lot of time perfecting our procedures. We also develop a duplicate of the network at our locations so that we can test and diagnose issues and also replicate problems that crop up in the field for troubleshooting."

A VSAT provider explains: "For installs, in coordination with the NOC, we follow our commissioning process and document the parameters in a configuration database, so that if anything pops up we can compare it to the time of installation. For configuration management and off-the-shelf product, we use the Network Management Systems coming with the VSAT platform, and use SAP and other enterprise resource planning systems, where we maintain parameters about remotes."

Pre-Dispatch Planning

Failure to understand the site, from resources to restrictions, is the top reason for inflated costs and schedule over-runs. Successful service providers make pre-dispatch planning a major priority in network deployment.

Site Surveys

"As part of project management," says one executive, "we exchange information with customers about what is needed at each site to successfully implement service in the timeframe that has been set. As part of this, the customers

let us know the procedures and access requirements at their sites. The engineer has pre-arranged for everything to be done in advance of their arrival, so they know exactly what will be done on site. That makes a huge difference, because they will usually need to guide the customer on the install."

Site planning considerations should include:

1. **Line of Sight.** Finding a site with a clear view of the sky is an obvious priority – but installers should take the future into account. "A tree or bush that is small today could be big in four years," notes a North American executive, "so you may need to record the issue for the future or address it today."
2. **Security.** Is the site secure from theft and vandals? If not, what can be done to protect valuable equipment? One enterprising operator in Africa designed a PVC box to enclose a small VSAT antenna that served electric substations. By hiding the antenna in a container permeable to RF, the company reduced equipment loss to near zero.
3. **Terrestrial RF** Interference. A site survey should take into account terrestrial sources of interference from radar to wireless base stations.
4. **Utility Power**: Rural locations in underdeveloped regions can have intermittent or poor-quality power, or even be entirely off the grid. Addressing the challenge during installation will dramatic reduce maintenance requirements in future. One managed VSAT network uses remote monitoring to detect voltage variations that damage power supplies of modems. "We calculated that if we provided a power conditioner at our own cost, it was cheaper than sending another field team to replace power supplies or entire modems."
5. **Wind and Weather Protection:** Wind can off-point systems or even knock them down, while moisture, dust and grime can degrade and corrode systems over time. Ensuring that you properly specify weight and wind resistance, environmental, moisture, and dust filtering to match with local conditions can prevent costly problems.
6. **De-Icing:** Snow and ice on antennas and feeds can also degrade satellite signals, particularly in higher frequencies. For locations subject to winter snow and ice accumulation, it may be important to add antenna de-icing equipment that sheds snow before ice accumulates. Professional earth station antenna de-ice systems use hot air or vibrating RF-transparent antenna covers made of architectural fabric.

Virtual Surveys

One provider performs a virtual site survey as part of planning. "Virtual site surveys are probably the biggest tool we have to understand what we will have to do when we arrive for an install," says an executive. "The virtual site survey may include looking at the location on Google Earth, and having the onsite contract fill out a form to provide us with advance information. Early engagement with the customer is vital in ensuring site-specific and technology-specific data is correct at source and to understand and assist the customer in achieving an installation schedule that is realistic."

"We always keep in mind that customer IT staff may not be satellite-savvy," says an operator. "Certain resources need to be available or you'll waste time."

Some VSAT network operators report developing detailed manuals for both internal and external use on how to deploy specific services, with site survey information, logistics, shipping, asset tracking, delivery, installation, test, and acceptance procedures. "If we need to run cable, we inform the customer site and installers," says a technical manager. "We provide information to the technicians about where they will go, who their site contact is, what tools and spares they need and requirements for site access."

Site Access

Another item is making sure to anticipate site access authorizations that will be required for the remote install site, particularly in a government facility, but in many other types of sites as well. One provider's process checklist illustrates the type of detailed preparation that may be required: installers with tattoos are barred from entry to Mexican jails, to avoid inciting gang rivalries, so the operator makes it a requirement that its installers not have visible tattoos.

Tools and Equipment

Another important practice is to make sure both NOC and field dispatch procedures ensuring that all technicians/installers have the required and predefined tools and equipment. For instance, for installations on oilrigs, installers need to wear safety glasses, goggles and boots.

