

# OPTIMIZING COMMUNICATIONS FOR DIRECT TO HOME



Why is Comtech Telecommunications the world's leading supplier of Direct To Home (DTH) head-end transmission equipment?

- **We have the widest selection of DTH satellite uplink hardware:**
  - Satellite Modems & Modulators
  - Frequency Converters
  - High Power Amplifiers
  - Switching & Redundancy Options
  - Signal Monitoring Equipment
- **We empower DTH providers to increase service offerings & ARPU, and reduce recurring costs:**
  - Enable software updates to new transmission standards
  - Improve bandwidth / power utilization and MER / BER performance
  - Enable full transponder utilization
  - Options for IP-based and VOD services
  - Add Enterprise IPTV offerings
  - Save 75% in amplifier costs, power consumption and facility costs
- **We provide service, support and stability:**

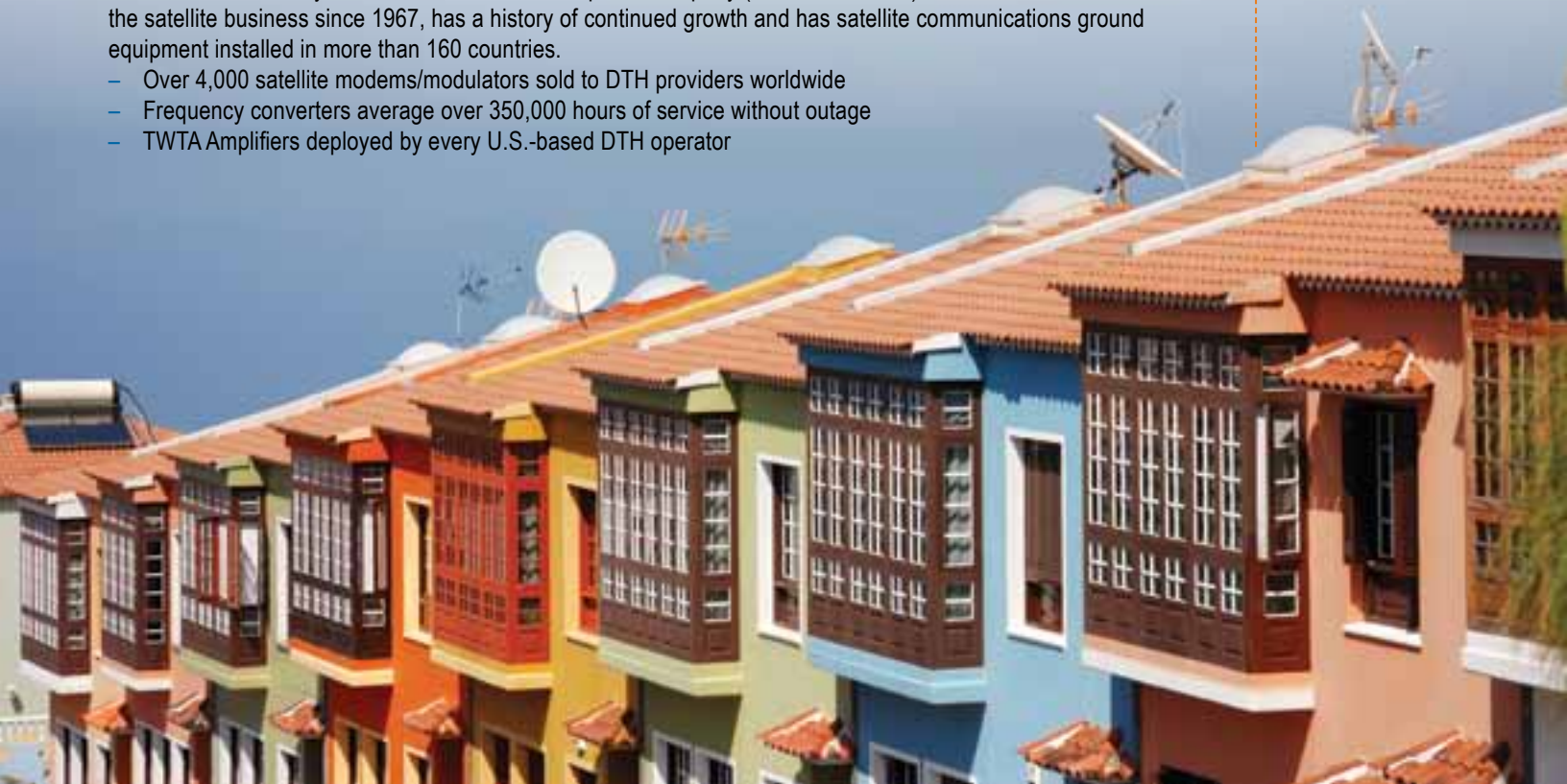
How can you expect the best available service and support from your vendors if they don't have a proven track record of stability? Comtech is a U.S.-based public company (NASDAQ: CMTL). Comtech has been in the satellite business since 1967, has a history of continued growth and has satellite communications ground equipment installed in more than 160 countries.

