
Amazon CloudFront

Developer Guide

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Amazon CloudFront: Developer Guide

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Table of Contents

| | |
|---|----|
| What Is Amazon CloudFront? | 1 |
| How CloudFront Delivers Content | 4 |
| Locations and IP Address Ranges of CloudFront Edge Servers | 6 |
| PCI DSS Compliance | 6 |
| AWS Billing and Usage Reports for CloudFront | 8 |
| AWS Billing Report for CloudFront | 10 |
| AWS Usage Report for CloudFront | 11 |
| Interpreting Your AWS Bill and the AWS Usage Report for CloudFront | 12 |
| CloudFront Reports | 15 |
| CloudFront Cache Statistics Reports | 16 |
| Downloading Data in CSV Format | 17 |
| How Cache Statistics Charts Are Related to Data in the CloudFront Access Logs | 19 |
| CloudFront Popular Objects Report | 20 |
| Downloading Data in CSV Format | 21 |
| How Data in the Popular Objects Report Is Related to Data in the CloudFront Access Logs | 22 |
| CloudFront Top Referrers Report | 23 |
| Downloading Data in CSV Format | 24 |
| How Data in the Top Referrers Report Is Related to Data in the CloudFront Access Logs | 25 |
| CloudFront Usage Reports | 25 |
| Downloading Data in CSV Format | 26 |
| How the Usage Charts Are Related to Data in the CloudFront Usage Report | 28 |
| CloudFront Viewers Reports | 29 |
| Displaying Viewers Charts and Reports | 30 |
| Downloading Data in CSV Format | 31 |
| How Data in the Locations Report Is Related to Data in the CloudFront Access Logs | 35 |
| Getting Started | 37 |
| Step 1: Sign up for Amazon Web Services | 37 |
| Step 2: Upload your content to Amazon S3 and grant object permissions | 38 |
| Step 3: Create a CloudFront Web Distribution | 39 |
| Step 4: Test your links | 45 |
| Working with Distributions | 46 |
| Overview of Web and RTMP Distributions | 47 |
| Web Distributions | 47 |
| RTMP Distributions | 48 |
| Creating Web and RTMP Distributions | 48 |
| Listing, Viewing, and Updating CloudFront Distributions | 48 |
| Deleting a Distribution | 49 |
| Using Alternate Domain Names (CNAMEs) | 50 |
| Using the * Wildcard in Alternate Domain Names | 50 |
| Restrictions on Using Alternate Domain Names | 51 |
| Adding an Alternate Domain Name | 51 |
| Choosing the Price Class for a CloudFront Distribution | 54 |
| Using CloudFront with Amazon S3 | 54 |
| Adding CloudFront When You're Distributing Content from Amazon S3 | 55 |
| Moving an Amazon S3 Bucket to a Different Region | 56 |
| Changes to the CloudFront API | 56 |
| Working with Web Distributions | 58 |
| Task List for Creating a Web Distribution | 58 |
| Creating or Updating a Web Distribution Using the CloudFront Console | 59 |
| Testing Your Web Distribution | 60 |
| Using Amazon S3 Origins and Custom Origins for Web Distributions | 61 |
| Using Amazon S3 Buckets for Your Origin | 61 |
| Using Amazon EC2 or Other Custom Origins | 62 |
| Values that You Specify When You Create or Update a Web Distribution | 63 |
| Delivery Method | 64 |

| | |
|---|-----|
| Origin Settings | 64 |
| Cache Behavior Settings | 68 |
| Distribution Details | 75 |
| Custom Error Pages and Error Caching | 79 |
| Restrictions | 79 |
| Values that CloudFront Displays in the Console When You Create or Update a Web Distribution | 80 |
| Distribution ID (General Tab) | 80 |
| Distribution Status (General Tab) | 80 |
| Last Modified (General Tab) | 81 |
| Domain Name (General Tab) | 81 |
| Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins | 81 |
| Using AWS WAF to Control Access to Your Content | 82 |
| Restricting the Geographic Distribution of Your Content | 82 |
| Using CloudFront Geo Restriction | 83 |
| Using a Third-Party Geolocation Service | 84 |
| Configuring On-Demand Smooth Streaming | 85 |
| Configuring On-Demand Progressive Downloads | 86 |
| Configuring On-Demand Apple HTTP Live Streaming (HLS) | 86 |
| Working with RTMP Distributions | 87 |
| How RTMP Distributions Work | 87 |
| Task List for Streaming Media Files Using RTMP | 89 |
| Creating an RTMP Distribution Using the CloudFront Console | 90 |
| Values that You Specify When You Create or Update an RTMP Distribution | 90 |
| Origin Domain Name (Amazon S3 Bucket) | 91 |
| Restrict Bucket Access (Amazon S3 Only) | 92 |
| Origin Access Identity (Amazon S3 Only) | 92 |
| Comment for New Identity(Amazon S3 Only) | 92 |
| Your Identities (Amazon S3 Only) | 92 |
| Grant Read Permissions on Bucket (Amazon S3 Only) | 92 |
| Price Class | 92 |
| Alternate Domain Names (CNAMEs) | 93 |
| Logging | 93 |
| Bucket for Logs | 93 |
| Log Prefix | 93 |
| Comment | 93 |
| Distribution State | 93 |
| Restrict Viewer Access (Use Signed URLs) | 94 |
| Trusted Signers | 94 |
| AWS Account Numbers | 94 |
| Values that CloudFront Displays in the Console When You Create or Update an RTMP Distribution | 95 |
| Distribution | 95 |
| Distribution ID | 95 |
| Status | 95 |
| Last Modified | 95 |
| Domain Name | 95 |
| Configuring the Media Player | 96 |
| MPEG Files | 96 |
| Using an Amazon S3 Bucket as the Origin for an RTMP Distribution | 96 |
| Creating Multiple RTMP Distributions for an Origin Server | 97 |
| Restricting Access Using Crossdomain.xml | 97 |
| Error Codes for RTMP Distributions | 98 |
| Troubleshooting RTMP Distributions | 98 |
| Working with Objects | 99 |
| Format of URLs for CloudFront Objects | 99 |
| Format of Public URLs for Objects in Amazon S3 | 100 |
| Format of Public URLs for Objects in a Custom Origin | 101 |
| How Public URLs Affect the Invalidation of Directories | 101 |
| Format of Signed URLs | 101 |

| | |
|--|-----|
| How CloudFront Processes HTTP and HTTPS Requests | 102 |
| Increasing the Proportion of Requests that Are Served from CloudFront Edge Caches | 102 |
| Specifying How Long CloudFront Caches Your Objects | 102 |
| Caching Based on Query String Parameters | 103 |
| Caching Based on Cookie Values | 103 |
| Caching Based on Request Headers | 104 |
| Serving Media Content by Using HTTP | 104 |
| Configuring CloudFront to Cache Based on Query String Parameters | 105 |
| Query String Parameters and Web Distributions | 105 |
| Query String Parameters and RTMP Distributions | 106 |
| Configuring CloudFront to Cache Objects Based on Cookies | 106 |
| Configuring CloudFront to Cache Objects Based on Request Headers | 108 |
| Headers and Web Distributions | 108 |
| Headers and RTMP Distributions | 112 |
| Forwarding Custom Headers to Your Origin (Web Distributions Only) | 112 |
| Configuring CloudFront to Forward Custom Headers to Your Origin | 112 |
| Custom Headers that CloudFront Can't Forward to Your Origin | 113 |
| Using Custom Headers for Cross-Origin Resource Sharing (CORS) | 113 |
| Using Custom Headers to Restrict Access to Your Content on a Custom Origin | 113 |
| Adding, Removing, or Replacing Objects in a Distribution | 114 |
| Adding Objects that You Want CloudFront to Distribute | 114 |
| Updating Existing Objects Using Versioned Object Names | 115 |
| Updating Existing Objects Using the Same Object Names | 115 |
| Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration) | 116 |
| Invalidating Objects (Web Distributions Only) | 121 |
| Customizing Error Responses | 127 |
| Creating or Updating a Cache Behavior for Custom Error Pages | 129 |
| Changing Response Codes | 129 |
| Controlling How Long CloudFront Caches Errors | 129 |
| How CloudFront Responds When a Custom Error Page Is Unavailable | 130 |
| Pricing for Custom Error Pages | 130 |
| Configuring Error Response Behavior | 131 |
| How CloudFront Processes Partial Requests for an Object (Range GETs) | 132 |
| Specifying a Default Root Object (Web Distributions Only) | 132 |
| Serving Compressed Files | 135 |
| Using CloudFront to Compress Your Content | 135 |
| Using a Custom Origin to Compress Your Content | 137 |
| Request and Response Behavior | 139 |
| Request and Response Behavior for Amazon S3 Origins | 139 |
| How CloudFront Processes and Forwards Requests to Your Amazon S3 Origin Server | 139 |
| How CloudFront Processes Responses from Your Amazon S3 Origin Server | 144 |
| Request and Response Behavior for Custom Origins | 145 |
| How CloudFront Processes and Forwards Requests to Your Custom Origin Server | 146 |
| How CloudFront Processes Responses from Your Custom Origin Server | 155 |
| How CloudFront Processes HTTP 3xx Status Codes from Your Origin | 158 |
| How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin | 158 |
| How CloudFront Processes Errors When You Have Configured Custom Error Pages | 158 |
| How CloudFront Processes Errors When You Have Not Configured Custom Error Pages | 160 |
| HTTP 4xx and 5xx Status Codes that CloudFront Caches | 161 |
| Serving Private Content through CloudFront | 162 |
| Overview of Private Content | 162 |
| Restricting Access to Objects in CloudFront Edge Caches | 163 |
| Restricting Access to Objects in Amazon S3 Buckets | 163 |
| Using an HTTP Server for Private Content | 164 |
| Task List: Serving Private Content | 165 |
| Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content | 166 |
| Creating a CloudFront Origin Access Identity and Adding it to Your Distribution | 166 |

