# DragonWave's Bandwidth Accelerator Feature

***DragonWave's Bandwidth Accelerator feature enables up to a 2.5x increase in capacity and spectral efficiency, allowing the Horizon Quantum to deliver from 2 to 4 Gbps per link.***

This feature combines white space suppression, lossless bulk compression, and header optimization technology to significantly enhance the efficiency of microwave transmission.

Contrary to lossy compression technology, which decides which data to send based on what it deems to be useful, Bandwidth Accelerator uses lossless compression, looking for patterns in both the header and the payload information string in order to substitute these with shorter representative "codes". This is done without losing any of the original data.

The bulk compression function of the Bandwidth Accelerator achieves gains similar to those found in software compression tools used to reduce file sizes; yet it is able to do this in real-time at very high speeds thanks to DragonWave's innovative technology. Header optimization and white space suppression provide additional throughput gains.

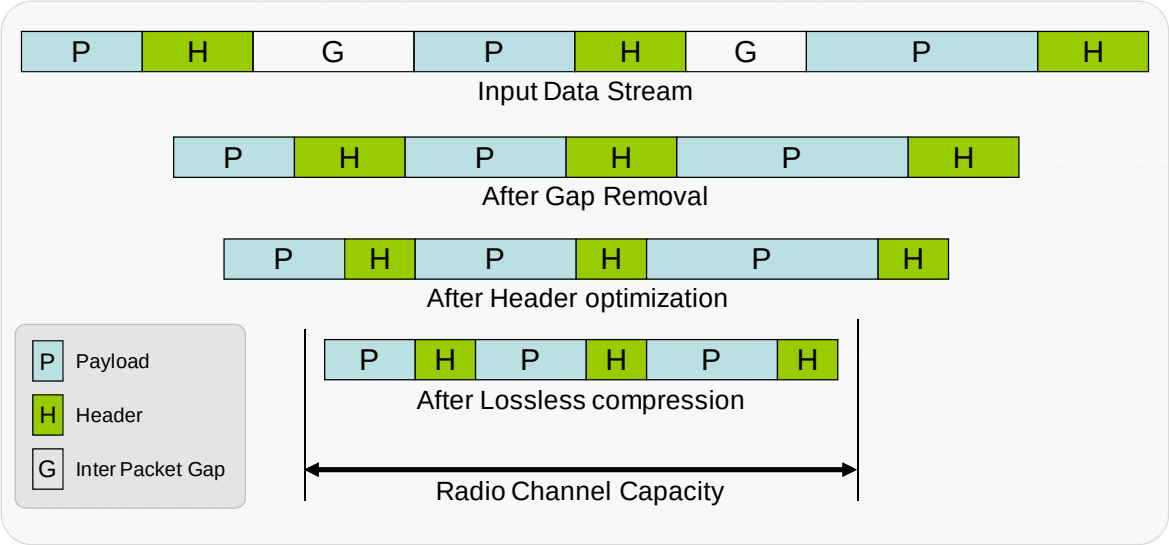
This feature delivers more than twice the throughput improvement compared to simple header compression techniques, while providing operators with many more configuration options and greater flexibility.

## SOLUTION BENEFITS

- **Lowest CAPEX per bit**
  - The Horizon Quantum with Bandwidth Accelerator delivers up to a 10–times improvement in cost per bit compared to traditional SONET/SDH systems.
- **Significant spectrum cost savings**
  - With spectrum licensing in some regions exceeding 40% of the total cost of ownership for backhaul networks, operators can achieve significant cost savings by reducing their spectrum footprint – even as they add significant capacity to the network.
- **Simplified operations**
  - Packet based traffic compression provides a simple and effective alternative to ATM cell processing.

## BANDWIDTH ACCELERATOR OPERATION

Bandwidth Accelerator allows operators to compress the input data stream to match the capacity of the available radio channel, as illustrated below. The result is an improvement in spectral efficiency and an effective increase in capacity with no impact on the RF channel and no loss of data.