  - Over 4,000 satellite modems/modulators sold to DTH providers worldwide
  - Frequency converters average over 350,000 hours of service without outage
  - TWTA Amplifiers deployed by every U.S.-based DTH operator

• **WIDEST SELECTION  
OF DTH UPLINK  
HARDWARE**

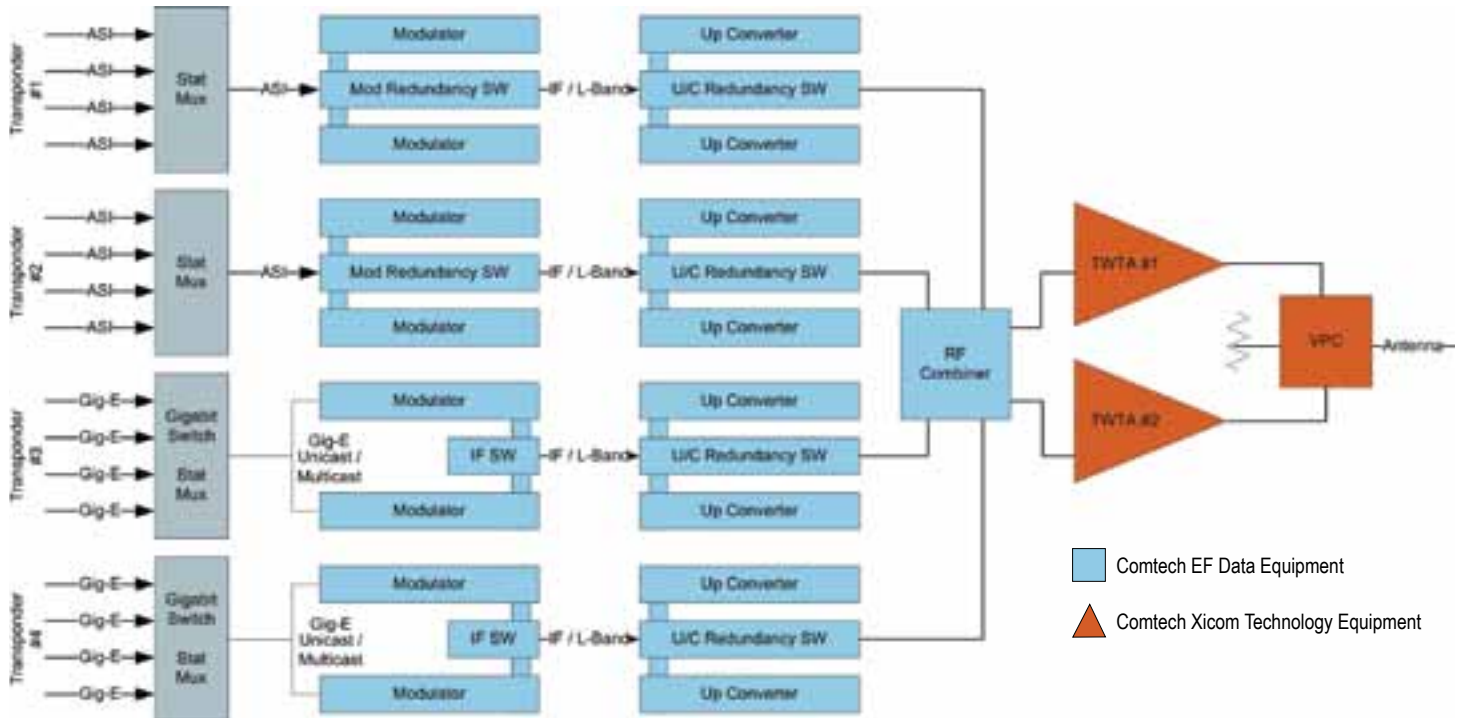
• **MARKET-LEADING  
TECHNOLOGIES**

• **STABILITY &  
RELIABILITY**





## COMTECH'S ROLE IN DTH TRANSMISSION



## SATELLITE MODEMS & MODULATORS

Modems and modulators should not just enable you to provide high quality video services. DTH service providers don't need a product that simply works. You need core hardware that you can depend on for decades, and you need the platform to be flexible enough to enable growth into new markets, expand your customer base, allow you to add new services to gain market share and increase ARPU. We understand your business model; our Comtech EF Data division is the world's leader in DTH modem/modulator sales with products deployed by leading DTH providers worldwide.

### Software Programmable Design

Our satellite modems/modulators are designed to meet the growing demands of DTH service offerings. We design our products by using high capacity, programmable FPGA cores. The FPGA core design allows our customers to grow their network and minimize the impact of new technologies and future service offerings. Customers who deployed proprietary and DVB-S platforms were able to upgrade their uplink facilities to the best available transmission standards, such as DVB-S2, without the need to change modem/modulator hardware. This core design and flexible architecture allows our customers to continue service on legacy platforms while using the same hardware to migrate new services, such as Pay Per View and High Definition programming, to newer and more efficient standards as set-top boxes are made available and deployed. Software upgrades minimize the impact on asset management updates and driver development for monitor and control systems, and eliminate the need to use maintenance windows for the purpose of hardware replacement and re-cabling of racks and facilities.





## SATELLITE MODEMS & MODULATORS

### Transport Stream Interfaces and Modularity

To protect your long term investment, our modems/modulators come with a flexible assortment of interface options that are field installable. Multiple interfaces can be co-installed on these products providing your DTH uplink facility the flexibility and monitoring capability you demand. Interface expansion slots include:

- 10/100/1000 Gig-E data pipe – Facilitates IPTV services to enterprises and DVR caching service