"To reduce delivery time, we look to warranty that the technicians are going with full tools and spares required, so they won't lose time on site due to lack of the right materials," says an operator of large national VSAT networks. "They must have the correct connectors and spares so we're assured they'll go with what they need. In the past, we've had problems with installers arriving onsite without the tools or spares that they needed, requiring them to travel home and return."

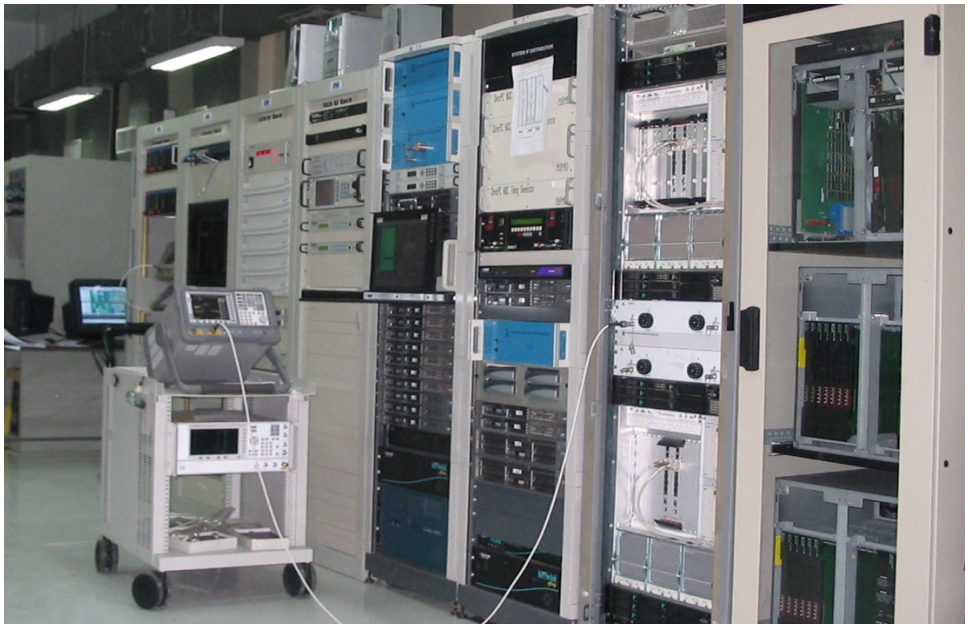
An effective process puts money in the bank. "We know what kind of rack you will need and what kinds of cable combinations will work," says one

technology manager. "We give installers all the cables and parts they could possibly need. We don't care whether they discard or return what they don't need – it saves us more money than trying to specify length of every cable and type of every plug."

Coordinating and Scheduling NOC Resources

The work of installers in the field needs NOC support and this must be included in the deployment plan. "We have very clear NOC procedures to call and start support," noted a manager. "There are times when we may be managing between 10 and 400 installs in a day. We plan ahead so that the NOC can forecast the resources they will need to support field teams."

WTA's survey found an average cost factor of 1.5 NOC persons required to support each remote activation, as detailed later in this report.



Courtesy: Globecomm

Pre-Shipment Configuring and Testing

Pre-shipment configuration and testing can be key to avoiding costly deployment errors and delays. "We pre-test everything before shipping to the field," a technical manager explains. "For remote networks, we integrate everything into portable rack units before sending the products to the client in remote locations, so the client can flip the switch and everything works."

Some operators test over the satellite as well. "We configure and test everything at the NOC using the satellite, including remote terminals and electronics through our hub and troubleshoot," says an executive in North America. "We flesh out problems there to ensure it is mostly plug-and-play before equipment is shipped out to remotes. We have spent a lot of time

perfecting our procedures. We also develop a duplicate of the network at our locations so that we can test and diagnose issues and also replicate problems that crop up in the field for troubleshooting."

Remote Configuration. Another option may be remotely controlled configuration: "We're trying to come up with a pre-configured terminal that could be standardized enough with enough communications software that it will call home and we can then download the configuration for the terminal," one interviewee reported. "The idea is to take the guesswork out of the field, so the field installers only need to deal with power and pointing, and the terminal can allow the NOC to push out its setup data."

Training Installers and NOC Teams

Along with well-designed internal processes and systems development, ensuring technicians and NOC teams are properly trained on systems is essential to controlling cost and quality.

"We make sure every person at the NOC on every shift is familiar with the equipment on the remotes," says and American operator's executive. "They must have hands-on experience with the configuration being delivered to the remote site. That means the modem programs, settings, data rates, and modem configurations, hardware configurations, switches, cables, routers, hardware RF and IP settings need to be understood by operators."