| | |
|---|-----|
| Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket | 168 |
| Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication | 170 |
| Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies (Trusted Signers) | 171 |
| Creating CloudFront Key Pairs for Your Trusted Signers | 172 |
| Reformatting the CloudFront Private Key (.NET and Java Only) | 173 |
| Adding Trusted Signers to Your Distribution | 174 |
| Verifying that Trusted Signers Are Active (Optional) | 176 |
| Rotating CloudFront Key Pairs | 176 |
| Choosing Between Signed URLs and Signed Cookies | 178 |
| Using Both Signed URLs and Signed Cookies | 178 |
| Using Signed URLs | 179 |
| Choosing Between Canned and Custom Policies for Signed URLs | 179 |
| How Signed URLs Work | 180 |
| Choosing How Long Signed URLs Are Valid | 180 |
| When Does CloudFront Check the Expiration Date and Time in a Signed URL? | 181 |
| Sample Code and Third-Party Tools | 181 |
| Creating a Signed URL Using a Canned Policy | 182 |
| Creating a Signed URL Using a Custom Policy | 189 |
| Using Signed Cookies | 198 |
| Choosing Between Canned and Custom Policies for Signed Cookies | 198 |
| How Signed Cookies Work | 198 |
| Preventing Misuse of Signed Cookies | 199 |
| When Does CloudFront Check the Expiration Date and Time in a Signed Cookie? | 200 |
| Sample Code and Third-Party Tools | 200 |
| Setting Signed Cookies Using a Canned Policy | 200 |
| Setting Signed Cookies Using a Custom Policy | 205 |
| Using a Linux Command and OpenSSL for Base64-Encoding and Encryption | 213 |
| Code Examples for Creating a Signature for a Signed URL | 214 |
| Create a URL Signature Using Perl | 214 |
| Create a URL Signature Using PHP | 216 |
| Create a URL Signature Using C# and the .NET Framework | 218 |
| Create a URL Signature Using Java | 226 |
| Using an HTTPS Connection to Access Your Objects | 229 |
| How CloudFront Works with HTTPS Connections | 230 |
| How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin | 230 |
| Supported Protocols and Ciphers | 233 |
| Using Alternate Domain Names and HTTPS | 234 |
| Choosing How CloudFront Serves HTTPS Requests | 234 |
| Requirements and Limits on Using SSL/TLS Certificates with CloudFront | 236 |
| To use alternate domain names with HTTPS | 238 |
| Determining the Size of the Public Key in an SSL/TLS Certificate | 239 |
| Rotating SSL/TLS Certificates | 240 |
| Reverting from a Custom SSL/TLS Certificate to the Default CloudFront Certificate | 241 |
| Switching from a Custom SSL/TLS Certificate with Dedicated IP Addresses to SNI | 241 |
| Charges for HTTPS Connections | 242 |
| Authentication and Access Control | 243 |
| Authentication | 243 |
| Access Control | 244 |
| Overview of Managing Access | 245 |
| ARNs for CloudFront Resources | 245 |
| Understanding Resource Ownership | 245 |
| Managing Access to Resources | 246 |
| Specifying Policy Elements: Resources, Actions, Effects, and Principals | 247 |
| Specifying Conditions in a Policy | 247 |
| Using IAM Policies for CloudFront | 248 |

| | |
|--|-----|
| Permissions Required to Use the CloudFront Console | 248 |
| AWS Managed (Predefined) Policies for CloudFront | 250 |
| Customer Managed Policy Examples | 250 |
| CloudFront API Permissions Reference | 253 |
| Required Permissions for Actions on Web Distributions | 253 |
| Required Permissions for Actions on RTMP Distributions | 254 |
| Required Permissions for Actions on Invalidations | 255 |
| Required Permissions for Actions on Origin Access Identities | 255 |
| Required Permissions for Actions on Tags | 255 |
| Access Logs | 256 |
| How Logging Works | 256 |
| Choosing an Amazon S3 Bucket for Your Access Logs | 257 |
| Amazon S3 Permissions Required to Access Your Log Files | 258 |
| File Name Format | 258 |
| Timing of Log File Delivery | 258 |
| Analyzing Access Logs | 259 |
| Editing Your Logging Settings | 259 |
| Deleting Log Files from an Amazon S3 Bucket | 260 |
| Log File Format | 260 |
| Web Distribution Log File Format | 261 |
| RTMP Distribution Log File Format | 267 |
| Charges for Access Logs | 269 |
| Monitoring CloudFront Activity Using CloudWatch | 270 |
| Downloading Data in CSV Format | 271 |
| Information About the Report | 272 |
| Data in the CloudWatch Metrics Report | 272 |
| Capturing API Requests with CloudTrail | 274 |
| CloudFront Information in CloudTrail Log Files | 274 |
| Understanding CloudFront Log File Entries | 275 |
| Tagging Amazon CloudFront Distributions | 280 |
| Tag Restrictions | 281 |
| Adding, Editing, and Deleting Tags for Distributions | 281 |
| Troubleshooting | 282 |
| I can't view the files in my web distribution | 282 |
| Did you sign up for both CloudFront and Amazon S3? | 282 |
| Are your Amazon S3 bucket and object permissions set correctly? | 282 |
| Is your alternate domain name (CNAME) correctly configured? | 283 |
| Are you referencing the correct URL for your CloudFront distribution? | 283 |
| Do you need help troubleshooting a custom origin? | 283 |
| I can't view the files in my RTMP distribution | 284 |
| Error Message: Certificate: <certificate-id> is being used by CloudFront. | 284 |
| Load Testing CloudFront | 285 |
| Streaming Tutorials | 286 |
| Live Streaming | 286 |
| On-Demand Streaming | 286 |
| RTMP Streaming | 286 |
| Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0 | 286 |
| Overview | 287 |
| Steps to Configure Live Streaming | 288 |
| Creating an Amazon Web Services Account | 288 |
| Creating an Amazon EC2 Key Pair | 288 |
| Subscribing to Adobe Media Server | 289 |
| Creating an AWS CloudFormation Stack for Live Streaming | 290 |
| Verifying that Adobe Media Server Is Running | 291 |
| Setting Up Adobe Flash Media Live Encoder to Publish a Live Stream | 292 |
| Embedding Strobe Media Playback for an Amazon CloudFront Live HTTP Stream in a Web Application | 295 |
| Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming | 296 |

| | |
|--|-----|
| Frequently Asked Questions | 297 |
| Additional Documentation | 303 |
| Live Smooth Streaming Using Amazon CloudFront and IIS Media Services 4.1 | 304 |
| Overview of Live Smooth Streaming with Amazon Web Services | 304 |
| Creating an Amazon Web Services Account | 305 |
| Creating an Amazon EC2 Key Pair | 305 |
| Creating an AWS CloudFormation Stack for Live Smooth Streaming | 306 |
| Verifying that Your Amazon EC2 Windows Server Instance Is Running | 309 |
| Getting Your Windows Password | 309 |
| Encoding Your Live Stream | 310 |
| Viewing Your Live Smooth Stream | 311 |
| Deleting Your AWS CloudFormation Live Smooth Streaming Stack | 311 |
| Frequently Asked Questions | 311 |
| Additional Documentation | 313 |
| Live Streaming with Wowza Streaming Engine 4.2 | 314 |
| Creating an Amazon Web Services Account | 314 |
| Creating an Amazon EC2 Key Pair | 315 |
| Getting a License for Wowza Streaming Engine 4.2 | 315 |
| Subscribing to Wowza Streaming Engine 4.2 through AWS Marketplace | 315 |
| Creating an AWS CloudFormation Stack for Live Streaming | 316 |
| Verifying that Wowza Streaming Engine 4.2 Is Running | 318 |
| Setting Up an Encoder to Publish a Live Stream | 318 |
| Playing the Live Stream in a Web Application | 319 |
| Deleting an AWS CloudFormation Stack for Live Streaming | 321 |
| Frequently Asked Questions | 321 |
| Additional Documentation | 322 |
| Live HTTP Streaming Using CloudFront and Any HTTP Origin | 324 |
| Creating a New CloudFront Distribution for Live Streaming | 324 |
| Configuring Web Players to Play the Live Stream | 325 |
| (Optional) Deleting an AWS CloudFormation Stack for Live Streaming | 325 |
| On-Demand Media Streaming with Unified Streaming | 325 |
| Creating an Amazon Web Services Account | 326 |
| Creating an Amazon EC2 Key Pair | 327 |
| Subscribing to Unified Streaming | 327 |
| Creating an AWS CloudFormation Stack for On-Demand Streaming | 328 |
| Verifying that Unified Streaming Server Is Running | 330 |
| Uploading Your Media Files to Amazon S3 | 330 |
| Playing the On-Demand Stream In a Test Web Application | 331 |
| Deleting the AWS CloudFormation Stack and Amazon S3 Bucket for On-Demand Streaming | 333 |
| Frequently Asked Questions | 334 |
| Additional Documentation | 336 |
| On-Demand Video Streaming Using CloudFront and Adobe Flash Player | 338 |
| Creating an Amazon S3 Bucket | 338 |
| Creating CloudFront Web and RTMP Distributions | 338 |
| Creating a Flash Project Using Adobe Flash Builder | 340 |
| Uploading Media and Flash Builder Files to an Amazon S3 Bucket | 341 |
| Playing the Media File | 342 |
| On-Demand Video Streaming Using CloudFront and Flowplayer for Adobe Flash | 343 |
| Uploading Media and Flowplayer Files to an Amazon S3 Bucket | 343 |
| Creating CloudFront Web and RTMP Distributions | 344 |
| Embedding Video in an HTML Page | 345 |
| On-Demand Video Streaming Using CloudFront and JW Player | 348 |
| Uploading Media and JW Player Files to an Amazon S3 Bucket | 348 |
| Creating CloudFront Web and RTMP Distributions | 349 |
| Embedding Video in a Web Page | 350 |
| Uploading the HTML File and Playing the Video | 352 |
| Limits | 353 |

| | |
|---|-----|
| Resources | 355 |
| Additional Amazon CloudFront Documentation | 355 |
| Getting Support | 356 |
| CloudFront Developer Tools and SDKs | 356 |
| Using CloudFront Logging | 356 |
| Additional Tips from the Amazon Web Services Blog | 356 |
| Invalidate Objects | 357 |
| Distributing Streaming Media | 357 |
| Tools and Code Examples for Configuring Private Content | 357 |
| Using CloudFront with a Content Management System | 358 |
| Document History | 359 |
| AWS Glossary | 373 |

What Is Amazon CloudFront?

Topics

- [How CloudFront Delivers Content \(p. 4\)](#)
- [Locations and IP Address Ranges of CloudFront Edge Servers \(p. 6\)](#)
- [PCI DSS Compliance \(p. 6\)](#)

CloudFront is a web service that speeds up distribution of your static and dynamic web content, for example, .html, .css, .php, and image files, to end users. CloudFront delivers your content through a worldwide network of data centers called edge locations. When a user requests content that you're serving with CloudFront, the user is routed to the edge location that provides the lowest latency (time delay), so content is delivered with the best possible performance. If the content is already in the edge location with the lowest latency, CloudFront delivers it immediately. If the content is not currently in that edge location, CloudFront retrieves it from an Amazon S3 bucket or an HTTP server (for example, a web server) that you have identified as the source for the definitive version of your content.

This concept is best illustrated by an example. Suppose you're serving the following image from a traditional web server, not from CloudFront:



(The image is owned by NASA and comes from the Visible Earth website, <http://visibleearth.nasa.gov/>.)

You're serving the image using the URL `http://example.com/globe_west_540.png`. Your users can easily navigate to this URL and see the image, but they probably don't know that their request was routed from one network to another—through the complex collection of interconnected networks that comprise the Internet—until the image was found.