- CCM, VCM and ACM Mod/Cod Mapping – Enables IP data services to business and end users
- PRO-MPEG COP3 – Allows use of next generation IP-based encoders and multiplexers
- Auto-EQ Automatic group delay and amplitude pre-distortion module – Maximizes transponder resources and compensates for satellite transponder distortion
- ASI-Monitor port – Provides valuable confidence monitoring solutions
- Redundant interfaces – Enables transport stream selection and internal switching



**CDM-710 Broadcast Satellite Modem & DM240XR DVB Modulator**

### Peak Performance

With 4,000+ modems/modulators deployed by DTH providers, no other company has the background and experience of supporting high revenue DTH programs like Comtech does. Your satellite transmission equipment represents your sole delivery mechanism to your end customer. DTH equipment is not used as a terrestrial emergency backup. Every outage represents a potential loss of multiple channels, guaranteed advertising positions, millions of subscribers and hundreds of thousands of dollars in revenue. Our modems/modulators are designed to exceed the DVB, DVB-S2 and DVB-DSNG standards and provide the industry's best Modulation Error Ratio (MER) performance. Comtech modems/modulators are built to last for decades and provide a platform flexible enough to support infrastructure upgrades and modification with minimal impact to hardware and wiring.



## FREQUENCY CONVERTERS

Comtech EF Data's converters set the standard for consistent reliability and cost-effective, high-performance frequency conversion. Providing a demonstrated MTBF of 350,000 hours derived from greater than 10,000 fielded units and over 15 years of market leadership, our converters are an excellent choice for the stringent reliability requirements of broadcast systems. A broad product line with over 40 different models translating between IF frequencies of 70/140 MHz or L-Band to C-, X-, Ku-Band and the Hotbird satellite bands ensures there is a converter suited for your specific requirements.



**MBT-5000 L-Band Up/Down Converter System**

Comtech offers 1:1 and 1:N redundancy switching options for your RF equipment. By utilizing the patented (U.S. #5666646) Daisy Chain Switching technology, the converters support redundant operation using distributed protection switching in an active Daisy Chain configuration. This redundant system topology provides backup for 1 to 12 online converters.

Comtech's numerous switching options coupled with the RF performance, breadth of products, and demonstrated reliability, make our converters the "no compromise," cost-effective choice of DTH operators.





