

JDSU WaveReady™ Uncompressed Contribution Video Transport Solutions



The emergence of cost-effective dense wavelength division multiplexing (DWDM) transport solutions enables digital standard definition (SD) and high definition (HD) video to be extended over long distances. Media broadcasters can reduce network complexity, simplify operations, and achieve better video quality compared to implementing alternative compression strategies. Service providers offering uncompressed video transport services can minimize the amount of bandwidth consumed on their networks while offering new, enhanced services.

Video Taxonomy

SD: Standard Definition

HD: High Definition

1080P: 1080 line HD images operating at 50-60 frames per second.

SMPTE: Society of Motion Picture and Television Engineers

SMPTE 259M: Describes 270 Mbps SD Serial Digital Interface developed by SMPTE

SMPTE 292M: Describes 1.5 Gbps HD Serial Digital Interface

SMPTE 424M: Describes 2.97 Gbps (3G) HD Serial Digital Interface

Uncompressed Contribution Video Transport

Contribution video networks interconnect video sources from locations and are used to collect signals from remote sources, such as studios or live event venues between broadcasters, and therefore require the highest quality levels.

Uncompressed video transport extends native video signals from the source to the destination in their native signal format without any form of compression. In this case, the entire video stream, including any embedded audio, closed captions, time code, metadata, or other data, is transported intact without modification.

Advantages of Uncompressed Video

Cost-Effectiveness

Prior to cost-effective DWDM transport, compression was mandatory because transport networks could not affordably deliver the required bandwidth for contribution video. Contribution networks tend to achieve between 5:1 and 50:1 compression ratios. Advances in video quality and increasing data rates now require more powerful compression hardware. Compression processing requirements have increased as video and audio formats have evolved from SD to HD, and audio standards from stereo to 5.1-channel surround sound. As a result, contribution quality encoders and decoders remain costly and complex at costs that range from \$15,000 to \$50,000 and \$3,000 to \$10,000, respectively. An encoder must be deployed at each content-origination point and a decoder at each destination point.

Simplicity

Uncompressed video formats adhere to universal standards and can be transmitted and received by any standard-compliant digital video equipment. Ensuring compatibility with video compression requires more complex configuration and testing to ensure interoperability between encoding and decoding devices. Also, providers obviously want to reduce the amount of time and expertise needed to install and configure contribution video network equipment. Furthermore, using less equipment in the end-to-end video transmission path improves network reliability.

Low Latency

Uncompressed video is mathematically lossless, meaning that every bit that enters a signal path is delivered unchanged at the output without added video processing latency. The encoding and decoding processes associated with compression can introduce significant delays. High-bandwidth frame-by-frame compression techniques typically require one or two frames of delay at the source and another one or two frames of delay at the destination, or approximately 33 to 80 ms compression at each end of the circuit. More aggressive compression techniques, such as H.264 below 10 Mbps, require as many as four, six, or sometimes more frames of delay at both ends of the circuit.

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High Quality

Uncompressed video transport does not introduce any signal impairments. In contrast, compression techniques introduce changes to signal. Uncompressed video signals are of the highest quality, free from any compression artifacts and are much easier to use and manage for both users and service providers. For video signals that require extensive processing before broadcast or that are archived as master files, uncompressed transport will help ensure that the best possible quality is available.

New Opportunities for Service Providers

The overall growth from video content has created new opportunities for service providers to offer revenue-generating, enhanced transport services. The use of terrestrial transport networks offloads satellite systems, freeing up valuable spectrum that can be repurposed for cellular networks. At the same time, native video transport over terrestrial networks eliminates the complexity and costs of external encoder/decoders required when traversing satellite networks.

Uncompressed video transport requires a straightforward service level agreement. When an uncompressed signal is delivered intact to its destination, including all of the bits originated by the source in the correct order and within the specified signal timing limits, the service provider cannot affect image or sound quality of the signal. Broadcasters clearly desire the ability to transport uncompressed SD and HD contribution video. With more DWDM equipment now supporting native video interfaces, service providers are investing capital to upgrade the capacity of their transport networks rather than undertake the costs of selecting, installing, and operating complex video encoding/decoding equipment.



WaveReady WRT-780/781:
4-port Flexible C/DWDM
4.25 Gbps Transponder



WaveReady SD/HD-SDI
Native Video SFP



WaveReady LPR-530:
Automatic Protection
Switch Module

WaveReady Contribution Video Transport Solution

WaveReady is a flexible, cost-effective, self-configuring DWDM transport portfolio. With support for native SD and HD video interfaces via small form factor pluggable interfaces, WaveReady is an ideal platform for extending contribution video while also simultaneously supporting other protocols, such as native Ethernet interfaces, over a single converged coarse wave division multiplexing (CWDM) or DWDM transport network.

WaveReady video transceivers provide standard native video formats, including SD-SDI (SMPTE 259M) and HD-SDI (SMPTE 292M). Supporting National Television System Committee (NTSC) and Phase Alternating Line (PAL) color-encoding schemes, WaveReady contribution video transport solutions are compatible with schemes used throughout the world.

WaveReady supports options for simple, cost-effective, and fast automatic protection switching solutions enabling operators to deliver highly resilient contribution video networks that address the needs of content producers.

Conclusion

Terrestrial-based uncompressed video transport services are highly desirable and beneficial for content creators, studios, editors, and broadcasters. Ever increasing amounts of high-definition content creates new opportunities for service providers offering enhanced transport services based on wavelength division multiplexing (WDM)-based networks. WaveReady from JDSU provides simple, cost-effective solutions for all network operators enabling them to realize new service opportunities through the delivery of value-added services.



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