## COMPRESSION GAIN

Compression gain varies significantly by traffic type. In addition, compression gain increases with block size in a non-linear fashion, with little improvement for block sizes greater than 10 KB.

**Expected Throughput by Traffic Type:**

| Channel Bandwidth | Traffic Type | | | | | |
|---|---|---|---|---|---|---|
| | Compressed VoIP | HTML | FTP | Partially Filled TDM | Uncompressed VoIP | Typical Traffic Mix |
| 56 MHz | 963 | 1107 | 1174 | 2406 | 3513 | 1078 |
| 50 MHz | 910 | 1047 | 1110 | 2275 | 3322 | 1019 |
| 40 MHz | 693 | 796 | 845 | 1731 | 2528 | 776 |
| 28 MHz | 475 | 546 | 580 | 1188 | 1734 | 532 |
| 14 MHz | 238 | 273 | 290 | 594 | 867 | 266 |
| 7 MHz | 98 | 112 | 119 | 244 | 356 | 109 |

Assumptions: 256QAM, dual channel operation, RFC2544 average frame size

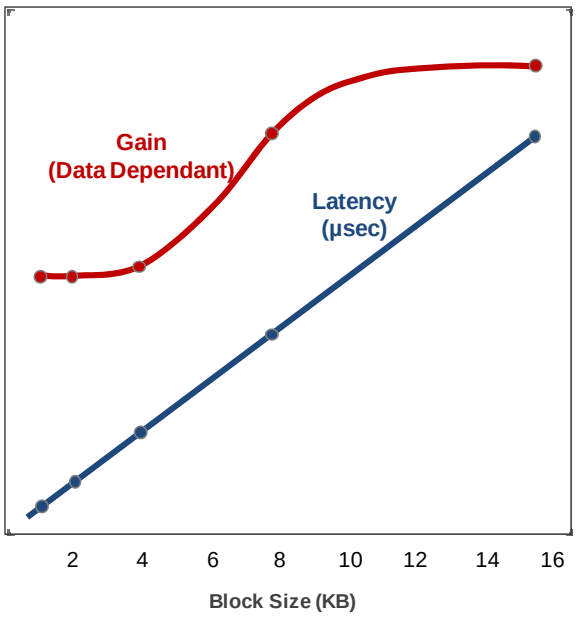
Compression occurs after queuing but before the rate limiter. For this reason, the rate limiter sees compressed flows, allowing queues to exceed their actual CIR. In addition, when queues with compression gain are under-subscribed, QOS can share this bandwidth with other queues as needed.

## LATENCY AND DELAY IMPACTS

Enabling the Bandwidth Accelerator feature on the Horizon Quantum introduces minimal latency while compressing and decompressing data, while storing data until a compression block is filled, and as the data stream is buffered at the far end of the link. In addition, latency increases linearly with block size – a parameter which is set by the end user.

Packet delay variation can occur when non-compressed time-sensitive queues collide with large output blocks – the result of low compression gain. This situation is similar to instances where time sensitive queues are mixed with all jumbo frames. Selecting smaller block sizes minimizes the number of collisions and reduces the packet delay variation of the system.

In situations where a block exits the compression engine without achieving compression, the system will revert back to the original block before the data is transmitted.




## OPERATIONAL FLEXIBILITY

Network operators have a great deal of flexibility with the ability to turn bandwidth acceleration on or off for each individual queue. Block size, which determines the size of each data bundle to be compressed, is also user configurable. This enables optimized throughput and latency for each traffic type carried in the network.

In order to monitor and track performance, compression gain is measured per queue with running averages of the compression statistics logged in real-time. These include ingress byte counts, egress byte counts and uncompressible byte counts.

## DRIVING NEXT GENERATION NETWORKS

DragonWave's Bandwidth Accelerator represents the latest innovation in packet microwave technology, driving a new level of capacity and spectral efficiency in order to meet the requirements of next generation networks. No other solution matches the high performance and low cost per bit delivered by DragonWave's Bandwidth Accelerator enabled solutions.