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SATELLITE Markets & Research

MARKET BRIEFS

Executive summaries of market trends and opportunities in key market segments and regions worldwide

Interfacility Links

by Elisabeth Tweedie

Teleports today are caught in a vortex of changes. In line with the overall explosion in video and data, the volume of data passing through a teleport is also exploding. According to the latest Visual Networking Index from Cisco, in the five years from 2016, Global IP traffic will experience a CAGR of 24%, rising to 3.3 zetabytes (ZB) in 2021. 82% of that traffic will be video.

At the same time, teleport customers are more and more looking for a complete managed service, as opposed to straight bandwidth. They are also looking for connectivity in more places. Maritime and Aeronautical were once relatively small niche markets, primarily using narrow L-Band technology. Now, both of those markets are expanding as the falling cost of bandwidth coupled with innovations in antenna technology combine to expand both markets, to C, Ku and Ka-band.

In order to survive and prosper, service providers need changes in both the equipment and the services offered to meet evolving requirements.

Additionally, according to John Flynn, VP Global Operations, Globecomm, "In the past two years the lead time to activate a service has fallen, and at the same time the complexity of requirements is increasing. Solutions now call for LTE, 3G and wireless as well as all satellite frequencies."

Many of the changes and improvements in the teleport are being driven by these three factors cited by Flynn.

As if this wasn't enough to content with, satellite technology itself, is also going through some major changes, which the teleports have to adapt to. A few years ago, when ViaSat announced that it would be launching a 140Gbps satellite, many were skeptical as to the feasibility of such a large system. Hughes' Jupiter 3, scheduled to be launched in 2021, will be an Ultra-High Density 600Gbps satellite. Obviously, these large satellites, require far more uplinks, than the traditional wide-beam satellites. High throughput satellites (HTS), and there are many of them, present both opportunities and challenges for the teleport operators. They offer significant decreases in the cost of bandwidth, driving down profit margins for the operators, whilst at the same time, the lower price, brings new customers into the marketplace. However, HTS satellites are just the beginning. There is now a well-established Medium Earth Orbit system (O3b), with plans from multiple operators to launch Low Earth Orbit (LEO) systems.

In order to survive and prosper, changes in both the equipment and the services offered are an absolute necessity. Video is no longer delivered either directly to the consumer via a Direct-to-Home (DTH) service, or to a cable headend, it is also delivered over the internet as an OTT service. As already mentioned, customers are more and more looking to the operator

for a complete managed network service (MNS). This means the complete package: delivery, not only via a satellite network, but also over fiber, cellular, internet and microwave, as needed. In addition, the entire network needs to be closely monitored and managed. This will include advanced analytics to forecast what types of issues are likely to arise. Doing this allows an operator to know which systems will be impacted in the result of a failure and to know how long it will be before individual service level agreements (SLAs) are breached. In order to do this, the operator needs new skills. RF, alone will not suffice. IP and IT skills are needed, so the operators have to retrain or recruit. John Flynn, emphasized the importance of this, stating that: "it is essential that we adhere to ITIL, (IT Infrastructure Library - a series of best practices for the IT industry), so as to guarantee the quality of our services and compliance with the IT industry's best practices. We deliver a Solution as a Service, we do not deliver a technology." Eddie Ferraro, MD Americas, Globecast, said that Globecast was in the middle of a multi-year roadmap, to move all facilities to IP. This includes transitioning the Globecast Broadcast Network (GCBN) from ASI (Asynchronous Serial Interface – a streaming data format that can carry multiple compressed video streams) to an IP network.

Traditionally, antennas and signal processing equipment, have to be located in close proximity to one another, as analog RF signals degrade rapidly as the distance they are carried over coaxial cable increases. One solution to expand the distance between the antenna and equipment is to convert the RF (Radio Frequency) signal into light, so that it can be transported over fiber. This can extend the separation between antenna and processing equipment up to 200 kilometers. DEV is one company, that offers this solution. One of its customers, a Ka-Band operator, was able to mitigate outages during heavy rainfall, by deploying two antennas, 100 kilometers apart. The DEV solution enabled the operator to connect and synchronize its two gateway antennas and switch between them as needed.

Digital IF (Intermediate Frequency), essentially takes RF over Fiber to the next level, and is another innovation that has the potential to fundamentally change, the ground systems requirements. Originally used by the military, it has now migrated to the commercial domain. Essentially Digital IF, is RF over IP.