One operator of large VSAT networks has a process to continuously evaluate its installers. "We have our supervisors randomly travel to installers to verify the quality of installations, so we can detect if they are not carrying the right tools or installing according to our standards. These are very important because we can avoid having failures in the short term. We ask all vendors to guarantee all sites for one year under all the different weather conditions. If they meet the quality standards and warranty of quality, they will not have a problem. If we see a problem and send a team and find improper installation, such as improper cable isolation, we may chargeback our installer for the poor-quality work. We stress this a lot," the executive explains.

Another executive recommends "You should know the people by personal meeting and by phone, and you really need to do a certification program with them, and kick them out if they don't perform as local installers."

Online Training. To minimize field labor, one operator provides online training through the web and Skype to local partners. On top of technical product training, installers should to have security and fire safety training, electrical and radiation safety training in some cases.

The Global VSAT Forum offers helpful online training and certification resources at https://gvf.org/training/training.html. "We insist installers have GVF or similar certification," says the executive of company managing over 1,200 network sites.

Minimizing Maintenance Costs

Maintenance issues can have a major impact on the profitability of providing a managed VSAT network service. How do you minimize maintenance costs while ensuring a high quality of service? It begins with doing a quality installation in the first place using equipment suited for the site and the applications. Once that is in place, according to respondents, cost-effective maintenance comes down to smart deployment of spares and use of monitoring technology.

Managing Spares

The low-profile task of managing spare components has a big impact on overall maintenance costs. "For corrective maintenance, we hold customer premise equipment stock at forward locations around the country allowing replacement parts to be dispatched as cheaply and quickly as possible," says a teleport technical manager.

One operator maintains hub and antenna redundancy at its central locations. "Always have an extra hub antenna available, so you can check for service degradation cause by hub components, such as RF, IFL or antenna issues. It also lets you move service to a backup antenna in the event of a hub system fault. We daisy-chain all our hub-managed networks three times a year for maintenance," says the provider's executive.

Sub-Contracting Maintenance

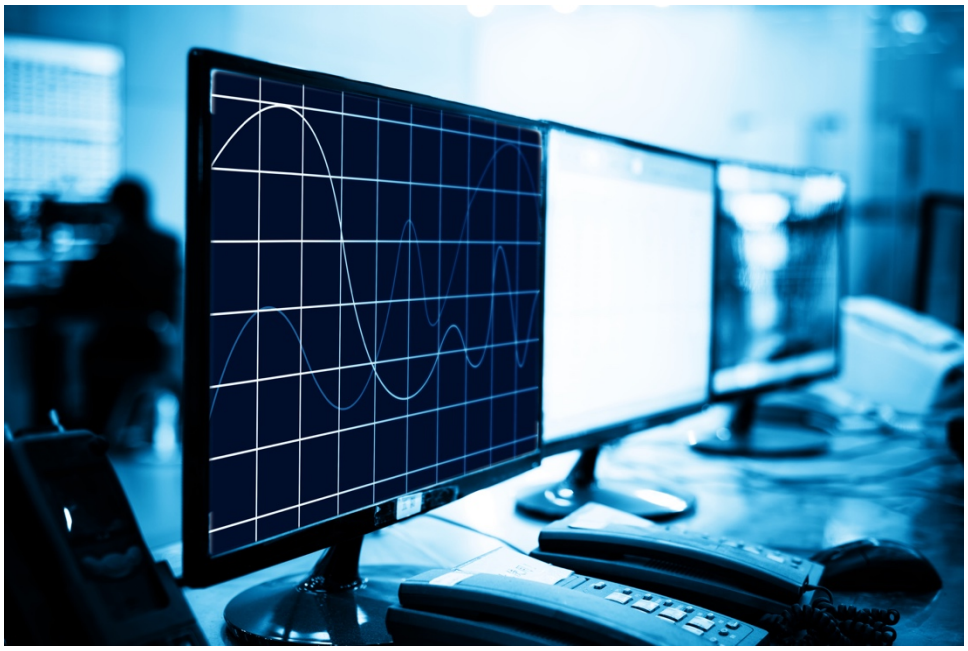
Some operators use third-party maintenance companies for preventative and regular maintenance. In many cases, local IT house "generalist" contracts can be more cost-efficient to use for performing maintenance on standard LAN/WAN and IT equipment such as routers. They also can offer a much larger labor pool compared with the limited pool of satellite-skilled labor.

