



Remote Communications for the Mining Industry

Creating an effective network infrastructure in the world's remotest locations is increasingly essential for mining companies. Modern communications solutions deliver the same levels of performance and availability as they expect from their corporate networks.



Introduction

It must be one of the biggest modern business ironies that an industry with the greatest need for data-hungry applications and real time communications has to operate in the world's most remote and challenging environments. Effective communications are at the heart of business success.

This is precisely the situation where the mining industry finds itself. Whereas other businesses may be able to operate with unreliable infrastructures and severe bandwidth restrictions, the extreme costs associated with exploration, production and operation means that network downtime can literally destroy profitability.

Satellite Communications has played a vital role in mine site connectivity for over three decades. But it has only been in a limited way. It has tended to be exploited for low bandwidth Supervisory Control and Data Acquisition (SCADA) and asset tracking applications. In part, this reflected the low bandwidth and low data flow capabilities of early VSAT

technologies. The picture is very different today. A well designed VSAT network offers a fast, secure, flexible and high performance infrastructure to meet the voice, data and growing multimedia needs of remote mining operations. It can achieve this in a much more cost-effective manner than any other available alternative.

This is not to suggest that satellite is a panacea. Standard fibre-based terrestrial services, and the rapidly maturing approaches to wireless technologies, also have an important role to play. It creates a situation where, for the first time, the mine operator has the ability and flexibility to develop a communications solution that reflects its exact business and budgetary requirements

rather than accepting a compromise based around individual technologies.

Hybrid communications delivers best-of-breed infrastructure with resilience, availability, security and the capability to provide data intensive business applications and Internet services at virtually the same performance levels experienced at the corporate headquarters. Maximum utilisation and flexibility can be achieved by sharing bandwidth between a customer's sites.

Towards a reliable infrastructure

If mining operations in the past could survive with the connectivity for low bandwidth applications like SCADA, this is certainly no longer the case. A simple example is the geological scan. It produces a very large data file that has to be distributed quickly to corporate headquarters or in-country offices for key personnel to make informed decisions on how to proceed. However, there are now a whole range of sophisticated, hugely data demanding applications in daily use by geologists, geophysicists, and drilling engineers amongst many others. These applications collect massive amounts of data in a variety of different formats which has to be distributed and shared in a timely manner.

Historically, the scan has been placed on a disk and mailed to headquarters for expert analysis, and the on-site team then have to wait patiently for the results and instructions on how to proceed.

The key to business effectiveness becomes the remote network's

ability to deliver efficient two-way communication when and where it is needed. Decision making can be reduced from days or weeks to hours or minutes. For the majority of locations where mining is taking place, satellite communications is the only reliable and cost-effective means to achieve this level of data throughput and two-way communication. The needs of the operators for advanced voice, video and data applications have outgrown the ability of highly fragmented terrestrial technologies to deliver.

Meeting today's implementation imperative

One of the greatest challenges for mining operators is uncertainty. Sites are continually being explored, constructed, operated and retired. The ability to move quickly from exploration to exploitation is essential – as is the need to be able to establish effective communications between the number of sites that can grow around a single deposit, between sites in different locations and between the site and the corporate network.

In these circumstances, the prohibitive costs of using terrestrial technologies for last mile or first mile connectivity are not even an issue. They simply cannot be installed to meet any sensible timeframes. The maturity of satellite communications and, as importantly, the ruggedisation of its far-end VSAT equipment, means that the network can be modelled and equipment set up and tested at the satellite service provider's facilities. In this way, the installation of the network at the remote site can be accomplished in as little as a few hours. In fact, the entire process from initial planning and design to full operation is measured in weeks rather than months.

The speed of implementation of a satellite network is matched by its flexibility to enable equipment to be dismantled and reassembled as operational needs dictate. A VSAT installation is highly portable allowing for repositioning that matches the highly fluid nature of the early stages of the mining process.

Measuring cost-effectiveness

It is natural to focus on the upfront investment costs of a remote communications project. However, real return in investment (ROI) will be measured in how efficiently a network can utilise its bandwidth allocation.