Digitizing the RF signal and transporting it in real-time without data loss, means that the processing equipment can be located miles, sometimes thousands of miles, from the antenna. For an operator like Globecomm, which operates multiple third-party teleports, it means that they can all be controlled from an existing data room, eliminating the need to duplicate equipment. This is also a game changer for Ka-Band satellites. Although new protocols mean that the signal loss due to rain fade, is not as severe as previously; and RF over fiber means that gateway antennas can be located up to 200 kilometers apart; with Digital IF, there is no limitation on the distance between the two antennas. They are linked to a central hub, and in the event of one antenna experiencing heavy rain, the signal can be seamlessly switched to the other antenna.

As well as necessitating new skills, in the teleports, all these changes are either necessitating, or being enabled by, changes in the physical equipment used in the teleport.

Additional equipment in the teleport, to handle the increasing volume of data and video, takes up more space, consumes more power and in many cases generates more heat. For some operators, these are major issues. An older teleport, may not have the additional space needed. In certain parts of the world, businesses, including teleports, are either being mandated to reduce power consumption, or given incentives to do so. For others, reducing power consumption is just good business, although there are still many teleports who don't see this an issue.

For those that do, there are a variety of strategies that can be employed. Moving the transmission equipment to closer to the antenna is a strategy being practiced by many teleports including those operated by Globecast. Moving the HPA (high power amplifier) outdoors, not only saves space, but depending on the location of the teleport, can reduce power consumption by up to 50% through reductions in cooling requirements. Even if they are not moved outdoors, new amplifiers are more efficient per output watt, than they were a few years ago.

Upgrading to new, more capable equipment, is one solution. New equipment is frequently smaller and more efficient, thereby requiring less rack space and consuming less power. This allows a teleport space to overlay new and additional services.

For example: RF Matrix Switches, a core piece of equipment in teleports, are becoming smaller and more efficient and therefore are a good candidate for upgrading. Older legacy switching systems, require miles of cable and thousands of watts of power to operate. In addition, the legacy systems may not be able to seamlessly integrate with current NMS, IT infrastructure and terrestrial fiber, all of which are integral for today's teleport.

The current generation of matrix switches give teleport operators the flexibility to automatically route signals between different uplink and downlink chains, without moving cables or patching. They can also be configured to provide backup, on a 1:1 or 1:n basis

as needed. The new switches take up less space and consume far less power than legacy systems.

DEV, is one manufacturer of Matrix Switches. The company was established over 20 years ago and still keeps everything in-house, including all system design, software and hardware development and manufacturing. However, in order to make sure it keeps up to date, it also works with universities for research and development. Because everything is in-house, DEV is able to provide a great deal of flexibility in design and an industry leading turnaround speed for orders. It also offers the longest warranty in the industry: 37 months.

DEV produces a series of RF Matrix switches, ranging from an 8x8 in one rack unit (1RU), all the way up to Archimedes, the smallest 64x64 Matrix switch. Archimedes takes up only 4RU and is upgradable to a 2048x2048 configuration. Asymmetrical combinations are also available. Archimedes also incorporates a full color HD TV display, operated by touch screen technology, so that the operator can check the content of a selected channel. The switch also offers the option to power a Low Noise Block (LNB). Each RF input port can deliver LNB power and select the polarity and band of the LNB, so eliminating the need for additional equipment for this.

DEV's products are designed for operation in multiple frequency bands and impedances to meet a wide spectrum of unique customer needs. This makes them equally suitable for: Teleports and Broadcasters; Satellite Operators; Satellite Ground Stations; Cable and IPTV Headends.

Looking to the future, according to Dave Hershberg, CEO, STS Global, Future changes impacting teleports, will include demands for more private networks, as cyber-attacks through the internet, become more prevalent, and the installation of phased array antennas to handle traffic from the LEO constellations.

Elisabeth Tweedie has over 20 years experience at the cutting edge of new communication and entertainment technologies. She is the founder and President of Definitive Direction a consultancy that focuses on researching and evaluating the long term potential for new ventures, initiating their development and identifying and developing appropriate alliances. During her 10 years at Hughes Electronics she worked on every acquisition and new business that the company considered during her time there.
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New L-Band Distribution Matrix

DEV Systemtechnik launched a new L-Band Distribution Matrix in its product portfolio. The 16² matrix can be ordered with up to 16 input and 20 output channels and fits in a compact 2RU chassis.

The 16² (DEV 1985) provides a high degree of flexibility: the number of input and output channels can be changed; connectors and impedances can be configured even after purchase. In addition to electrical and optical inputs, the DEV 1985 supports variable gain and slope and comes with a local user interface. Other features known from DEV matrices such as an integrated spectrum analyzer and LNB powering on all channels can also be optionally included in the 16x16 matrix.

