

# Incredible Shrinking Content

## Understanding Array Compression Technology

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### White Paper

#### Overview

Using compression, enterprises can improve the performance of customer and business-focused applications while at the same time reducing operating expenditures. Learn about:

- How compression works and the specifics of Array Networks' compression implementation
- ROI metrics that spell out a clear business case for compression
- The application performance and user experience improvements enabled by compression

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### → Overview

Many Web browsers have the ability to accept content that is compressed using the *deflate* algorithm which is documented in RFC 1950, 1951, and 1952. Because of this, it is possible for content servers to send their content in a compressed format that reduces the amount of necessary transmission bandwidth.

Array Application Front End appliances work as a drop-in tool that enables the automatic compression of content using the deflate algorithm when a browser supporting this function is detected. By automatically performing compression, administrators are not required to alter applications to gain the benefits offered by inline compression.



### → Browser Compatibility

While most browsers do support the deflate algorithm, it is a feature that cannot be assumed. To accommodate for this, the Array Operating System examines each request header and notes what content types a browser is capable of accepting. If a browser cannot support deflated files, ArrayOS will automatically send non-deflated files to the end user.

Because both deflate and non-deflate capable browsers are supported, ArrayOS ensures that any modern browser (such as Internet Explorer and Netscape Navigator) can work with a Web site using compression.

### → Hardware Acceleration

Inline compression is very computationally intensive. The compression algorithm must scan through entire blocks of data looking for redundancies and encode resulting data such that the redundancies are gone. Array AFE appliances address this issue with the use of special hardware that enables the system to compress data at a rate of 350Mbps per second.

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### → Return On Investment

Any technology that claims to improve the end user experience must be cost justified. The return on investment (ROI) achieved by the inline compression feature makes this an easy calculation.

As content is compressed between the server and the end user, the Web site benefits from having less content to send over its already overburdened Internet connections. Since most sites must pay for their Internet connectivity on a per megabit charge, anything that will reduce this charge results in money that is directly and immediately saved by the Web site.

Take for example the CNN.com Web site that regularly used 100 Mbps worth of Internet connectivity. At the cost of \$250/megabit, a 100 Mbps connection is \$25,000 per month!

Enabling compression on the CNN.com Web site, the same number of users could be supported in a mere 30Mbps. Even assuming that the price per megabit increases to \$300/megabit, the cost still drops to \$9,000 per month. At a savings of \$16,000 per month, an Array AFE with compression would pay for itself in less than two months.

### → Performance Gains

The performance improvements achieved by the end user is largely accomplished by the reduced amount of time necessary to download content. Because the majority of users use low speed dial-up connections that can only transfer 2-3 Kbps, the cost of performing compression is typically not significant as compared to the savings achieved by only having to download content that is 50% of the original size.

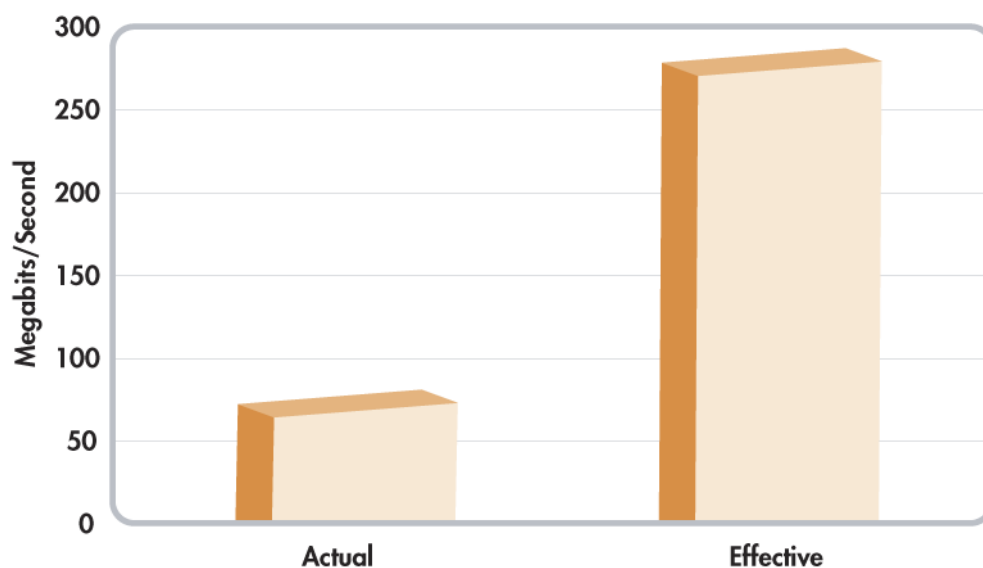
An example is the download of the CNN.com homepage. The main page is a 50Kbps HTML file. With zero compression, the typical dial-up user would be able to fetch this file in approximately 20 seconds. The Array AFE with its hardware-accelerated compression is able to achieve a 5:1 ratio bringing the file size down to 10Kbps. The resulting download time of the compressed file would be approximately 3 seconds. With the Array able to compress 350Mbps (43Mbytes) of traffic per second, the additional latency for a single file would be 1 millisecond (0.001 seconds). Taking the compression latency into account with the reduced download time, the end user would experience an 85% performance improvement.