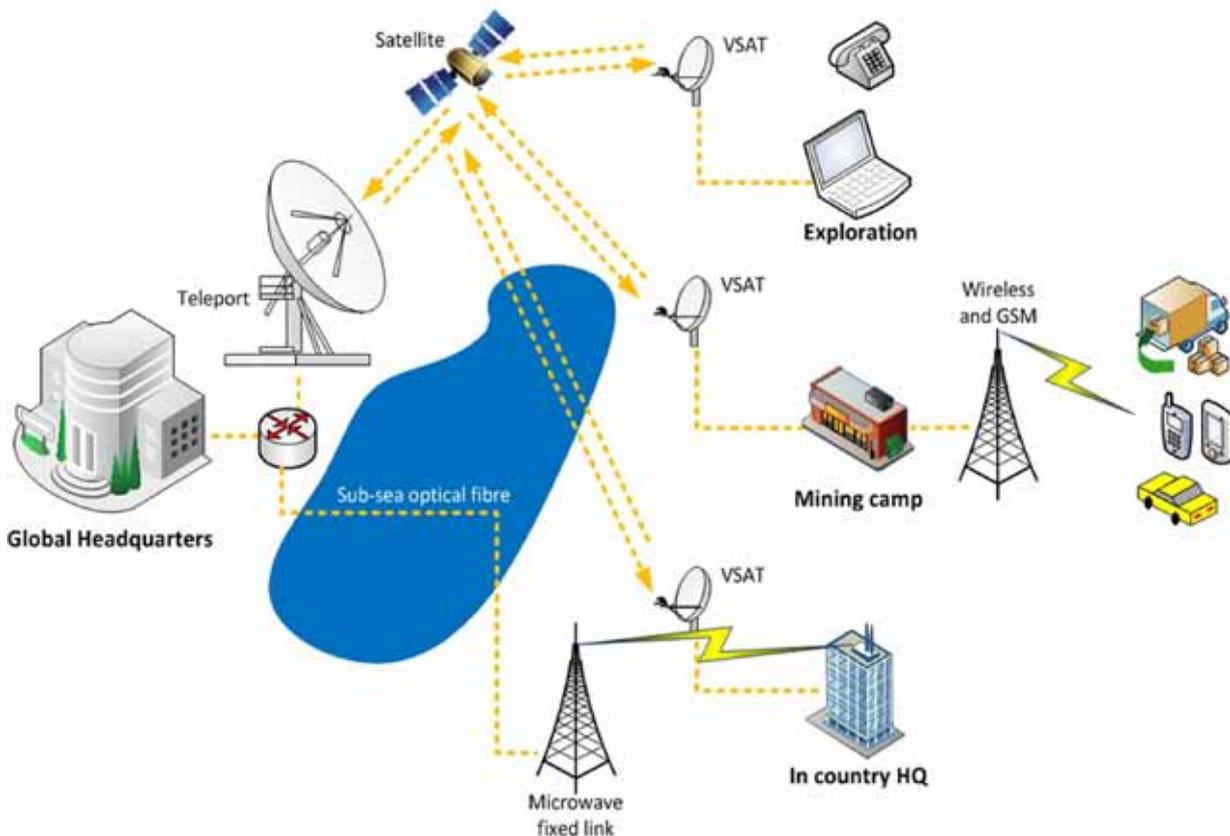
The first element is securing availability. The robustness of the on-site infrastructure is essential. It is almost worth considering 'over engineering' the initial installation if the result is a reduction in network downtime, management and maintenance. A satellite service provider should build and test the system off-site so that a robust system can be installed on-site in minutes or hours.

Secondly, the infrastructure should allow for operationally matched availability. Put simply, the organisation should only pay for the bandwidth it needs. If a site only needs

communications capabilities occasionally, there is no reason for the system to be always-on. The more the communications requirements can be planned and scheduled, the more cost-effective the running costs.

Finally, some mine operators have operated at less than a third of the bandwidth that they are paying for. Smart allocation of bandwidth means that specialist business applications, standard office systems, Internet and voice services can be partitioned and delivered simultaneously. It provides the possibility that a single satellite hybrid network can securely fulfil the communications requirements for all the different entities – mine owner, prime contractor, sub-contractors and staff – at a fraction of the cost of installing a number of separate infrastructures.