The new 16² is designed for operation via DEV's Web Interface for multiple users. The Secure Lock Operation mode allows users to lock a switched path so that other users cannot redirect those paths. Intelligent redundancy options with RF Sensing allow the matrix to automatically restore service via a backup path in the rare event of a primary path failure.

DEV Systemtechnik develops and manufactures a complete range of products and systems for the optical and electrical transmission of Radio Frequency (RF) signals via coaxial cable or fiber. For over 20 years DEV has designed, engineered, and manufactured RF transmission equipment for satellite, broadcast, and cable applications. All products are built to meet the highest standards of system availability, reliability and manageability.

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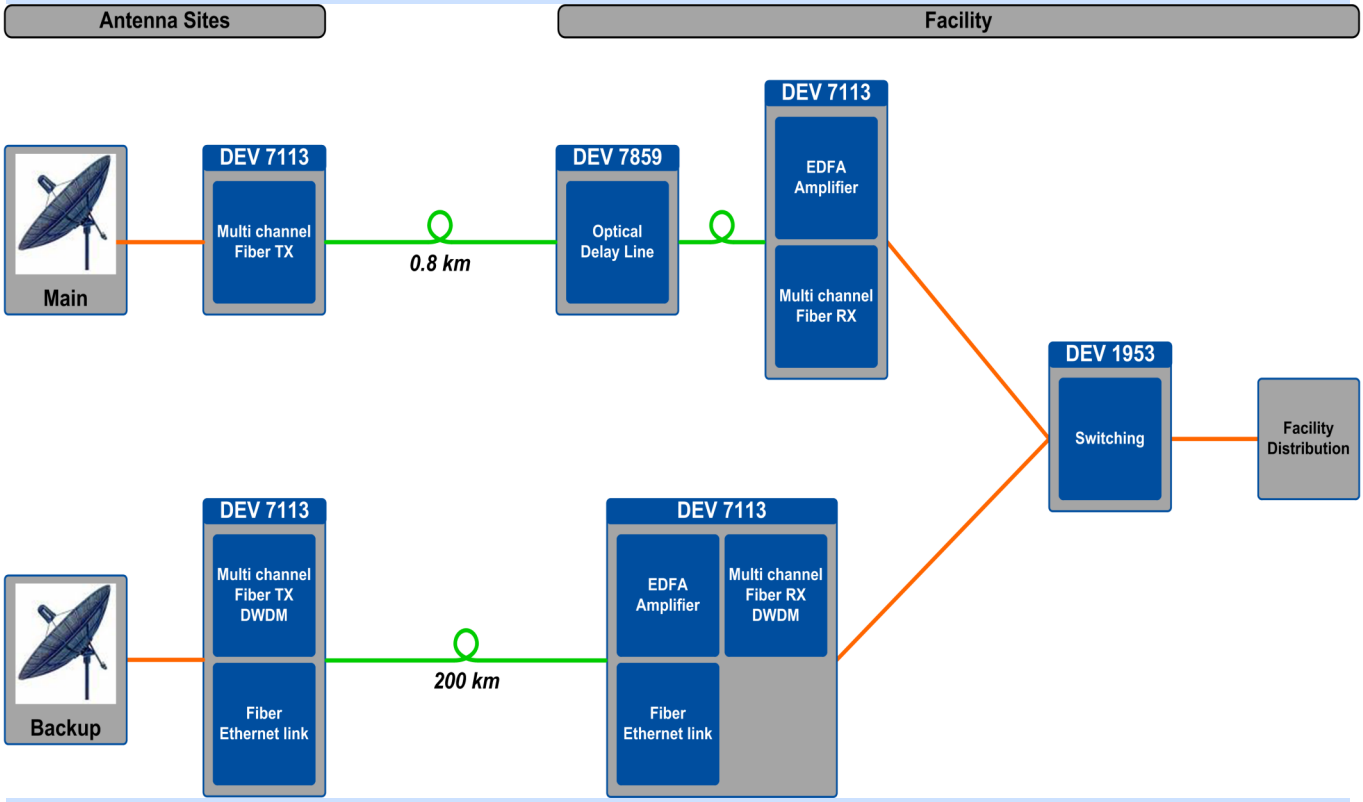
Case Study:

DWDM Solution allows 200 km Ka-Band Antenna Diversity

Introduction

This case study provides an overview of how a large satellite and data communications service provider implemented a cost effective, location diverse antenna installation for Ka-Band satellite data transmissions. DEV Systemtechnik develops and manufactures a complete range of products and systems for the optical and electrical transmission of Radio Frequency (RF) signals via coaxial cable or fiber. For over 20 years DEV has designed, engineered, and manufactured RF transmission equipment for satellite, broadcast, and cable applications. All products are built to meet the highest standards of system availability, reliability and manageability.



