Product Bulletin
October 31, 2014

CDM-570A/L-IP Satellite Modems

Overview

Comtech EF Data has been a thought leader in the high-end satellite ground equipment market for decades, providing enterprise, maritime and energy users, service providers, MNOs and systems integrators the most cost-effective backhaul and satellite networking suite for the most demanding fixed and mobile networks. This trend continues with the release of an enhanced Packet Processor in the CDM-570A/L-IP Satellite Modems. This new entry-level point-to-point and point-to-multipoint solution provides the efficiency, intelligence and horsepower required to support the ever-increasing demands of enterprise, energy and maritime users.

Satellite operators continue to innovate in the sky, launching new High Throughput Satellite (HTS) designs that promise increased performance and better economics. In parallel, it is imperative that ground manufacturers provide innovative, purpose-built and future-ready solutions that allow users to attain these new levels of performance and economics that allow them to penetrate new markets, offer enhanced services and minimize subscriber churn through a differentiated service offering. The CDM-570A/L & CDM-570A/L-IP are Comtech EF Data's entry-level answer to this market challenge, providing the most efficient low data rate point-to-point solution while also powering the point-to-multipoint shared satellite networking market.

Groundbreaking Efficiency

When discussing satellite communications, one must start with the raw efficiency of the solution, or the number of Mbps that can be sent through a given MHz. In its simplest form, Mbps/MHz ratios are calculated using the modulation (number of bits per symbol) and coding (amount of error correction added) method.

The CDM-570A/L & CDM-570A/L-IP leverage many of Comtech EF Data's industry-leading coding gain and physical layer operations, including the VersaFEC Forward Error Correction and Modulation method, Adaptive Coding & Modulation (ACM), DoubleTalk® Carrier-in-Carrier® bandwidth compression and optimized transmit filter rolloffs to provide the highest raw Mbps/MHz rates in the industry, creating the most attractive economics possible, allowing either:

- **Reduced Bandwidth (MHz) for a Given Throughput (Mbps)**, resulting in a decrease in OPEX cost structure for a given revenue stream, or
- **Increased Throughput (Mbps) for a Given Bandwidth (MHz)**, resulting in an increase in revenue stream with a given OPEX cost structure.

VersaFEC

Comtech EF Data designed the VersaFEC waveform was to provide high performance, low latency Constant Coding and Modulation (CCM) and Adaptive Coding and Modulation (ACM) operation based on Low Density Parity Check (LDPC) encoding/decoding for applications below 5 Msps. The design provides industry-leading coding gain while offering the lowest latency performance, which is essential when supporting connection-oriented and interactive applications. High link latency can either severely reduce the speed and quality of an application or, worse, cause the application not to operate at all. The VersaFEC modulation and coding method was purpose-built to support these applications at the low-to-medium data rates typical with point-to-point mobile backhaul and point-to-multipoint satellite networking.

Adaptive Coding & Modulation

An ACM method varies the throughput of a link dependent upon real-time atmospheric conditions. This is in contrast to a Constant Coding and Modulation method, which assigns a single throughput for a link at all times. The disadvantage of the CCM approach is that a link must be designed to the worst-case operating condition to ensure a given Service Level Agreement (SLA). As worst-case conditions typically occur less than 1% of the time, much additional potential throughput is wasted, which results in significant inefficiencies and unattractive economics, severely limited the addressable market. The CDM-570A/L & CDM-570A/L-IP leverage ACM in both

directions of the link, enabling users to use aggressive modulation and coding in times of clear weather conditions (high Mbps/MHz ratios) while backing down to more robust modulation and coding to meet SLA's in time of adverse conditions.

DoubleTalk Carrier-in-Carrier Bandwidth Compression

Taking this a step further, the CDM-570A/L & CDM-570A/L-IP leverage Comtech EF Data's patented bandwidth compression technology that overlays transmit and receive carriers. The CDM-570A on each end of the link receives a combined signal that includes information from both the remote modem and itself and intelligently removes its own signal from the information flow. For loopback connections, this ability to re-use bandwidth results in a significantly reduced bandwidth requirement and further increases the overall efficiency of the link.

Robust Intelligence

Adaptive Coding and Modulation (ACM) is an important feature on many satellite links, enabling link margin to be converted to an increase in data throughput, thereby providing a service provider the ability to maximize the utilization of its leased satellite resource. However, when there are large variations in capacity, such as with High Throughput Satellite (HTS) links carrying packet-based content, ACM simply isn't enough. What is really needed are robust traffic shaping (also known as Quality of Service) and header compression techniques to be teamed with the ACM functionality.