Remote connectivity options to multiple or single sites worldwide



Integration is vital

Reliability and speed of implementation are important considerations for all remote communications networks but, for the mining industry, perhaps the most important consideration is the ability to deliver a fully integrated solution for Internet, voice, video and data requirements.

The growth of wireless technologies – especially as they improve in terms of cost, performance and range – has introduced a potential for organisations to develop a series of ad hoc and un-integrated solutions. There are some instances where individual solutions have been created for each communications requirement. This development of isolated information silos is not only costly but dramatically reduces business efficiency and acts as a barrier to effective decision making.

The requirement has to be for a single network infrastructure that can

accommodate all data and voice requirements. This does not mean that terrestrial, wireless and mobile technologies are not available to mine operators, but that they should be placed within an integrated or hybrid network infrastructure.

Wireless and GSM can have advantages in terms of intra-site and site-to-site communications. The glue, however, to the integrated Wide Area Network (WAN) will continue to be the VSAT satellite infrastructure. It allows for highly available and cost-effective bandwidth between sites, in-country offices and the corporate headquarters. It can deliver the performance necessary for sites and offices to share communications and business applications at DSL-like speeds – with higher security levels!

In addition to operational services, it is difficult to over-estimate the importance of welfare provision. At the simplest form, this may simply be viable voice services and email facilities for on-site employees. A more advanced level could see the

provision of a range of well being services – such as web access, broadcast radio, TV and on-demand movies – delivered to the accommodation areas of the site.

An integrated satellite WAN also provides the potential for a single network to securely meet the communications needs for all the organisations operating at the site. Each operates independently, and it is essential their network functions in isolation to its peers. However, the communications requirements are very broadly similar, and a satellite hybrid network can reliably provide the range of services to each network as a separate entity. Many wireless solutions would allow for separate networks to operate securely on-site from a single wireless hub.

The key is effective bandwidth utilisation; the ability to deliver services to single or multiple sites for a wide range of purposes in a secure, available and high performance infrastructure.

Delivering mining communications requirements

Access to corporate business applications With so many people involved in the upstream process for mining, the ability to share corporate business applications – such as SAP and Oracle – becomes essential. On-site personnel need to be able to access the applications and perform tasks as they would if they were in the office. Delivering this application performance becomes straightforward with the bandwidth available through satellite communications.

Access to real-time communication On-site teams cannot wait for days or weeks to receive notification of the next actions to take. To maximise business effectiveness, personnel need to be able to share large data files and communicate in real time. A satellite or satellite hybrid solution is the only possibility for delivering this level of secure, real-time communication anywhere in the world.

The importance of well being With personnel on-site for weeks or months at a time, well being is a major issue. At a minimum, separate voice and email services are required for personnel to keep in touch with family and friends. However, Internet and entertainment services are also important. These services may often have to be supplied over a completely separate network as web surfing and the use of services such as Skype can transgress governance policies on the corporate network.

Dealing with medical emergencies Direct lines of communications that can by-pass the local infrastructure are essential in times of medical emergency. With few sites employing full time medical teams, the ability to share photos and video images with trained medical staff off-site is important for early treatment and to ensure the proper remedial action is taken. It also allows for early action triggers if the emergency calls for the rapid evacuation of injured personnel.

Large File Transfer Many of the geological and geophysical applications create extremely large data files. These files have to be distributed in a timely manner in very challenging conditions. Data loss is a major issue for large file transfer and this is exacerbated in remote locations. Satellite systems can deliver virtually error free transfer where data is sent in very small packets and the system can automatically track and re-distribute corrupted data packets so that the receiving end gets the full file as it was sent.

Asset tracking and management Asset tracking has grown significantly over the previous decade. The systems can now ensure that the organisation is receiving maximum utilisation of assets such as trucks and drilling rigs. Employing a satellite hybrid infrastructure, wireless trackers can be placed on the asset that reports back to the wireless hub on site and onwards via satellite.

On site security Allied to the security of personnel, security of plant, equipment and product are also essential to safeguard profitability and the long-term viability of remote mining operations. IP-based access control systems and CCTV surveillance cameras can be quickly installed – either hard wired or wirelessly - that can report to the site office or be remotely managed in near real time via satellite.