Challenge

High-throughput Satellite (HTS) technology operating in Ka-Band offers significant advantages over conventional satellite networks operating in Ku-Band and other lower frequencies as more bandwidth is available at the higher Ka-Band frequencies. However, adverse weather conditions negatively impact the higher (26.5-40 GHz) Ka-Band frequencies causing service interruptions and performance degradations.

Solution

In order to mitigate the impacts of adverse weather conditions, the system was designed with local and remote antenna sites. The remote antenna site was located 200 kilometers away from the local site providing location diversity to offset the effects of the adverse weather conditions at either site. The Time Division Multiple Access (TDMA) channel access method delivered precise time synchronization of the local and diverse route ensures hitless signal switching.

The solution was implemented using off-the-shelf Dense Wave Division Multiplexing (DWDM) products from the DEV Optribution® family of products:

- The versatile DEV 7113 space saving chassis that is able to house up to 16 optical DWDM transmit modules (DEV 7251), or up to 20 optical receive modules (DEV 7333)
- EDFA optical amplifier modules are also available for the DEV 7113 chassis
- To ensure synchronization in time, a delay line is used for the local route (DEV 7859)
- To control the remote antenna site equipment, DEV implemented a 1 GBit Ethernet Link over fiber

The DEV solution provides first-class quality in terms of optical transmission while meeting all requirements and being highly reliable and readily serviceable, for example:

- Optical Tx-Rx-Modules, EDFA, redundant power supplies and the control module are hot swappable
- Additional modules are installed in Cold Standby for the event of failure

Results

The DEV optical DWDM system that the customer deployed ensured uninterrupted service for the high ban width HTS Ka-Band system by connecting signals from the local and remote antennas. DEV worked closely with the customer in the design and realization phase of the project providing technical expertise to solve various challenges including:

- Ensuring proper isolation and handling of the signals of the up and down links within the DWDM transmission
- Ensuring proper signal transmission independent of weather conditions
- Delivering a 1 GBit Ethernet Link for remote equipment management within the RF over Fiber System
- Designing and implementing a delay line to synchronize the signals from the local and diverse antennas

Conclusion

A location diverse synchronized antenna installation is essential to overcome adverse weather and environmental conditions for HTS Ka-Band systems. DEV provided a scalable solution in terms of numbers of antennas and distance to the remote antenna site. RF over Fiber using DWDM technologies can readily provide distances of 200 km between the main and diverse antenna sites. DEV provided the customer a space efficient and cost effective turnkey system solution.

Interview with Manfred Mettendorff Managing Director, DEV Systemtechnik

How do you find DEV's position in the market segments you are active at the moment?

DEV is a leader when it comes to signal monitoring, switching and transmission in Teleports and Satellite Earth Stations. Broadcast Headends in over 80 countries benefit from DEV solutions. Major stations worldwide as well as cable operators rely on DEV's high quality systems to provide flawless services to their countless customers.

What are your targets for your first year in your position?

We will expand our sales footprint in some regions where we are currently not as present as we should be. From a product point of view, we will strengthen our portfolio by further optimizing the cost / performance ratio with the launch of new optical systems in 2018. In addition we plan grow in the HFC market supporting the transition from legacy cable networks to DOCSIS 3.1 compliant gigabit networks with dedicated solutions.

You are in a very competitive market, what differentiates your company and products from your competitors?

DEV has a strong track record in challenging, mission critical signal transmission. Our modular approach allows offering systems for a wide range of diverse requirements matching customer's individual requirements. Customers get exactly what they need to tackle their local signal transmission challenges or to optimize existing infrastructure with unparalleled quality. Due to full in-house design, production and test of all critical systems and subsystems in Germany, we can offer high flexibility and very fast reaction times.

What can we expect from DEV in the coming months?

We will launch a new product line for optical transmission targeting small, scalable headends. The new system will offer an outstanding cost / performance ratio for RF over fiber in Satellite and cable infrastructure. Further we are expanding our broad matrix product line in 2018. For Cable Networks we launched MODULO HFC in 2018, a fully modular, versatile headend solution that supports the full DOCSIS 3.1 spectrum up to 1218 MHz downstream and 204 MHz upstream. This will help operators to upgrade legacy networks to support Gbit transmission as outlined with DOCSIS3.1 standards.

Anything else you want to add?

We will present some of our new systems at major exhibitions such as ANGA COM, Cologne, CommunicAsia, Singapore and IBC, Amsterdam and look forward to discuss our solution with customers, partners and interested parties. We are always eager to learn from our customers about transmission & network challenges which we can help to solve. Operators as well as System Integrators are invited to get in touch with our team at any time to arrange appointments.

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