Further suppose that the web server from which you're serving the image is in Seattle, Washington, USA, and that a user in Austin, Texas, USA requests the image. The traceroute list below (courtesy of www.WatchMouse.com) shows one way that this request could be routed.

- 1 vrid-225.core-sw.aus.us.siteprotect.com (216.139.225.1) 0.627 ms
- 2 xe-3-4.brdr-rtr-02.aus.us.siteprotect.com (216.139.253.53) 0.219 ms
- 3 66.113.197.121 0.452 ms
- 4 xe-5-2-0.edge3.Dallas1.Level3.net (4.59.112.37) 4.978 ms
- 5 ae-73-70.ebr3.Dallas1.Level3.net (4.69.145.116) 9.817 ms
- 6 ae-7-7.ebr3.Atlanta2.Level3.net (4.69.134.22) 30.570 ms
- 7 ae-2-2.ebr1.Washington1.Level3.net (4.69.132.86) 38.801 ms
- 8 ae-81-81.csv3.Washington1.Level3.net (4.69.134.138) 41.795 ms
- 9 ae-3-89.edge2.Washington1.Level3.net (4.68.17.145) 39.193 ms
- 10 72.21.222.139 35.767 ms



Map courtesy of the University of Texas Libraries, The University of Texas at Austin

In this example, the request was routed 10 times within the United States before the image was retrieved, which is not an unusually large number of hops. If your user were in Europe, the request would be routed through even more networks to reach your server in Seattle. The number of networks and the distance that the request and the image must travel have a significant impact on the performance, reliability, and availability of the image.

CloudFront speeds up the distribution of your content by routing each user request to the edge location that can best serve your content. Typically, this is the CloudFront edge location that provides the lowest latency. This dramatically reduces the number of networks that your users' requests must pass through, which improves performance. Users get lower latency—the time it takes to load the first byte of the object—and higher data transfer rates. You also get increased reliability and availability because copies of your objects are now held in multiple edge locations around the world.

For a list of the locations of CloudFront edge servers, see [The Amazon CloudFront Global Edge Network](#) on the CloudFront Product Details page.

How CloudFront Delivers Content

After some initial setup, CloudFront works invisibly to speed up delivery of your content. This overview includes both the steps you perform before your first user accesses your application or website and how CloudFront serves your content when configuration is complete.

Setting up CloudFront involves a few simple steps:

How You Configure CloudFront to Deliver Your Content

1. You configure your **origin servers**, from which CloudFront gets your files for distribution from CloudFront edge locations all over the world.

An origin server stores the original, definitive version of your objects. If you're serving content over HTTP, your origin server is either an Amazon S3 bucket or an HTTP server, such as a web server. Your HTTP server can be running on an Amazon Elastic Compute Cloud (Amazon EC2) instance or on a server that you manage; these servers are also known as custom origins.

If you're distributing media files on demand using the Adobe Media Server RTMP protocol, your origin server is always an Amazon S3 bucket.

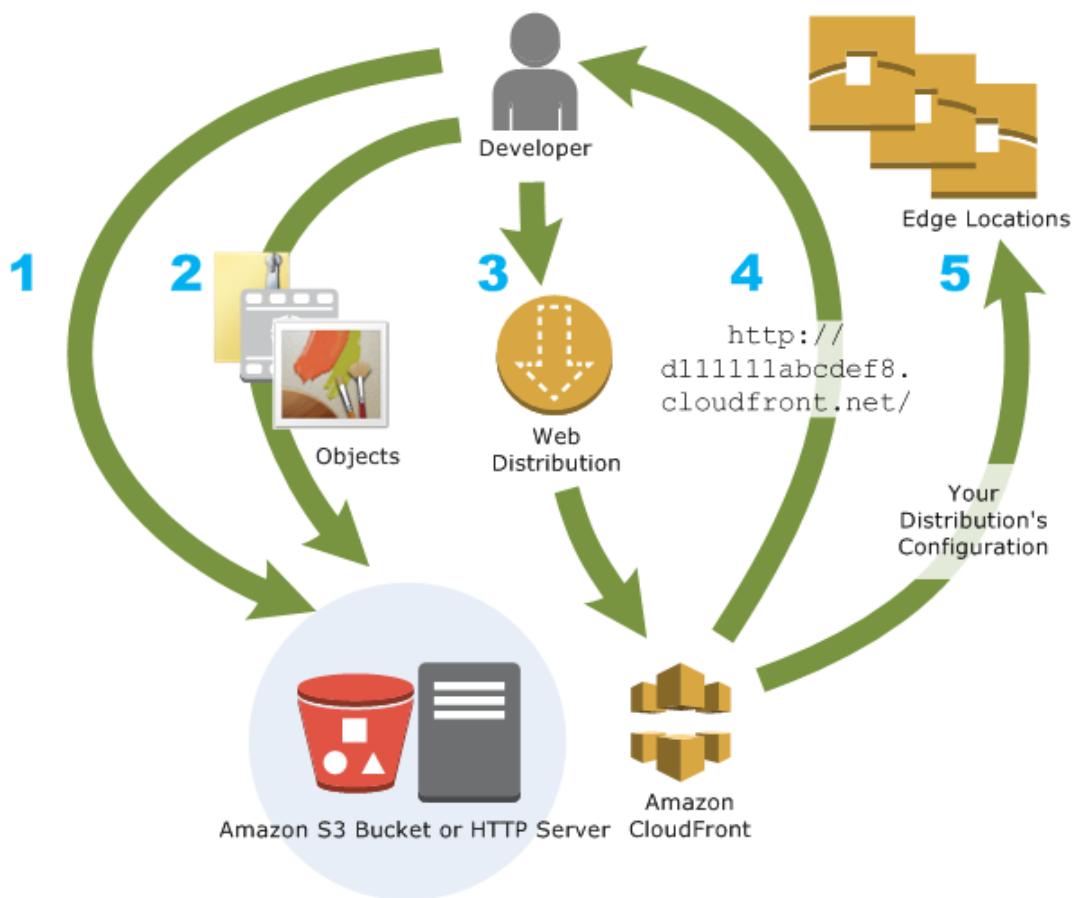
2. You upload your files to your origin servers. Your files, also known as **objects**, typically include web pages, images, and media files, but can be anything that can be served over HTTP or a supported version of Adobe RTMP, the protocol used by Adobe Flash Media Server.

If you're using an Amazon S3 bucket as an origin server, you can make the objects in your bucket publicly readable, so anyone who knows the CloudFront URLs for your objects can access them. You also have the option of keeping objects private and controlling who accesses them. See [Serving Private Content through CloudFront \(p. 162\)](#).

3. You create a CloudFront **distribution**, which tells CloudFront which origin servers to get your files from when users request the files through your web site or application. At the same time, you specify details such as whether you want CloudFront to log all requests and whether you want the distribution to be enabled as soon as it's created.
4. CloudFront sends your distribution's configuration (but not your content) to all of its **edge locations**—collections of servers in geographically dispersed data centers where CloudFront caches copies of your objects.
5. As you develop your website or application, you use the domain name that CloudFront provides for your URLs. For example, if CloudFront returns `d11111abcdef8.cloudfront.net` as the domain name for your distribution, the URL for `logo.jpg` in your Amazon S3 bucket (or in the root directory on an HTTP server) will be `http://d11111abcdef8.cloudfront.net/logo.jpg`.

You can also configure your CloudFront distribution so you can use your own domain name. In that case, the URL might be `http://www.example.com/logo.jpg`.

6. Optionally, you can configure your origin server to add headers to the files; the headers indicate how long you want the files to stay in the cache in CloudFront edge locations. By default, each object stays in an edge location for 24 hours before it expires. The minimum **expiration time** is 0 seconds; there isn't a maximum expiration time limit. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).



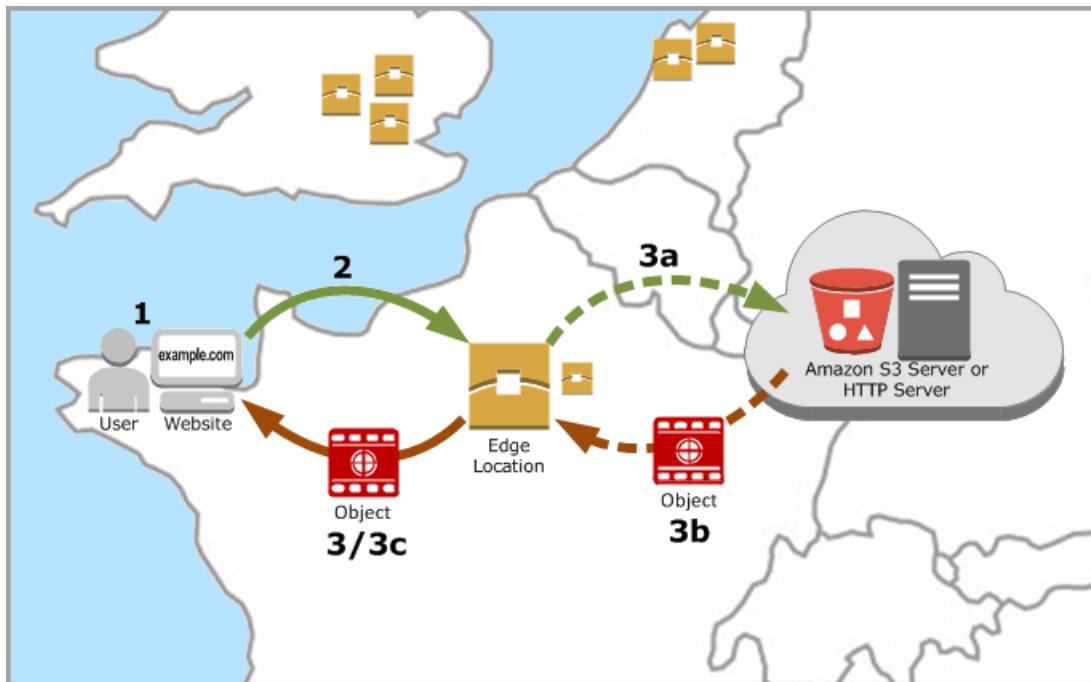
How CloudFront Delivers Content to Your Users

Once you configure CloudFront to deliver your content, here's what happens when users request your objects:

1. A user accesses your website or application and requests one or more objects, such as an image file and an HTML file.
2. DNS routes the request to the CloudFront edge location that can best serve the user's request, typically the nearest CloudFront edge location in terms of latency, and routes the request to that edge location.
3. In the edge location, CloudFront checks its cache for the requested files. If the files are in the cache, CloudFront returns them to the user. If the files are *not* in the cache, it does the following:
 - a. CloudFront compares the request with the specifications in your distribution and forwards the request for the files to the applicable origin server for the corresponding file type—for example, to your Amazon S3 bucket for image files and to your HTTP server for the HTML files.
 - b. The origin servers send the files back to the CloudFront edge location.
 - c. As soon as the first byte arrives from the origin, CloudFront begins to forward the files to the user. CloudFront also adds the files to the cache in the edge location for the next time someone requests those files.
4. After an object has been in an edge cache for 24 hours or for the duration specified in your file headers, CloudFront does the following:

- a. CloudFront forwards the next request for the object to your origin to determine whether the edge location has the latest version.
- b. If the version in the edge location is the latest, CloudFront delivers it to your user.