Because backup VSATs can appear to be expensive on a per-site basis, some operators blend the cost of spares into their recurring network pricing. "We put a few thousand $USD for backup remotes into the network costs and amortize it over a year, so that customers don't feel the capex pain, but can have the assurances of reliable service," an operator reveals.

M&C Systems

Network management and monitoring systems with detailed status information can help control maintenance costs in a big way. "We continuously monitor sites and have an automatic reporting system for all parameters, from transmission schemes to data traffic," said one operator. "By identifying the site and seeing the transmission parameters, we can not only identify remote issues as they happen but often predict them based on inbound link faults, parameters or signatures. For example, a fluctuating receive signal may indicate an antenna

pointing issue. We have the data and experience to see what may be the root cause of the problem."



Courtesy: Crystal

Proactive monitoring allowed an operator in the Americas to take a big bite out of maintenance costs. "If we see reception reducing, we can assume there's a problem, such as miss-pointing due to wind. The key is to flag problems early so that you can schedule maintenance instead of having to dispatch an emergency team. We coordinate with other installation work so that installers on new sites can also handle proactive maintenance on existing sites. That saves a lot on labor and travel costs."

Another managed network provider serving maritime is developing a database to track the number of hours a motion-stabilized antenna has operated to develop mean-time-between-failure metrics that it can apply to optimizing its preventative maintenance program.

Modeling the Cost of VSAT Network Installation

Remote terminal technology improves every year – but installing, aligning and turning up a remote antenna is still a time-consuming and demanding job.

Frequently, installers allocate a full day for a bidirectional installation due to the uncertainty of the process, regardless of the technology. The cost of the installation is mostly labor (around 90%) for a typical two-person team, one qualified engineer or technician and one assistant. The remaining expenses are related to transportation, lodging, food and materials such as cabling.

VSAT installation sites are typically in non-urban locations, and the average travel might well be above 100 km each way, which also incurs travel labor time. Installation sites are frequently in underserved areas with either poor-quality or missing terrestrial phone service. This can require the use of expensive satellite phones to communicate with a NOC during a line-up procedure. In this situation, difficulties such as dropped calls, background noises, language barriers and frequent interruptions can result in the need to spend a second day to complete installation, and a doubling of installation cost. In extreme but not unusual cases. installation sites can be in isolated locations, where, for example, the only way to access the site is by using a helicopter or boat. In these cases, it can require several days to install, causing the highest personnel and labor costs.

Cost Factors for Installation

The sponsor of this report, INTEGRASYS, has developed a detailed cost model for VSAT network installation, and offers a free analysis to network operators to help them calculate costs accurately and identify ways to reduce them. The key inputs to the INTEGRASYS model are provided below.

Installation Inputs
Average hourly salary of installers
Number of installers assigned to each remote installation
Average hours required per remote installation
Average hours of travel time for each remote installation
Average travel cost per person for each remote installation
Average hotel cost per person for each remote installation
For maritime or aeronautical terminals, average hourly “port cost” for a vessel in harbor or an airplane on the ground
After installation, average percentage of remote terminals require a second visit
Number of NOC/hub staff required to support the average remote

Installation Inputs
installation
Average annual salary of NOC/hub support technicians
Average fee charged per month for hosting the hub and testing uplinks and remote terminals
Average shipping cost per remote

CAPEX Inputs
Average cost of VSAT hub
Average cost per remote outdoor unit
Average cost per remote indoor unit
Average cost per field spectrum analyzer
Average cost of a teleport spectrum monitor for the network

Survey Results

The INTEGRASYS model provides industry averages for most of these parameters. To help INTEGRASYS further refine its model, WTA conducted a survey of VSAT network operators to amass more cost data in each of these areas. Highlights of the survey include:

- For a 50-site VSAT high-performance networks, capital expenditure represents 45% of total investment while operating expenses make up 55% of the total.
- Respondents spend an average of US$224,000 on a VSAT hub, $1,225 on a conventional VSAT remote outdoor unit ($9,000+ if equipped with motorized pedestal or high-capacity RF equipment), and $733 for a conventional VSAT remote indoor unit ($1,200+ for the motorized, high-capacity version).
- On average, service providers assign 2.1 installers to each remote installation, who spend 12 hours at work and another 12 hours of travel time. On average, each installer racks up more than US$1,000 in travel and hotel costs per installation.
- Only 5% of installations require an immediate follow-up visit to correct a technology or installation problem.
- On average, 1.5 NOC staff are required to support a remote installation.