## HIGH POWER AMPLIFIERS

High power amplifiers are a critical component in DTH uplinks. Amplifiers affect link performance, and are one of the major factors involved in determining availability, installation and operational costs. Our Comtech Xicom Technology division understands that you need the most cost-effective and reliable solution that provides the flexibility to grow your business. We are the DTH uplink amplifier provider of choice in North America and the leading outdoor traveling wave tube amplifier (TWTA) supplier worldwide.

TWTA solutions reduce the cost to purchase, install, operate and maintain the HPAs by over 75% when compared to indoor klystron power amplifiers (KPA). We offer industry-leading high power outdoor packaged TWTA systems in C-, Ku-, DBS- and Ka-Band.

### Reducing System Cost and Complexity

TWTAs can simultaneously transmit multiple carriers, taking the place of multiple KPAs. Multi-carrier operation with a single HPA can dramatically reduce your installation and replacement costs. For example, a DTH provider with four channels to transmit can multiplex these with a 1+1 TWTA solution, requiring only two HPAs, compared with four online amplifiers and at least one spare for a klystron approach. Benefits include:

- Eliminating the need for multiplexers and simplified switching systems.
- Reducing your HPA power consumption by ~90% due to the reduced number of HPAs required and TWTA efficiency, lowering operating costs and enhancing reliability.
- Reducing the size and cost of the emergency backup generator (or increasing backup operation time by up to 10X).
- Eliminating the need for a fast channel changer for the backup HPA, since transmit frequencies are easily changed on a TWTA by modifying its input frequency; klystrons must be mechanically tuned, increasing operational manpower requirements.



**Ka-Band Antenna-Mount TWTA**

High power outdoor TWTAs enable you to mount the HPA at the antenna. Moving the HPAs from the transmission room to the antenna provides additional benefits:

- Eliminates long waveguide runs between the transmission room and antenna along with their associated RF losses. In many cases, a single TWTA, with its higher instantaneous bandwidth, can provide much more power at the antenna compared to KPAs.
- Reduces space requirements in the transmission room facility; saves on new installations and frees up space needed for upgrades.
- Reduces air conditioning costs by eliminating a significant portion of the thermal dissipation in the transmission room.

### Flexibility for the Future

Expanding your network using TWTAs is easy compared to a KPA approach. Carriers can be added without installing additional amplifiers as long as the system operates within the power and linearity requirements of the TWTA. This method is more flexible than the traditional approach of adding a new KPA for each added carrier. And, it provides flexibility in the link for changes in power and linearity requirements per channel as the transmission standards change. Maximizing this TWTA advantage, we offer the highest output power TWTAs in the industry, with up to 1250W at Ku-Band, 750W at DBS-Band, and 500W at Ka-Band. Since you operate these links for decades, we offer TWTAs with multiple sources of tubes, thus reducing dependence on a single tube supplier. Our TWTAs are available with options for extended bandwidth, Ethernet interface, predistortion linearizers, and integrated L-Band BUCs.

The business case for our outdoor TWTAs in DTH uplinks is compelling. DTH providers benefit from a reliable solution offering reduced costs, lower electricity consumption and a reduction in facilities and ancillary equipment costs. Our long history of technology leadership in high power outdoor TWTAs for satellite communications and our outstanding record for reliability will help build your business and we will be there to support you in the future.





## SWITCHING & REDUNDANCY OPTIONS

We recognize that DTH operators depend on year round operation and support. Any outage affects multiple programs, vast revenue streams and millions of customers. For these reasons, Comtech offers DTH providers a wide selection of switching and redundancy configurations to complement our modem, converter and amplifier products.

- Baseband, IF, L-Band and RF switching
- Monitor ports for online, backup and switch positioning for local and remote status
- Series switching, independent switching and chain switching
- 1:1 prime service, 1:N and M:N configurations
- Product fault detection, valid stream detection, IP address and Port based detection