If the version in the edge location is not the latest, your origin sends the latest version to CloudFront, and CloudFront delivers the object to your user and stores the latest version in the cache at that edge location.



Locations and IP Address Ranges of CloudFront Edge Servers

For a list of the locations of CloudFront edge servers, see [The Amazon CloudFront Edge Network](#) on the Amazon CloudFront detail page.

Amazon Web Services (AWS) publishes its current IP address ranges in JSON format. To view the current ranges, download [ip-ranges.json](#). For more information, see [AWS IP Address Ranges](#) in the *Amazon Web Services General Reference*.

To find the IP address ranges that are associated with CloudFront edge servers, search `ip-ranges.json` for the following string:

```
"service": "CLOUDFRONT"
```

PCI DSS Compliance

CloudFront supports the processing, storage, and transmission of credit card data by a merchant or service provider, and has been validated as being compliant with Payment Card Industry (PCI) Data

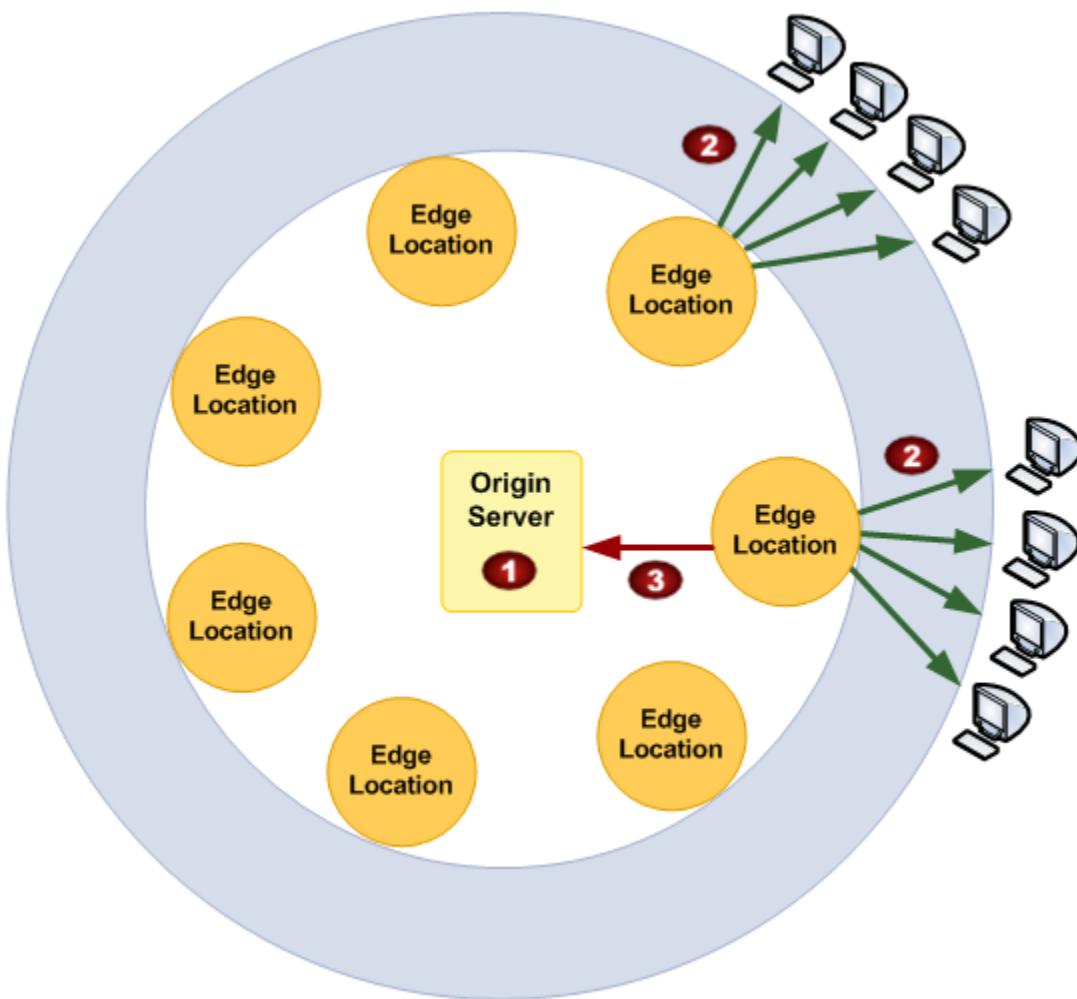
Security Standard (DSS). For more information about PCI DSS, including how to request a copy of the AWS PCI Compliance Package, see [PCI DSS Level 1](#).

As a security best practice we recommend that you don't cache credit card information in CloudFront edge caches. For example, you can configure your origin to include a `Cache-Control:no-cache="field-name"` header in responses that contain credit card information such as the last four digits of a credit card number and the card owner's contact information.

AWS Billing and Usage Reports for CloudFront

Amazon CloudFront is designed so you don't have to pay any up-front fees or commit to how much content you'll have. As with the other AWS services, you pay as you go and pay only for what you use.

The following diagram and table summarize the charges to use CloudFront.



Your monthly bill from AWS separates your usage and dollar amounts by AWS service and function. The following table lists the charges that are illustrated in the previous graphic.

| | Charge | Comments |
|---|-------------------------------------|--|
| ① | Storage in an Amazon S3 bucket | You pay normal Amazon S3 storage charges to store objects in your bucket; the charges appear in the Amazon S3 portion of your AWS statement. |
| ② | Serving objects from edge locations | You incur CloudFront charges when CloudFront responds to requests for your objects. These charges are lower than the corresponding Amazon S3 charges. The CloudFront charges appear in the CloudFront portion of your AWS statement. For more information, see Amazon CloudFront Pricing . |
| ③ | Submitting data to your origin | You incur CloudFront charges when users transfer data to your origin, which includes DELETE, OPTIONS, PATCH, POST, and PUT requests. The CloudFront charges appear in the CloudFront portion of your AWS statement. For more information, see Amazon CloudFront Pricing . |

Note

You also incur a surcharge for HTTPS requests. For more information, see [Amazon CloudFront Pricing](#).

AWS provides two usage reports for CloudFront:

- The billing report is a high-level view of all of the activity for the AWS services that you're using, including CloudFront. For more information, see [AWS Billing Report for CloudFront \(p. 10\)](#).
- The usage report is a summary of activity for a specific service, aggregated by hour, day, or month. For more information, see [AWS Usage Report for CloudFront \(p. 11\)](#).

In addition, you can view usage charts that provide a graphical representation of your CloudFront usage. For more information, see [CloudFront Usage Reports \(p. 25\)](#).

AWS Billing Report for CloudFront

You can view a summary of your AWS usage and charges, listed by service, on the Bills page in the AWS Management Console.

You can also download a more detailed version of the report in CSV format. The detailed billing report includes the following values that are applicable to CloudFront:

- **ProductCode** — AmazonCloudFront
- **UsageType** — One of the following values
 - A code that identifies the type of data transfer
 - Invalidations
 - SSL-Cert-Custom

For more information, see [Interpreting Your AWS Bill and the AWS Usage Report for CloudFront \(p. 12\)](#).

- **ItemDescription** — A description of the billing rate for the **UsageType**.
- **Usage Start Date/Usage End Date** — The day that the usage applies to, in Coordinated Universal Time (UTC).
- **Usage Quantity** — One of the following values:
 - The number of requests during the specified time period
 - The amount of data transferred in gigabytes
 - The number of objects invalidated
 - The sum of the prorated months that you had SSL certificates associated with enabled CloudFront distributions. For example, if you have one certificate associated with an enabled distribution for an entire month and another certificate associated with an enabled distribution for half of the month, this value will be 1.5.

To display summary billing information and download the detailed billing report

1. Sign in to the AWS Management Console at <https://console.aws.amazon.com/console/home>.
2. In the title bar, click your IAM user name, and click **Billing & Cost Management**.
3. In the navigation pane, click **Bills**.
4. To view summary information for CloudFront, under **Details**, click **CloudFront**.
5. To download a detailed billing report in CSV format, click **Download CSV**, and follow the on-screen prompts to save the report.

AWS Usage Report for CloudFront

AWS provides a CloudFront usage report that is more detailed than the billing report but less detailed than CloudFront access logs. The usage report provides aggregate usage data by hour, day, or month; and it lists operations by region and usage type, such as data transferred out of the Australia region.

The CloudFront usage report includes the following values:

- **Service** — AmazonCloudFront
- **Operation** — HTTP method. Values include `DELETE`, `GET`, `HEAD`, `OPTIONS`, `PATCH`, `POST`, and `PUT`.
- **UsageType** — One of the following values
 - A code that identifies the type of data transfer
 - Invalidations
 - SSL-Cert-Custom

For more information, see [Interpreting Your AWS Bill and the AWS Usage Report for CloudFront \(p. 12\)](#).

- **Resource** — Either the ID of the CloudFront distribution associated with the usage or the certificate ID of an SSL certificate that you have associated with a CloudFront distribution.
- **StartTime/EndTime** — The day that the usage applies to, in Coordinated Universal Time (UTC).
- **UsageValue** — (1) The number of requests during the specified time period or (2) the amount of data transferred in bytes.

If you're using Amazon S3 as the origin for CloudFront, consider running the usage report for Amazon S3, too. However, if you use Amazon S3 for purposes other than as an origin for your CloudFront distributions, it might not be clear what portion applies to your CloudFront usage.

Tip

For detailed information about every request that CloudFront receives for your objects, turn on CloudFront access logs for your distribution. For more information, see [Access Logs \(p. 256\)](#).

To download the usage report for CloudFront or Amazon S3

1. Sign in to the AWS Management Console at <https://console.aws.amazon.com/console/home>.
2. In the title bar, click your IAM user name, and click **Billing & Cost Management**.
3. In the navigation pane, click **Reports**.
4. Under **AWS Usage Report**, click **AWS Usage Report**.
5. In the **Service** list, click **CloudFront or Amazon Simple Storage Service**.
6. Select the applicable settings:
 - **Usage Types** — For a detailed explanation of CloudFront usage types, see the section called ["Interpreting Your AWS Bill and the AWS Usage Report for CloudFront" \(p. 12\)](#).