To request a free forecast of the total installation costs of a VSAT network, with recommendations on cost reduction, contact info.sales@integrasys-sa.com.

Technology Tools for Improving Design and Installation

The managed VSAT network providers we interviewed reported several technology advances that have enabled significant improvements in their network engineering and installation.

Network Design

Most of the VSAT terminal equipment and installation tools today have a web interface that make it easy to enable remote monitoring and operation from the NOC. "Products from INTEGRASYS and others can be helpful in reducing the time to install and troubleshoot by offering an additional view to what's happening in the network," according to a managed VSAT provider's executive. Another respondent described integrated remote management tools from Hughes and ViaSat that eliminate the need for installers to call the NOC.

As another example, a VSAT network provider explains the benefit of its server application, which connects spectrum analyzers via web interface to remote users in the field. According to the operator's technical manager, "The computer commands the analyzer to check frequencies and can complete measurement in seconds, which allows multiple users to share the resources at the same time over the internet. We used to do cross pol for dishes with a spectrum analyzer on a rack, and the installer having to walk with the spectrum analyzer to verify cross pol levels. It was very inefficient. Now it is only 15 minutes at the NOC for a cross pol." Two years ago, the operator implemented an automated system, whereby field teams can access a web page and run multiple cross pol tests at the same time without visiting each location. The current system has reduced the field teams' average install times from 6-8 hours in the past down to 4 hours today.

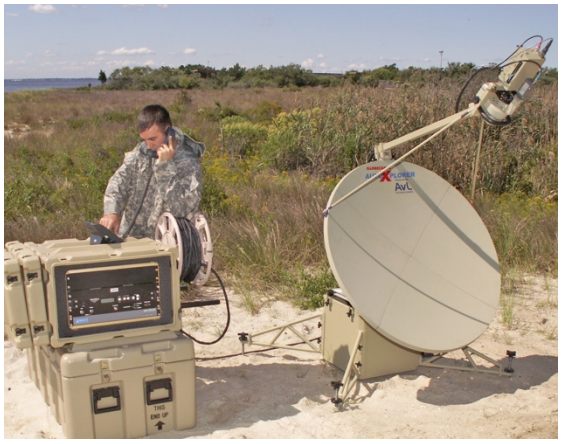
Portable Spectrum Analysis Tools

Compared to years ago when a suitable spectrum analyzer could cost over $70,000 and weigh a great deal, today's handheld spectrum analyzers make cross pol alignment much easier and cheaper. "In the past, providing a spectrum analyzer to the site was far too expensive, but today the equipment is affordable for large installations, such as yachts or major cruise ships with a lot of equipment," said an operator's executive.

"Spectrum analyzers have improved tremendously for handling measurements and automating them," explains an operator in North America. "For tasks such as cross pol isolation, this is helpful. We have provided low-cost spectrum analyzers for some installs, which we can even remotely access."

Auto-Align Antennas for Mobile Systems

Operators that work with transportable and on-the-move systems reported that the introduction of auto-acquire Ku-Band antennas has made installations easier than in the past. These motorized systems acquire satellites with the push of a button. "The interface to the modem is ready, and they work with most standard modems, so you set them up without any need for alignment or cross pol issues with the antennas," according to a North American network manager.

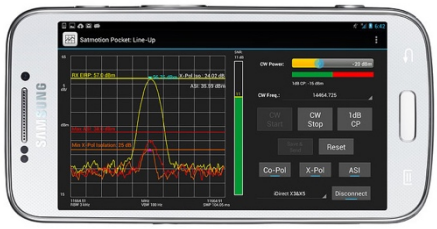


Courtesy Globecomm

An operator in Asia shares a similar view. "Major improvement in TDMA networks allow a motorized antenna to self-install, where a user remotely enters data onto the modem, and you do not need a major on-site engineer then to install the VSAT."

Installation and Operation

"Remote antenna pointing tools, such as **INTEGRASYS'** SATMOTION Pocket VSAT Auto Commission tool, have helped some VSAT providers do more precise and timely installation with more pointing accuracy, allowing for higher quality in the network," says a North American managed VSAT service provider's executive. "Finding the satellite can also be much easier today with smartphone apps to ensure that the antenna has line-of-sight to the spacecraft."