Corporate Social Responsibility With many organisations operating in remote regions, where local villagers can become an important source of labour within the mine, Corporate Social Responsibility has grown in importance. Similar to supplying well being services to on-site personnel, some mine operators are beginning to use the same systems to deliver welfare services to local villages. This can include distance learning, entertainment services and Internet access.

Back up and redundancy It is essential that data is backed up to mitigate against disaster, especially where IT equipment is operating in extremes of weather or irregular power provision. This can be achieved during off peak times for the main system or employing the redundant path. The redundant path can be a separate VSAT system or through the main satellite link if bandwidth can be allocated.

Satellite services can now deliver in the type of data rates required for essential business applications such as SAP or video conferencing. However, to make this type of data throughput affordable, most organisations need to be able to maximise bandwidth utilisation. Shared bandwidth allows a mining company to flexibly allocate bandwidth between all its sites. In this way, the network can accommodate the peak workload for one site and then re-allocate the bandwidth elsewhere when the requirements of that site reduce.

Real-time decision-making

The development of mine site technology often seems only bounded by the human imagination. It is a demonstration of the importance of making decisions quickly and getting them right first time that keyhole cameras are being fitted to drill heads which then feed back live pictures of the seam they

are drilling so that professionals – often thousands of miles away – can make a decision on which direction the head should now be taking. This is only one example of the importance of real-time decision making to mining operators.

Early exploration often involves the use of photography and email. The use of high definition video is also becoming more common. Of course, it is nonsensical that all the experts needed to make an informed decision can be at every site. It is far more effective for them to be centrally located and armed with all the information. Satellite imaging – which has an increasingly important role in determining where exploration should commence – is unlikely to be available to professionals in the field.

Today, only a satellite or satellite hybrid infrastructure can deliver the secure, high performance two-way communication that makes this type of vital real-time decision-making, with parties dispersed across the globe, a reality.