For Amazon S3, select **All Usage Types**.

- **Operation** — Select **All Operations**.
- **Time Period** — Select the time period that you want the report to cover.
- **Report Granularity** — Select whether you want the report to include subtotals by the hour, by the day, or by the month.

7. Click the download button for the desired format.
8. Follow the on-screen prompts to view or save the report.

Interpreting Your AWS Bill and the AWS Usage Report for CloudFront

Your AWS bill for CloudFront service includes codes and abbreviations that might not be immediately obvious. The first column in the following table lists items that appear in your bill and explains what each means.

In addition, you can get an AWS usage report for CloudFront that contains more detail than the AWS bill for CloudFront. The second column in the table lists items that appear in the usage report and shows the correlation between bill items and usage report items.

Most codes in both columns include a two-letter abbreviation that indicates the location of the activity. In the following table, *region* in a code is replaced by one of the following two-letter abbreviations in your AWS bill and in the usage report:

- **AP:** Hong Kong, Philippines, South Korea, Singapore, and Taiwan (Asia Pacific)
- **AU:** Australia
- **CA:** Canada
- **EU:** Europe
- **IN:** India
- **JP:** Japan
- **SA:** South America
- **US:** United States

For more information about pricing by region, see [Amazon CloudFront Pricing](#).

Note

This table doesn't include charges for transferring your objects from an Amazon S3 bucket to CloudFront edge locations. These charges, if any, appear in the **AWS Data Transfer** portion of your AWS bill.

| Items in Your CloudFront Bill | Values in the Usage Type Column in the CloudFront Usage Report |
|---|--|
| <p><i>region</i>-DataTransfer-Out-Bytes</p> <p>Sum of bytes that CloudFront served for web and RTMP distributions:</p> <ul style="list-style-type: none"> Web distributions: Total bytes served from CloudFront edge locations in <i>region</i> in response to user GET and HEAD requests RTMP distributions: Total bytes transferred from CloudFront edge locations in <i>region</i> to end users | <p>Web distributions:</p> <ul style="list-style-type: none"> <i>region</i>-Out-Bytes-HTTP-Static: Bytes served via HTTP for objects with TTL ≥ 3600 seconds <i>region</i>-Out-Bytes-HTTPS-Static: Bytes served via HTTPS for objects with TTL ≥ 3600 seconds <i>region</i>-Out-Bytes-HTTP-Dynamic: Bytes served via HTTP for objects with TTL < 3600 seconds <i>region</i>-Out-Bytes-HTTPS-Dynamic: Bytes served via HTTPS for objects with TTL < 3600 seconds <i>region</i>-Out-Bytes-HTTP-Proxy: Bytes returned from CloudFront to viewers via HTTP in response to DELETE, OPTIONS, PATCH, POST, and PUT requests. <i>region</i>-Out-Bytes-HTTPS-Proxy: Bytes returned from CloudFront to viewers via HTTPS in response to DELETE, OPTIONS, PATCH, POST, and PUT requests. <p>RTMP distributions:</p> <ul style="list-style-type: none"> <i>region</i>-FMS-Out-Bytes |
| <p><i>region</i>-DataTransfer-Out-OBytes</p> <p>Web distributions only: Total bytes transferred from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests.</p> | <p><i>region</i>-Out-OBytes-HTTP-Proxy</p> <p>Total bytes transferred via HTTP from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests.</p> <p><i>region</i>-Out-OBytes-HTTPS-Proxy</p> <p>Total bytes transferred via HTTPS from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests.</p> |
| <p><i>region</i>-Requests-Tier1</p> <p>Web distributions only: Number of HTTP GET and HEAD requests</p> | <p><i>region</i>-Requests-HTTP-Static</p> <p>Number of HTTP GET and HEAD requests served for objects with TTL ≥ 3600 seconds</p> <p><i>region</i>-Requests-HTTP-Dynamic</p> <p>Number of HTTP GET and HEAD requests served for objects with TTL < 3600 seconds</p> |
| <p><i>region</i>-Requests-Tier2-HTTPS</p> <p>Web distributions only: Number of HTTPS GET and HEAD requests</p> | <p><i>region</i>-Requests-HTTPS-Static</p> <p>Number of HTTPS GET and HEAD requests served for objects with TTL ≥ 3600 seconds</p> <p><i>region</i>-Requests-HTTPS-Dynamic</p> <p>Number of HTTPS GET and HEAD requests served for objects with TTL < 3600 seconds</p> |

| Items in Your CloudFront Bill | Values in the Usage Type Column in the CloudFront Usage Report |
|--|---|
| <i>region</i> -Requests-HTTP-Proxy Web distributions only: Number of HTTP DELETE, OPTIONS, PATCH, POST, and PUT requests that CloudFront forwards to your origin | <i>region</i> -Requests-HTTP-Proxy Same as the corresponding item in your CloudFront bill |
| <i>region</i> -Requests-HTTPS-Proxy Web distributions only: Number of HTTPS DELETE, OPTIONS, PATCH, POST, and PUT requests that CloudFront forwards to your origin | <i>region</i> -Requests-HTTPS-Proxy Same as the corresponding item in your CloudFront bill |
| Invalidations Web distributions only: The charge for invalidating objects (removing the objects from CloudFront edge locations); for more information, see Paying for Object Invalidation (p. 127) | Invalidations Same as the corresponding item in your CloudFront bill |
| SSL-Cert-Custom Web distributions only: The charge for using an SSL certificate with a CloudFront alternate domain name such as example.com instead of using the default CloudFront SSL certificate and the domain name that CloudFront assigned to your distribution | SSL-Cert-Custom Same as the corresponding item in your CloudFront bill |

CloudFront Reports

The CloudFront console includes a variety of reports:

- [CloudFront Cache Statistics Reports \(p. 15\)](#)
- [CloudFront Popular Objects Report \(p. 15\)](#)
- [CloudFront Top Referrers Report \(p. 16\)](#)
- [CloudFront Usage Reports \(p. 16\)](#)
- [CloudFront Viewers Reports \(p. 16\)](#)

Most of these reports are based on the data in CloudFront access logs, which contain detailed information about every user request that CloudFront receives. You don't need to enable access logs to view the reports. For more information, see [Access Logs \(p. 256\)](#). The CloudFront usage report is based on the AWS usage report for CloudFront, which also doesn't require any special configuration. For more information, see [AWS Usage Report for CloudFront \(p. 11\)](#).

CloudFront Cache Statistics Reports

The CloudFront cache statistics report includes the following information:

- **Total Requests** – Shows the total number of requests for all HTTP status codes (for example, 200 or 404) and all methods (for example, GET, HEAD, or POST)
- **Percentage of Viewer Requests by Result Type** – Shows hits, misses, and errors as a percentage of total viewer requests for the selected CloudFront distribution
- **Bytes Transferred to Viewers** – Shows total bytes and bytes from misses
- **HTTP Status Codes** – Shows viewer requests by HTTP status code
- **Percentage of GET Requests that Didn't Finish Downloading** – Shows viewer GET requests that didn't finish downloading the requested object as a percentage of total requests

For more information, see [CloudFront Cache Statistics Reports \(p. 16\)](#).

CloudFront Popular Objects Report

The CloudFront popular objects report lists the 50 most popular objects and statistics about those objects, including the number of requests for the object, the number of hits and misses, the hit ratio, the number of bytes served for misses, the total bytes served, the number of incomplete downloads, and the number of requests by HTTP status code (2xx, 3xx, 4xx, and 5xx).

For more information, see [CloudFront Popular Objects Report \(p. 20\)](#).

CloudFront Top Referrers Report

The CloudFront top referrers report includes the top 25 referrers, the number of requests from a referrer, and the number of requests from a referrer as a percentage of the total number of requests during the specified period.

For more information, see [CloudFront Top Referrers Report \(p. 23\)](#).

CloudFront Usage Reports

The CloudFront usage reports include the following information:

- **Number of Requests** – Shows the number of HTTP and HTTPS requests that CloudFront responds to from edge locations in the selected region during each time interval for the specified CloudFront distribution
- **Data Transferred by Protocol** – Shows the total amount of data transferred over HTTP and HTTPS from CloudFront edge locations in the selected region during each time interval for the specified CloudFront distribution
- **Data Transferred by Destination** – Shows the total amount of data transferred over HTTP and HTTPS from CloudFront edge locations in the selected region during each time interval for the specified CloudFront distribution

For more information, see [CloudFront Usage Reports \(p. 25\)](#).

CloudFront Viewers Reports

The CloudFront viewers reports include the following information:

- **Devices** – Shows the types of devices (for example, Desktop or Mobile) that your users use to access your content
- **Browsers** – Shows the name (or the name and version) of the browsers that your users use most frequently to access your content, for example, Chrome or Firefox
- **Operating Systems** – Shows the name (or the name and version) of the operating system that viewers run on most frequently when accessing your content, for example, Linux, Mac OS X, or Windows
- **Locations** – Shows the locations, by country or by U.S. state/territory, of the viewers that access your content most frequently

For more information, see [CloudFront Viewers Reports \(p. 29\)](#).

CloudFront Cache Statistics Reports

You can use the Amazon CloudFront console to display a graphical representation of statistics related to CloudFront edge locations. Data for these statistics are drawn from the same source as CloudFront access logs. You can display charts for a specified date range in the last 60 days, with data points every hour or every day. You can usually view data about requests that CloudFront received as recently as an hour ago, but data can occasionally be delayed by as much as 24 hours.

Note

You don't need to enable access logging to view cache statistics.

To display CloudFront cache statistics

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the navigation pane, click **Cache Statistics**.
3. In the **CloudFront Cache Statistics Reports** pane, for **Start Date** and **End Date**, select the date range for which you want to display cache statistics charts. Available ranges depend on the value that you select for **Granularity**:
 - **Daily** – To display charts with one data point per day, select any date range in the previous 60 days.
 - **Hourly** – To display charts with one data point every hour, select any date range of up to 14 days within the previous 60 days.

Dates and times are in Coordinated Universal Time (UTC).

4. For **Granularity**, specify whether to display one data point per day or one data point per hour in the charts. If you specify a date range greater than 14 days, the option to specify one data point per hour is not available.
5. For **Viewer Location**, choose the continent from which viewer requests originated, or choose **All Locations**. Cache statistics charts include data for requests that CloudFront received from the specified location.
6. In the **Distribution** list, select the distributions for which you want to display data in the usage charts:
 - **An individual web distribution** – The charts display data for the selected CloudFront web distribution. The **Distribution** list displays the distribution ID and alternate domain names (CNAMEs) for the distribution, if any. If a distribution has no alternate domain names, the list includes origin domain names for the distribution.
 - **All Web Distributions** – The charts display summed data for all web distributions that are associated with the current AWS account, excluding web distributions that you have deleted.
7. Click **Update**.
8. To view data for a daily or hourly data point within a chart, move your mouse pointer over the data point.
9. For charts that show data transferred, note that you can change the vertical scale to gigabytes, megabytes, or kilobytes for each chart.