Before the introduction of SATMOTION Pocket and similar products, installers were completely dependent on NOC operation staff, reached by voice call, to ensure correct pointing, power and signal. "VSAT systems have become less complex and easier to physically deploy in recent years," noted another executive, "but the steps that a managed service provider must adhere to when commissioning a network are the same. Many interactions between a satellite operator and your NOC and field installation team are still required each time a site is brought on-air, or for moves, adds and changes, to minimize interference and cross-pol problems."

Not all software products are created equal, as one respondent noted: "Some licensing complexities with antenna pointing software tools have actually hindered its wider adoption," he says.

Field Service Management Software

Logistics and field service management software that works with smart phones is another area that has helped improve deployment costs. As an example, one operator is working on a tool to track the work of its installers through a smartphone app. "We can estimate their site arrival time and take action to prepare for delays. Instead of having them call the NOC, they can inform the systems where they are and it can tell if the installation is on schedule. Or we can see if they are taking a long time, and call them to see if there are any problems," explains a technical manager.

This system also allows the VSAT provider to identify and record the cause of any delays, and maintain its SLA commitments. "If the customer takes 3 hours to give us access after we arrive on time, this can be reported through the field software and won't count towards our delivery schedule." The system can also document before and after photos of the site, and provide electronic documents and signatures of acceptance that go online to the NOC and our commercial and network databases.

Network Management Systems

The newest generation of network management systems (NMS) let customers see their bandwidth utilization, performance statistics, services and traffic protocols. "By providing customers with these tools," said an executive, "we have drastically reduced calls to our NOC that were caused by customers doing something wrong over their networks. Now they can directly see the stats from their router or terminal as it reflects what is happening at the site. They can see that they are getting the bandwidth they pay for."

Adaptive Modulation/Coding and Modem Improvements

Advances nearly every year "are letting us put more power into existing dishes," says a managed network provider in North America. These range from better modems to better antennas, reducing the power requirements for BUCs.

"The introduction of downstream and upstream adaptive modulation schemes has improved the way networks are engineered. We see more rapid re-acquisition on new systems as well as better encryption and authentication," adds a European teleport executive.

"The modems have all made big improvements," adds an executive in the Asia Pacific. Due to improvements in spectral efficiency the operator can reduce the cost of bandwidth to its own customers by 30-50% compared to several years ago.

Speeding, Shrinking, Adapting

The VSAT service providers interviewed for this report paint a picture of network design, engineering and installation that is all about faster installation, reductions in technology size and cost, and increasing ability to adapt as customer demand changes.

Flickr Creative Commons, Budiono

The fast rise of HTS has created concerns that traditional VSAT is on its way out, as far cheaper (if less reliable) broadband connectivity via satellite becomes the unified platform for data communications. It seems certain that some erosion will occur as much lower prices, and the growth of flat-panel antennas at ever more competitive cost, lure less demanding applications away. Mission-criticality and service quality, however, will continue to demand VSAT, and continued innovation by technology and service providers is likely to preserve that competitive advantage for years to come.

About the Report


van Herck


Freyer


Bell

Understanding and Improving the ROI of VSAT Networks was developed under the direction of WTA's Research Committee, led by Serge van Herck. Dan Freyer of AdWavez Marketing LLC conducted the interviews and wrote the report, which was edited by WTA Executive Director Robert Bell.

About the World Teleport Association

Since 1985, the World Teleport Association (WTA) has focused on improving the business of satellite communications from the ground up. At the core of its membership are the world's most innovative operators of teleports, from independents to multinationals, niche service providers to global carriers. WTA is dedicated to advocating for the interests of teleport operators in the global telecommunications market and promoting excellence in teleport business practice, technology and operations. Members benefit from the opportunity to:

- *Collaborate for Mutual Benefit*, from maintaining a level playing field for competition to implementing management practices that reduce costs.
- *Network Within the Sector*, to identify business opportunities, strategic partners and market insights.
- *Improve Their Global Profile*, through WTA-hosted events, listings in WTA's buyer's guide and placement in WTA's publications.
- *Raise Their Competitive Game* with free access to WTA research, white papers and market studies.

World Teleport Association
+1 212-825-0218 wta@worldteleport.org www.worldteleport.org