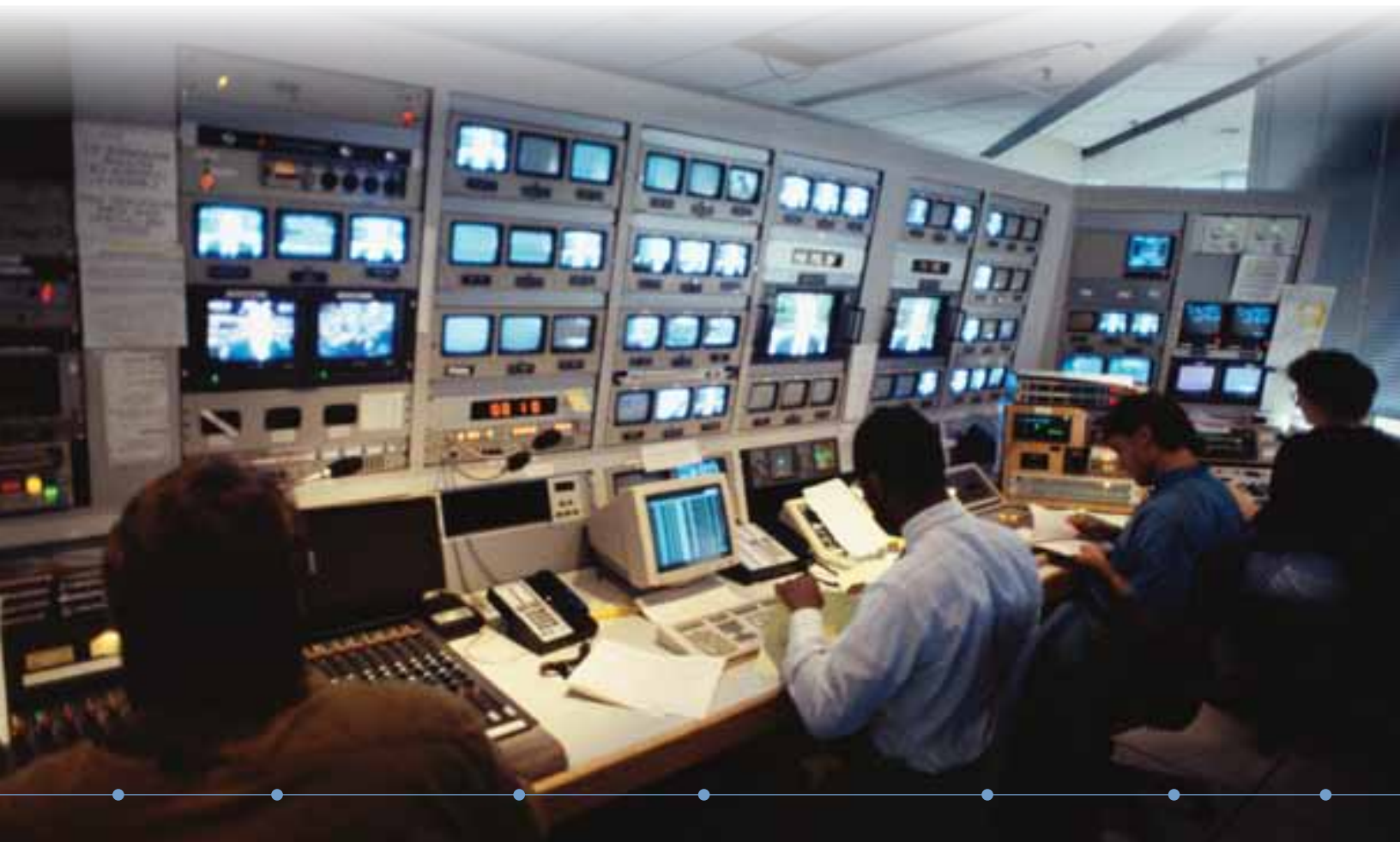
## SIGNAL MONITORING EQUIPMENT



**DD240XR DVB Demodulator**

Whether you need to monitor your signals at the uplink facility or remotely due to cross strapping or localized feed support, Comtech has a solution for your operations and service group. Comtech offers solutions for IF, RF and baseband monitoring.

Comtech also offers specialized products to remotely monitor signals and backhaul video and data feeds to network operation centers (NOC) and uplink facilities. We offer ASI baseband backhaul solutions, Gig-E backhaul solutions and remote IRD monitoring options.





## MORE INFORMATION

Based on a consistent track record of reliability and stability, our market-leading satellite communications technologies and global acceptance, you can have confidence when you select Comtech as your DTH head-end transmission equipment provider. Our solutions can help you increase service offerings, increase ARPU and reduce recurring costs.

Contact us to learn more about how our infrastructure products can be integrated into your network to optimize satellite communications.



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