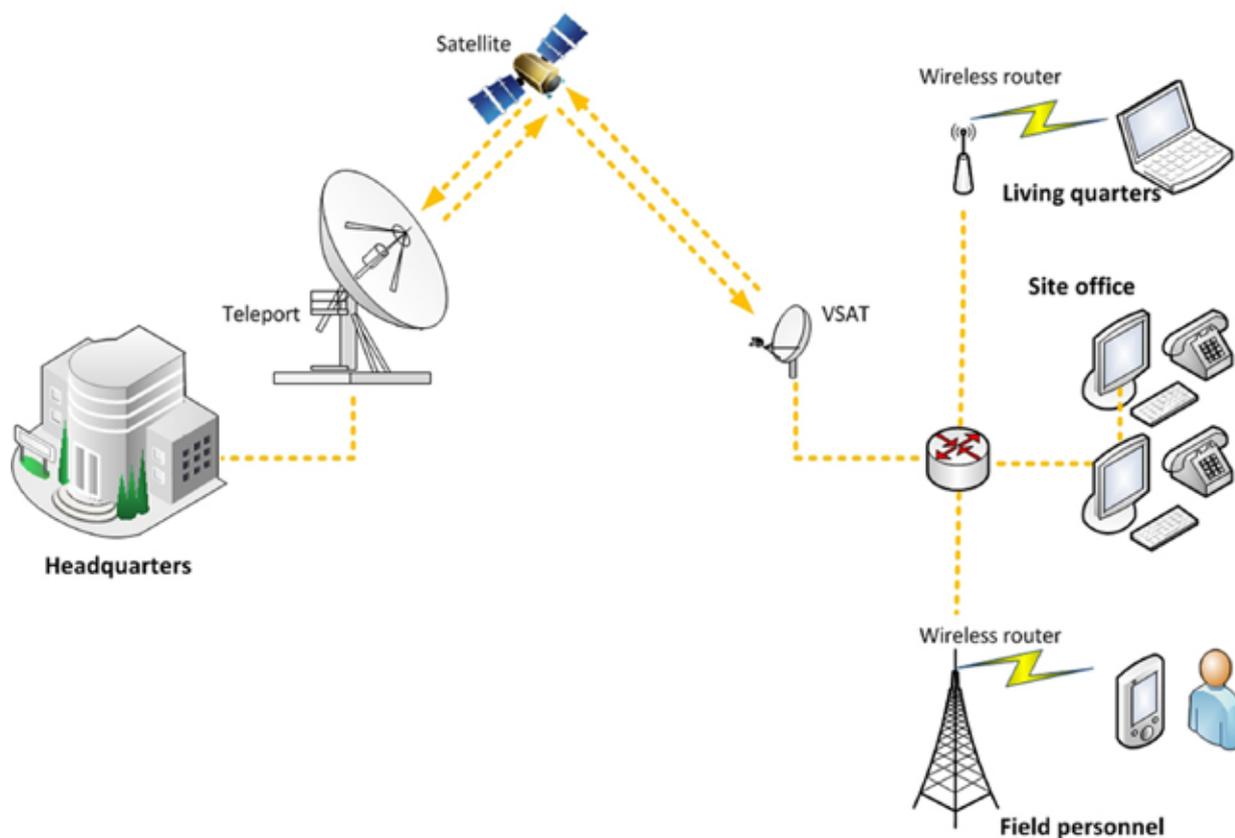
A highly flexible and scalable network

Whether secure site-to-site or high performance site-to-multi-site, a VSAT infrastructure is highly scalable.

It delivers the most cost-effective communications platform, whether the mining operator has only a few sites in a single geographical region or wishes to connect hundreds of sites globally. However, satellite is more likely to be one component of the complete solution.

There are two important reasons for this. Firstly, the development of terrestrial, wireless and mobile technologies gives a much greater degree of flexibility in network design. It is much easier today for an organisation to develop an infrastructure around their specific business requirements.

Satellite Hybrid Infrastructure for Mining Operations



Service providers can deliver very high levels of customisation around which network topology and technologies meets the requirements of business and budget. Mine operators can benefit from true multi-platform, multi-technology solutions.

This is often termed as 'technology agnostic'. The ability to create a network around the business challenge not the underlying technologies. However, a better way to consider this is the ability to deliver a 'best-of-breed' solution. A solution that fulfils current communications requirements but has the ability and flexibility to adapt to the changes that will occur within the business.

Secondly, the geographical location of the mine site will often dictate the technologies that can be deployed. This is not only true in terms of the physical attributes of the location but also the government regulation and policy of the country it is within. All multinational organisations are well aware of the impediments that can be placed on them by local administrative policy. Within communications, there are many

instances where government policy will deter the deployment of certain technologies. This alone dictates that a remote network will very often have to utilise a range of satellite, wireless and fixed line services in order for a mining company to supply effective communications services to all its sites and comply with local regulations.

Creating 'better than terrestrial' availability

From the arid climate of sub-Saharan Africa to the Siberian cold, mining operations are situated in extreme and challenging environments. In addition to the rugged nature of the equipment, the remote communications network has to provide high availability levels in hostile weather conditions. At the quality end of the market, satellite service providers are able to deliver superior network uptime that is backed by guaranteed Service Level Agreements (SLAs). This level of service is significantly higher than that of many terrestrial providers in developed countries with an

established infrastructure. It is very often superior to the levels of service possible from the local terrestrial provider – even in their larger cities.

In conclusion

Satellite communications have developed within mining to overcome the connectivity and cost issues associated with terrestrial services when operating in remote environments around the world. Today, satellite and satellite hybrid solutions are not the only option, but they are the preferred route when organisations need a high availability, high performance network infrastructure, and one that can securely accommodate the data-hungry voice, data and video applications on which a modern mining operation relies. By establishing effective two way communication between sites and the head office, a remote communications network can deliver the effective real-time decision-making that is necessary to drive profitability in an environment where time really is money.

About Datasat Communications

Datasat Communications has been successfully delivering remote communications solutions for governments, commercial organisations and emergency services for 25 years. Specialists in satellite communications, the company brings experience in terrestrial and wireless technologies to deliver fully integrated satellite hybrid networks around the globe.

The company tailors every network to the specific requirements of the organisation – from small bespoke networks to large global platform-based systems. With a reputation for quality and customer service, the company provides high performance, reliable and secure network infrastructure for Internet, broadband and business services to remote locations across the globe.

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