Lossless Payload Compression in Hardware

Bit streams have different levels of redundancy. The CDM-570A/L-IP intelligent payload compression engine replaces actual information with a smaller, "representative" data stream that still fully describes the data to be sent. This information stream is then fully reconstructed without loss ("lossless") on the other end of the link, reducing the total number of bits that need to be sent over a satellite link. While the levels of redundancy vary depending upon traffic makeup, the CDM-570A/L-IP's lossless compression engine typically provides 20%-30% savings, a significant savings and increase in efficiency.

Header Compression with Packet Processor

The Internet Protocol (IP) breaks a stream of data into separate blocks that are to be sent to a destination through a network of nodes. Designed to operate in a complicated point-to-multipoint network that includes numerous "hops" to get to an endpoint, the protocol, as a means of protection, wraps the payload into a transmission packet that traverses a series of bridges and routers that each make a decision along a path on where to next forward the packet. To allow these many different devices to make the proper forwarding decision, a great amount of overhead is required within the header of the packet. As satellite networks are autonomous, much of this information, from a satellite communications perspective, is overhead and need not be transmitted over the satellite link. It is imperative that any satellite network solution incorporate a header compression technique

The CDM-570A/L-IP's header compression engine compresses typical layer 2, 3 and 4 headers from 38-68 bytes down to 3 or fewer bytes, a significant bandwidth savings and increase in efficiency. Depending on the size of the payload, this can represent over 70% overall bandwidth savings.

Traffic Shaping with Packet Processor

As packet-based content continues to dominate today's communication systems, traffic shaping is becoming a system level requirement for all network topologies. Traffic shaping is the engine that enables the transmission of the highest "value" traffic during periods of congestion, ensuring that the most important services are uninterrupted. Without it, all traffic is treated equally and even the most critical services can suffer. A site that has a terrestrial data rate that is greater than the satellite WAN capacity allocated to it will not operate properly without the proper traffic shaping, no matter the satellite network sharing mechanism, even with ACM implemented.

The powerful packet processor of the CDM-570A/L-IP functions in Layer 2 (managed switch) or Layer 3 (routed) modes of operation while performing the advanced Quality of Service functions required to properly handle traffic. The packet processor provides full VLAN support, providing an additional layer of traffic separation and prioritization.

Unparalleled Horsepower

There are two limits that define the capabilities of a satellite platform carrying IP data. The first is the amount of information that can be transmitted across a link, in Mbps. The second is the number of IP packets that can be processed simultaneously, in PPS. It is important to consider both when determining the scalability of a chosen platform.

All of the benefits of header compression, payload compression and traffic shaping won't be recognized if the hardware that performs these functions can't keep up with the user traffic. A high-end platform must be able to handle the traffic load on either Traditional or HTS satellites. When traffic shaping (QoS) and header compression are concurrently enabled, the packet processor will handle 40,000 packets per second duplex. These performance numbers make the CDM-570A/L-IP the most powerful entry-level point-to-point IP packet processing engine in the market, allowing the packet processor to run at the full capacity of the CDM-570A/L's & CDM-570A/L-IP's top speed of 10 Mbps. For point-to-multipoint links, the CDM-570A/L-IP is often teamed with the CDD-562 dual demod (two demods) and CDD-564 quad demod (four demods) to enable small to medium size high performance satellite networks.

Conclusion

The CDM-570A/L & CDM-570A/L-IP are perfectly positioned for two main uses. First, the CDM-570A/L & CDM-570A/L-IP modems were purpose-built to best support low data rate point-to-point backhaul links of today and into the future. Second, the CDM-570A/L-IP provides high performance point-to-multipoint satellite solution for small to medium networks in the industry. They provide not only the best overall link efficiencies of any entry-level offering in the market but are also future ready, having the underlying horsepower to carry the most demanding links of tomorrow with the highest throughputs. The CDM-570A/L & CDM-570A/L-IP provides the many layers of optimization that are essential to providing the most robust yet cost-effective solution for enterprise, maritime, energy, mobile network and telco operators to continually increase throughputs per site in response to increased subscriber demand, roll out new enhanced services to generate new revenues, upgrade existing infrastructure to support 3G and increase subscriber base while minimizing user churn through a heightened level of service, reliability and uptime. In a multipoint environment, it has the efficiency, intelligence and horsepower to support the most demanding networks.

2114 West 7th Street, Tempe, Arizona 85281 USA
Voice: +1.480.333.2200 ● Fax: +1.480.333.2540 ● Email: sales@comtechefdata.com