Topics

- [Downloading Data in CSV Format \(p. 17\)](#)
- [How Cache Statistics Charts Are Related to Data in the CloudFront Access Logs \(p. 19\)](#)

Downloading Data in CSV Format

You can download the Cache Statistics report in CSV format. This section explains how to download the report and describes the values in the report.

To download the Cache Statistics report in CSV format

1. While viewing the Cache Statistics report, click **CSV**.
2. In the **Opening file name** dialog box, choose whether to open or save the file.

Information About the Report

The first few rows of the report include the following information:

Version

The version of the format for this CSV file.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Granularity

Whether each row in the report represents one hour or one day.

ViewerLocation

The continent that viewer requests originated from, or `ALL`, if you chose to download the report for all locations.

Data in the Cache Statistics Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

ViewerLocation

The continent that viewer requests originated from, or `ALL`, if you chose to download the report for all locations.

TimeBucket

The hour or the day that data applies to, in Coordinated Universal Time (UTC).

RequestCount

The total number of requests for all HTTP status codes (for example, 200 or 404) and all methods (for example, GET, HEAD, or POST).

HitCount

The number of viewer requests for which the object is served from a CloudFront edge cache.

MissCount

The number of viewer requests for which the object isn't currently in an edge cache, so CloudFront must get the object from your origin.

ErrorCount

The number of viewer requests that resulted in an error, so CloudFront didn't serve the object.

IncompleteDownloadCount

The number of viewer requests for which the viewer started but didn't finish downloading the object.

HTTP2xx

The number of viewer requests for which the HTTP status code was a 2xx value (succeeded).

HTTP3xx

The number of viewer requests for which the HTTP status code was a 3xx value (additional action is required).

HTTP4xx

The number of viewer requests for which the HTTP status code was a 4xx value (client error).

HTTP5xx

The number of viewer requests for which the HTTP status code was a 5xx value (server error).

TotalBytes

The total number of bytes served to viewers by CloudFront in response to all requests for all HTTP methods.

BytesFromMisses

The number of bytes served to viewers for objects that were not in the applicable edge cache at the time of the request. This value is a good approximation of bytes transferred from your origin to CloudFront edge caches. However, it excludes requests for objects that are already in the edge cache but that have expired.

How Cache Statistics Charts Are Related to Data in the CloudFront Access Logs

The following table shows how cache statistics charts in the CloudFront console correspond with values in CloudFront access logs. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Total Requests

This chart shows the total number of requests for all HTTP status codes (for example, 200 or 404) and all methods (for example, GET, HEAD, or POST). Total requests shown in this chart equal the total number of requests in the access log files for the same time period.

Percentage of Viewer Requests by Result Type

This chart shows hits, misses, and errors as a percentage of total viewer requests for the selected CloudFront distribution:

- **Hit** – A viewer request for which the object is served from a CloudFront edge cache. In access logs, these are requests for which the value of `x-edge-response-result-type` is `Hit`.
- **Miss** – A viewer request for which the object isn't currently in an edge cache, so CloudFront must get the object from your origin. In access logs, these are requests for which the value of `x-edge-response-result-type` is `Miss`.
- **Error** – A viewer request that resulted in an error, so CloudFront didn't serve the object. In access logs, these are requests for which the value of `x-edge-response-result-type` is `Error`, `LimitExceeded`, or `CapacityExceeded`.

The chart does not include refresh hits—requests for objects that are in the edge cache but that have expired. In access logs, refresh hits are requests for which the value of `x-edge-response-result-type` is `RefreshHit`.

Bytes Transferred to Viewers

This chart shows two values:

- **Total Bytes** – The total number of bytes served to viewers by CloudFront in response to all requests for all HTTP methods. In CloudFront access logs, **Total Bytes** is the sum of the values in the `sc-bytes` column for all of the requests during the same time period.
- **Bytes from Misses** – The number of bytes served to viewers for objects that were not in the applicable edge cache at the time of the request. In CloudFront access logs, **Bytes from Misses** is the sum of the values in the `sc-bytes` column for requests for which the value of `x-edge-response-result-type` is `Miss`. This value is a good approximation of bytes transferred from your origin to CloudFront edge caches. However, it excludes requests for objects that are already in the edge cache but that have expired.

HTTP Status Codes

This chart shows viewer requests by HTTP status code. In CloudFront access logs, status codes appear in the `sc-status` column:

- **2xx** – The request succeeded.
- **3xx** – Additional action is required. For example, 301 (Moved Permanently) means that the requested object has moved to a different location.
- **4xx** – The client apparently made an error. For example, 404 (Not Found) means that the client requested an object that could not be found.
- **5xx** – The origin server didn't fill the request. For example, 503 (Service Unavailable) means that the origin server is currently unavailable.

Percentage of GET Requests that Didn't Finish Downloading

This chart shows viewer GET requests that didn't finish downloading the requested object as a percentage of total requests. Typically, downloading an object doesn't complete because the viewer canceled the download, for example, by clicking a different link or by closing the browser. In CloudFront access logs, these requests have a value of 200 in the `sc-status` column and a value of `Error` in the `x-edge-result-type` column.

CloudFront Popular Objects Report

The Amazon CloudFront console can display a list of the 50 most popular objects for a distribution during a specified date range in the previous 60 days.

Data for the Popular Objects report is drawn from the same source as CloudFront access logs. To get an accurate count of the top 50 objects, CloudFront counts the requests for all of your objects in 10-minute intervals beginning at midnight and keeps a running total of the top 150 objects for the next 24 hours. (CloudFront also retains daily totals for the top 150 objects for 60 days.) Near the bottom of the list, objects constantly rise onto or drop off of the list, so the totals for those objects are approximations. The fifty objects at the top of the list of 150 objects may rise and fall within the list, but they rarely drop off of the list altogether, so the totals for those objects typically are more reliable.

When an object drops off of the list of the top 150 objects and then rises onto the list again over the course of a day, CloudFront adds an estimated number of requests for the period that the object was missing from the list. The estimate is based on the number of requests received by whichever object was at the bottom of the list during that time period. If the object rises into the top 50 objects later in the day, the estimates of the number of requests that CloudFront received while the object was out of the top 150 objects usually causes the number of requests in the Popular Objects report to exceed the number of requests that appear in the access logs for that object.

Note

You don't need to enable access logging to view a list of popular objects.

To display popular objects for a distribution

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the navigation pane, click **Popular Objects**.
3. In the **CloudFront Popular Objects Report** pane, for **Start Date** and **End Date**, select the date range for which you want to display a list of popular objects. You can choose any date range in the previous 60 days.

Dates and times are in Coordinated Universal Time (UTC).

4. In the **Distribution** list, select the distribution for which you want to display a list of popular objects.
5. Click **Update**.

Topics

- [Downloading Data in CSV Format \(p. 21\)](#)
- [How Data in the Popular Objects Report Is Related to Data in the CloudFront Access Logs \(p. 22\)](#)

Downloading Data in CSV Format

You can download the Popular Objects report in CSV format. This section explains how to download the report and describes the values in the report.

To download the Popular Objects report in CSV format

1. While viewing the Popular Objects report, click **CSV**.
2. In the **Opening file name** dialog box, choose whether to open or save the file.

Information About the Report

The first few rows of the report include the following information:

Version

The version of the format for this CSV file.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Data in the Popular Objects Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

Object

The last 500 characters of the URL for the object.

RequestCount

The total number of requests for this object.

HitCount

The number of viewer requests for which the object is served from a CloudFront edge cache.

MissCount

The number of viewer requests for which the object isn't currently in an edge cache, so CloudFront must get the object from your origin.

HitCountPct

The value of **HitCount** as a percentage of the value of **RequestCount**.

BytesFromMisses

The number of bytes served to viewers for this object when the object was not in the applicable edge cache at the time of the request.

TotalBytes

The total number of bytes served to viewers by CloudFront for this object in response to all requests for all HTTP methods.

IncompleteDownloadCount

The number of viewer requests for this object for which the viewer started but didn't finish downloading the object.

HTTP2xx

The number of viewer requests for which the HTTP status code was a 2xx value (succeeded).

HTTP3xx

The number of viewer requests for which the HTTP status code was a 3xx value (additional action is required).

HTTP4xx

The number of viewer requests for which the HTTP status code was a 4xx value (client error).

HTTP5xx

The number of viewer requests for which the HTTP status code was a 5xx value (server error).

How Data in the Popular Objects Report Is Related to Data in the CloudFront Access Logs

The following list shows how values in the Popular Objects report in the CloudFront console correspond with values in CloudFront access logs. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

URL

The last 500 characters of the URL that viewers use to access the object.

Requests

The total number of requests for the object. This value generally corresponds closely with the number of GET requests for the object in CloudFront access logs.

Hits

The number of viewer requests for which the object was served from a CloudFront edge cache. In access logs, these are requests for which the value of `x-edge-response-result-type` is `Hit`.

Misses

The number of viewer requests for which the object wasn't in an edge cache, so CloudFront retrieved the object from your origin. In access logs, these are requests for which the value of `x-edge-response-result-type` is `Miss`.

Hit Ratio

The value of the **Hits** column as a percentage of the value of the **Requests** column.

Bytes from Misses

The number of bytes served to viewers for objects that were not in the applicable edge cache at the time of the request. In CloudFront access logs, **Bytes from Misses** is the sum of the values in the `sc-bytes` column for requests for which the value of `x-edge-result-type` is `Miss`.

Total Bytes

The total number of bytes that CloudFront served to viewers in response to all requests for the object for all HTTP methods. In CloudFront access logs, **Total Bytes** is the sum of the values in the `sc-bytes` column for all of the requests during the same time period.

Incomplete Downloads

The number of viewer requests that did not finish downloading the requested object. Typically, the reason that a download doesn't complete is that the viewer canceled it, for example, by clicking a

different link or by closing the browser. In CloudFront access logs, these requests have a value of 200 in the `sc-status` column and a value of `Error` in the `x-edge-result-type` column.

2xx

The number of requests for which the HTTP status code is 2xx, `Successful`. In CloudFront access logs, status codes appear in the `sc-status` column.

3xx

The number of requests for which the HTTP status code is 3xx, `Redirection`. 3xx status codes indicate that additional action is required. For example, 301 (`Moved Permanently`) means that the requested object has moved to a different location.

4xx

The number of requests for which the HTTP status code is 4xx, `Client Error`. 4xx status codes indicate that the client apparently made an error. For example, 404 (`Not Found`) means that the client requested an object that could not be found.