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But like any technology, the proof is in repeatable performance tests. Array Networks' took to the task using Ziff Davis Publishing's WebBench tool.

In our first example, we compare actual throughput with effective throughput when downloading the CNN.com homepage with compression enabled. The effective throughput is the amount of data the client receives once it is decompressed. The actual throughput is the amount of bandwidth required to send the data.

### Throughput for CNN Homepage with Compression



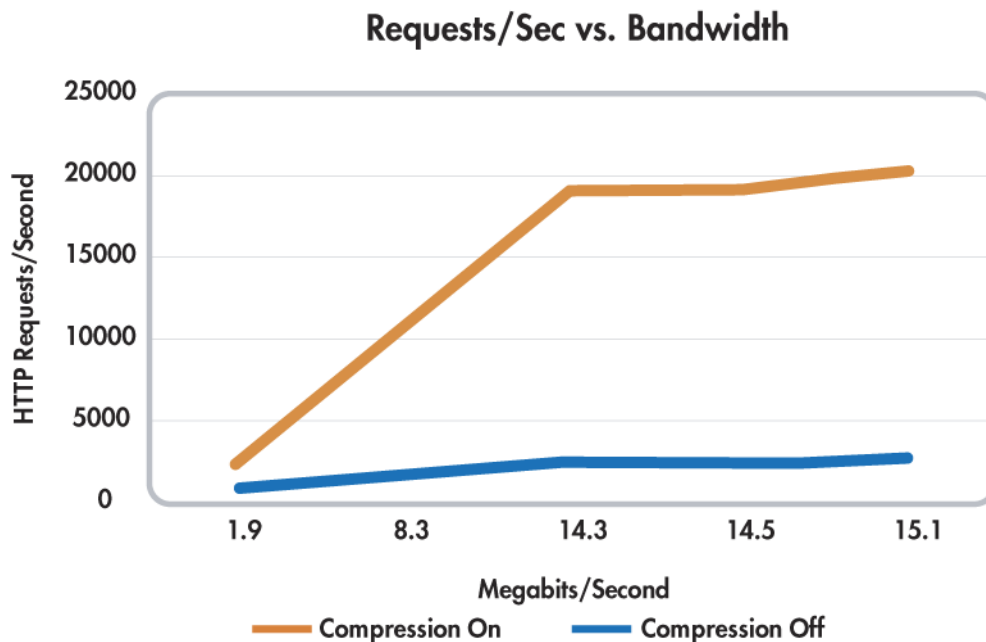
In this test we see that the Array is able to deliver an effective throughput of 281 Mbps. With the compression enabled, all of this content was delivered in a mere 71 Mbps. For end users, this represents an improvement of 74.7% in response time.

From an ROI point of view, the Array AFE resulted in a \$52,500 per month savings in bandwidth assuming a per megabit cost of \$250. Even if the per-megabit cost is \$500 at 71Mbps, the Array AFE saves \$35,000 per month.

The gear heads will appreciate the fact that in this test the Array sustained the same level of performance even as the offered load went from 5 clients to 25 clients, a non-trivial feat.

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The next CNN.com homepage example measures requests per second achieved per megabit of traffic for compressed and uncompressed traffic.



In the above graph we see that in the same amount of bandwidth, compressed traffic was able to achieve over 20,000 HTTP requests per second. By comparison, the non-compressed traffic peaked at 2,000 HTTP requests per second.

### → Summary

The inclusion of inline compression – with a clear benefit to end users, minimal fuss for administrators, and an incredible ROI – is a powerful feature/function that contributes heavily in making Array Application Front End appliances the preferred choice for IT professionals.

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### *About Array Networks*

Array Networks is a world leader in secure application acceleration and deployment appliances for global enterprises. Built upon the Array SpeedStack(TM) technology, Array's unified secure content access solutions enable industry-leading performance, integration, scalability and ease of implementation and management. Headquartered in Campbell, California with sales offices in the U.S., Europe, Asia Pacific and Latin America, Array engineers and manufactures its products in the Silicon Valley and sells them through direct and indirect channels across the globe.

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