5xx

The number of requests for which the HTTP status code is 5xx, `Server Error`. 5xx status codes indicate that the origin server didn't fill the request. For example, 503 (`Service Unavailable`) means that the origin server is currently unavailable.

CloudFront Top Referrers Report

The CloudFront console can display a list of the 25 domains of the websites that originated the most HTTP and HTTPS requests for objects that CloudFront is distributing for a specified distribution. These top referrers can be search engines, other websites that link directly to your objects, or your own website. For example, if `http://example.com/index.html` links to 10 graphics, `example.com` is the referrer for all 10 graphics. You can display the Top Referrers report for any date range in the previous 60 days.

Note

If a user enters a URL directly into the address line of a browser, there is no referrer for the requested object.

Data for the Top Referrers report is drawn from the same source as CloudFront access logs. To get an accurate count of the top 25 referrers, CloudFront counts the requests for all of your objects in 10-minute intervals and keeps a running total of the top 75 referrers. Near the bottom of the list, referrers constantly rise onto or drop off of the list, so the totals for those referrers are approximations. The 25 referrers at the top of the list of 75 referrers may rise and fall within the list, but they rarely drop off of the list altogether, so the totals for those referrers typically are more reliable.

Note

You don't need to enable access logging to view a list of top referrers.

To display top referrers for a distribution

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the navigation pane, click **Top Referrers**.
3. In the **CloudFront Top Referrers Report** pane, for **Start Date** and **End Date**, select the date range for which you want to display a list of top referrers.

Dates and times are in Coordinated Universal Time (UTC).

4. In the **Distribution** list, select the distribution for which you want to display a list of top referrers.
5. Click **Update**.

Topics

- [Downloading Data in CSV Format \(p. 24\)](#)

- [How Data in the Top Referrers Report Is Related to Data in the CloudFront Access Logs \(p. 25\)](#)

Downloading Data in CSV Format

You can download the Top Referrers report in CSV format. This section explains how to download the report and describes the values in the report.

To download the Top Referrers report in CSV format

1. While viewing the Top Referrers report, click **CSV**.
2. In the **Opening file name** dialog box, choose whether to open or save the file.

Information About the Report

The first few rows of the report include the following information:

Version

The version of the format for this CSV file.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Data in the Top Referrers Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

Referrer

The domain name of the referrer.

The total number of requests from the domain name in the `Referrer` column.

RequestsPct

The number of requests submitted by the referrer as a percentage of the total number of requests during the specified period.

How Data in the Top Referrers Report Is Related to Data in the CloudFront Access Logs

The following list shows how values in the Top Referrers report in the CloudFront console correspond with values in CloudFront access logs. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Referrer

The domain name of the referrer. In access logs, referrers are listed in the `cs(Referer)` column.

Request Count

The total number of requests from the domain name in the **Referrer** column. This value generally corresponds closely with the number of `GET` requests from the referrer in CloudFront access logs.

Request %

The number of requests submitted by the referrer as a percentage of the total number of requests during the specified period. If you have more than 25 referrers, then you can't calculate **Request %** based on the data in this table because the **Request Count** column doesn't include all of the requests during the specified period.

CloudFront Usage Reports

The Amazon CloudFront console can display a graphical representation of your CloudFront usage that is based on a subset of the usage report data. You can display charts for a specified date range in the last 60 days, with data points every hour or every day. You can usually view data about requests that CloudFront received as recently as four hours ago, but data can occasionally be delayed by as much as 24 hours.

For more information, see [How the Usage Charts Are Related to Data in the CloudFront Usage Report \(p. 28\)](#).

To display CloudFront usage charts

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In **navigation** pane, click **Usage Reports**.
3. In the **CloudFront Usage Reports** pane, for **Start Date** and **End Date**, select the date range for which you want to display usage charts. Available ranges depend on the value that you select for **Granularity**:
 - **Daily** — To display charts with one data point per day, select any date range in the previous 60 days.
 - **Hourly** — To display charts with one data point every hour, select any date range of up to 14 days within the previous 60 days.

Dates and times are in Coordinated Universal Time (UTC).

4. For **Granularity**, specify whether to display one data point per day or one data point per hour in the charts. If you specify a date range greater than 14 days, the option to specify one data point per hour is not available.
5. For **Billing Region**, choose the CloudFront billing region that has the data you want to view, or choose **All Regions**. Usage charts include data for requests that CloudFront processes in edge locations in the specified region. The region where CloudFront processes requests might or might not correspond with the location of your users.

Select only regions that are included in the price class for your distribution; otherwise, the usage charts probably won't contain any data. For example, if you chose Price Class 200 for your distribution, the South America and Australia billing regions are not included, so CloudFront generally won't process your requests from those regions. For more information about price classes, see [Choosing the Price Class for a CloudFront Distribution \(p. 54\)](#).

6. In the **Distribution** list, select the distributions for which you want to display data in the usage charts:
 - **An individual web distribution** — The charts display data for the selected CloudFront distribution. The **Distribution** list displays the distribution ID and alternate domain names (CNAMEs) for the distribution, if any. If a distribution has no alternate domain names, the list includes origin domain names for the distribution.
 - **All Web Distributions (excludes deleted)** — The charts display summed data for all web distributions that are associated with the current AWS account, excluding web distributions that you have deleted.
 - **All Deleted Distributions** — The charts display summed data for all web distributions that are associated with the current AWS account and that were deleted in the last 60 days.
7. Click **Update Graphs**.
8. To view data for a daily or hourly data point within a chart, move your mouse pointer over the data point.
9. For charts that show data transferred, note that you can change the vertical scale to gigabytes, megabytes, or kilobytes for each chart.

Topics

- [Downloading Data in CSV Format \(p. 26\)](#)
- [How the Usage Charts Are Related to Data in the CloudFront Usage Report \(p. 28\)](#)

Downloading Data in CSV Format

You can download the Usage report in CSV format. This section explains how to download the report and describes the values in the report.

To download the Usage report in CSV format

1. While viewing the Usage report, click **CSV**.
2. In the **Opening file name** dialog box, choose whether to open or save the file.

Information About the Report

The first few rows of the report include the following information:

Version

The version of the format for this CSV file.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for, `ALL` if you ran the report for all distributions, or `ALL_DELETED` if you ran the report for all deleted distributions.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Granularity

Whether each row in the report represents one hour or one day.

BillingRegion

The continent that viewer requests originated from, or `ALL`, if you chose to download the report for all billing regions.

Data in the Usage Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, `ALL` if you ran the report for all distributions, or `ALL_DELETED` if you ran the report for all deleted distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

BillingRegion

The CloudFront billing region that you ran the report for, or `ALL`.

TimeBucket

The hour or the day that data applies to, in Coordinated Universal Time (UTC).

HTTP

The number of HTTP requests that CloudFront responded to from edge locations in the selected region during each time interval for the specified CloudFront distribution. Values include:

- The number of `GET` and `HEAD` requests, which cause CloudFront to transfer data to your users
- The number of `DELETE`, `OPTIONS`, `PATCH`, `POST`, and `PUT` requests, which cause CloudFront to transfer data to your origin

HTTPS

The number of HTTPS requests that CloudFront responded to from edge locations in the selected region during each time interval for the specified CloudFront distribution. Values include:

- The number of `GET` and `HEAD` requests, which cause CloudFront to transfer data to your users
- The number of `DELETE`, `OPTIONS`, `PATCH`, `POST`, and `PUT` requests, which cause CloudFront to transfer data to your origin

HTTPBytes

The total amount of data transferred over HTTP from CloudFront edge locations in the selected billing region during the time period for the specified CloudFront distribution. Values include:

- Data transferred from CloudFront to your users in response to `GET` and `HEAD` requests
- Data transferred from CloudFront to your origin for `DELETE`, `OPTIONS`, `PATCH`, `POST`, and `PUT` requests
- Data transferred from CloudFront to your users in response to `DELETE`, `OPTIONS`, `PATCH`, `POST`, and `PUT` requests

HTTPSSBytes

The total amount of data transferred over HTTPS from CloudFront edge locations in the selected billing region during the time period for the specified CloudFront distribution. Values include:

- Data transferred from CloudFront to your users in response to `GET` and `HEAD` requests
- Data transferred from CloudFront to your origin for `DELETE`, `OPTIONS`, `PATCH`, `POST`, and `PUT` requests

- Data transferred from CloudFront to your users in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

BytesIn

The total amount of data transferred from CloudFront to your origin for DELETE, OPTIONS, PATCH, POST, and PUT requests in the selected region during each time interval for the specified CloudFront distribution.

BytesOut

The total amount of data transferred over HTTP and HTTPS from CloudFront to your users in the selected region during each time interval for the specified CloudFront distribution. Values include:

- Data transferred from CloudFront to your users in response to GET and HEAD requests
- Data transferred from CloudFront to your users in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

How the Usage Charts Are Related to Data in the CloudFront Usage Report

The following list shows how the usage charts in the CloudFront console correspond with values in the **Usage Type** column in the CloudFront usage report.

Topics

- [Number of Requests \(p. 28\)](#)
- [Data Transferred by Protocol \(p. 28\)](#)
- [Data Transferred by Destination \(p. 29\)](#)

Number of Requests

This chart shows the number of HTTP and HTTPS requests that CloudFront responds to from edge locations in the selected region during each time interval for the specified CloudFront distribution.

Number of HTTP Requests

- ***region*-Requests-HTTP-Static:** Number of HTTP GET and HEAD requests served for objects with TTL \geq 3600 seconds
- ***region*-Requests-HTTP-Dynamic:** Number of HTTP GET and HEAD requests served for objects with TTL $<$ 3600 seconds
- ***region*-Requests-HTTP-Proxy:** Number of HTTP DELETE, OPTIONS, PATCH, POST, and PUT requests that CloudFront forwards to your origin

Number of HTTPS Requests

- ***region*-Requests-HTTPS-Static:** Number of HTTPS GET and HEAD requests served for objects with TTL \geq 3600 seconds
- ***region*-Requests-HTTPS-Dynamic:** Number of HTTPS GET and HEAD requests served for objects with TTL $<$ 3600 seconds
- ***region*-Requests-HTTPS-Proxy:** Number of HTTPS DELETE, OPTIONS, PATCH, POST, and PUT requests that CloudFront forwards to your origin

Data Transferred by Protocol

This chart shows the total amount of data transferred over HTTP and HTTPS from CloudFront edge locations in the selected region during each time interval for the specified CloudFront distribution.

Data Transferred over HTTP

- *region*-Out-Bytes-HTTP-Static: Bytes served via HTTP for objects with TTL \geq 3600 seconds
- *region*-Out-Bytes-HTTP-Dynamic: Bytes served via HTTP for objects with TTL $<$ 3600 seconds
- *region*-Out-Bytes-HTTP-Proxy: Bytes returned from CloudFront to viewers via HTTP in response to DELETE, OPTIONS, PATCH, POST, and PUT requests
- *region*-Out-OBytes-HTTP-Proxy: Total bytes transferred via HTTP from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

Data Transferred over HTTPS

- *region*-Out-Bytes-HTTPS-Static: Bytes served via HTTPS for objects with TTL \geq 3600 seconds
- *region*-Out-Bytes-HTTPS-Dynamic: Bytes served via HTTPS for objects with TTL $<$ 3600 seconds
- *region*-Out-Bytes-HTTPS-Proxy: Bytes returned from CloudFront to viewers via HTTPS in response to DELETE, OPTIONS, PATCH, POST, and PUT requests
- *region*-Out-OBytes-HTTPS-Proxy: Total bytes transferred via HTTPS from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

Data Transferred by Destination

This chart shows the total amount of data transferred over HTTP and HTTPS from CloudFront edge locations in the selected region during each time interval for the specified CloudFront distribution.

Data Transferred from CloudFront to Your Users

- *region*-Out-Bytes-HTTP-Static: Bytes served via HTTP for objects with TTL \geq 3600 seconds
- *region*-Out-Bytes-HTTPS-Static: Bytes served via HTTPS for objects with TTL \geq 3600 seconds
- *region*-Out-Bytes-HTTP-Dynamic: Bytes served via HTTP for objects with TTL $<$ 3600 seconds
- *region*-Out-Bytes-HTTPS-Dynamic: Bytes served via HTTPS for objects with TTL $<$ 3600 seconds
- *region*-Out-Bytes-HTTP-Proxy: Bytes returned from CloudFront to viewers via HTTP in response to DELETE, OPTIONS, PATCH, POST, and PUT requests
- *region*-Out-Bytes-HTTPS-Proxy: Bytes returned from CloudFront to viewers via HTTPS in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

Data Transferred from CloudFront to Your Origin

- *region*-Out-OBytes-HTTP-Proxy: Total bytes transferred via HTTP from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests
- *region*-Out-OBytes-HTTPS-Proxy: Total bytes transferred via HTTPS from CloudFront edge locations to your origin in response to DELETE, OPTIONS, PATCH, POST, and PUT requests

CloudFront Viewers Reports

The CloudFront console can display four reports about the physical devices (desktop computers, mobile devices) and about the viewers (typically web browsers) that are accessing your content:

- **Devices** – The type of the devices that your users use most frequently to access your content, for example, Desktop or Mobile.
- **Browsers** – The name (or the name and version) of the browsers that your users use most frequently to access your content, for example, Chrome or Firefox. The report lists the top 10 browsers.
- **Operating Systems** – The name (or the name and version) of the operating system that viewers run on most frequently when accessing your content, for example, Linux, Mac OS X, or Windows. The report lists the top 10 operating systems.

- **Locations** – The locations, by country or by U.S. state/territory, of the viewers that access your content most frequently. The report lists the top 50 countries or U.S. states/territories.

You can display all four Viewers reports for any date range in the previous 60 days. For the Locations report, you can also display the report with data points every hour for any date range of up to 14 days in the previous 60 days.

Note

You don't need to enable access logging to view Viewers charts and reports.

Topics

- [Displaying Viewers Charts and Reports \(p. 30\)](#)
- [Downloading Data in CSV Format \(p. 31\)](#)
- [How Data in the Locations Report Is Related to Data in the CloudFront Access Logs \(p. 35\)](#)

Displaying Viewers Charts and Reports

To display CloudFront Viewers charts and reports, perform the following procedure.

To display CloudFront Viewers charts and reports

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the navigation pane, click **Viewers**.
3. In the **CloudFront Viewers** pane, for **Start Date** and **End Date**, select the date range for which you want to display viewer charts and reports.

For the Locations chart, available ranges depend on the value that you select for **Granularity**:

- **Daily** – To display charts with one data point per day, select any date range in the previous 60 days.
- **Hourly** – To display charts with one data point every hour, select any date range of up to 14 days within the previous 60 days.

Dates and times are in Coordinated Universal Time (UTC).

4. (Browsers and Operating Systems charts only) For **Grouping**, specify whether you want to group browsers and operating systems by name (Chrome, Firefox) or by name and version (Chrome 40.0, Firefox 35.0).
5. (Locations chart only) For **Granularity**, specify whether to display one data point per day or one data point per hour in the charts. If you specify a date range greater than 14 days, the option to specify one data point per hour is not available.
6. (Locations chart only) For **Details**, specify whether to display the top locations by countries or by U.S. states.
7. In the **Distribution** list, select the distribution for which you want to display data in the usage charts:
 - **An individual web distribution** – The charts display data for the selected CloudFront web distribution. The **Distribution** list displays the distribution ID and an alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.
 - **All Web Distributions (excludes deleted)** – The charts display summed data for all web distributions that are associated with the current AWS account, excluding web distributions that you have deleted.

8. Click **Update**.
9. To view data for a daily or hourly data point within a chart, move your mouse pointer over the data point.

Downloading Data in CSV Format

You can download each of the Viewer reports in CSV format. This section explains how to download the reports and describes the values in the report.

To download the Viewer reports in CSV format

1. While viewing the applicable Viewer report, click **CSV**.
2. Choose the data that you want to download, for example, **Devices** or **Devices Trends**.
3. In the **Opening file name** dialog box, choose whether to open or save the file.

Topics

- [Information About the Reports \(p. 31\)](#)
- [Devices Report \(p. 32\)](#)
- [Device Trends Report \(p. 32\)](#)
- [Browsers Report \(p. 32\)](#)
- [Browser Trends Report \(p. 33\)](#)
- [Operating Systems Report \(p. 33\)](#)
- [Operating System Trends Report \(p. 34\)](#)
- [Locations Report \(p. 34\)](#)
- [Location Trends Report \(p. 35\)](#)

Information About the Reports

The first few rows of each report includes the following information:

Version

The version of the format for this CSV file.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for, or **ALL** if you ran the report for all web distributions.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Grouping (Browsers and Operating Systems Reports Only)

Whether the data is grouped by the name or by the name and version of the browser or operating system.

Granularity

Whether each row in the report represents one hour or one day.

Details (Locations Report Only)

Whether requests are listed by country or by U.S. state.

Devices Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

Requests

The number of requests that CloudFront received from each type of device.

RequestsPct

The number of requests that CloudFront received from each type of device as a percentage of the total number of requests that CloudFront received from all devices.

Device Trends Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

TimeBucket

The hour or the day that the data applies to, in Coordinated Universal Time (UTC).

Desktop

The number of requests that CloudFront received from desktop computers during the period.

Mobile

The number of requests that CloudFront received from mobile devices during the period. Mobile devices can include both tablets and mobile phones. If CloudFront can't determine whether a request originated from a mobile device or a tablet, it's counted in the `Mobile` column.

Smart-TV

The number of requests that CloudFront received from smart TVs during the period.

Tablet

The number of requests that CloudFront received from tablets during the period. If CloudFront can't determine whether a request originated from a mobile device or a tablet, it's counted in the `Mobile` column.

Unknown

Requests for which the value of the `User-Agent` HTTP header was not associated with one of the standard device types, for example, `Desktop` or `Mobile`.

Empty

The number of requests that CloudFront received that didn't include a value in the HTTP `User-Agent` header during the period.

Browsers Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

Group

The browser or the browser and version that CloudFront received requests from, depending on the value of Grouping. In addition to browser names, possible values include the following:

- **Bot/Crawler** – primarily requests from search engines that are indexing your content.
- **Empty** – requests for which the value of the User-Agent HTTP header was empty.
- **Other** – browsers that CloudFront identified but that aren't among the most popular. If Bot/Crawler, Empty, and/or Unknown don't appear among the first nine values, then they're also included in Other.
- **Unknown** – requests for which the value of the User-Agent HTTP header was not associated with a standard browser. Most requests in this category come from custom applications or scripts.

Requests

The number of requests that CloudFront received from each type of browser.

RequestsPct

The number of requests that CloudFront received from each type of browser as a percentage of the total number of requests that CloudFront received during the time period.

Browser Trends Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or ALL if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

TimeBucket

The hour or the day that the data applies to, in Coordinated Universal Time (UTC).

(Browsers)

The remaining columns in the report list the browsers or the browsers and their versions, depending on the value of Grouping. In addition to browser names, possible values include the following:

- **Bot/Crawler** – primarily requests from search engines that are indexing your content.
- **Empty** – requests for which the value of the User-Agent HTTP header was empty.
- **Other** – browsers that CloudFront identified but that aren't among the most popular. If Bot/Crawler, Empty, and/or Unknown don't appear among the first nine values, then they're also included in Other.
- **Unknown** – requests for which the value of the User-Agent HTTP header was not associated with a standard browser. Most requests in this category come from custom applications or scripts.

Operating Systems Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or ALL if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

Group

The operating system or the operating system and version that CloudFront received requests from, depending on the value of `Grouping`. In addition to operating system names, possible values include the following:

- **Bot/Crawler** – primarily requests from search engines that are indexing your content.
- **Empty** – requests for which the value of the `User-Agent` HTTP header was empty.
- **Other** – operating systems that CloudFront identified but that aren't among the most popular. If `Bot/Crawler`, `Empty`, and/or `Unknown` don't appear among the first nine values, then they're also included in `Other`.
- **Unknown** – requests for which the value of the `User-Agent` HTTP header was not associated with a standard browser. Most requests in this category come from custom applications or scripts.

Requests

The number of requests that CloudFront received from each type of operating system.

RequestsPct

The number of requests that CloudFront received from each type of operating system as a percentage of the total number of requests that CloudFront received during the time period.

Operating System Trends Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

TimeBucket

The hour or the day that the data applies to, in Coordinated Universal Time (UTC).

(Operating systems)

The remaining columns in the report list the operating systems or the operating systems and their versions, depending on the value of `Grouping`. In addition to operating system names, possible values include the following:

- **Bot/Crawler** – primarily requests from search engines that are indexing your content.
- **Empty** – requests for which the value of the `User-Agent` HTTP header was empty.
- **Other** – operating systems that CloudFront identified but that aren't among the most popular. If `Bot/Crawler`, `Empty`, and/or `Unknown` don't appear among the first nine values, then they're also included in `Other`.
- **Unknown** – requests for which the operating system isn't specified in the `User-Agent` HTTP header.

Locations Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

LocationCode

The abbreviation for the location that CloudFront received requests from. For more information about possible values, see the description of Location in [How Data in the Locations Report Is Related to Data in the CloudFront Access Logs \(p. 35\)](#).

LocationName

The name of the location that CloudFront received requests from.

Requests

The number of requests that CloudFront received from each location.

RequestsPct

The number of requests that CloudFront received from each location as a percentage of the total number of requests that CloudFront received from all locations during the time period.

TotalBytes

The number of bytes that CloudFront served to viewers in this country or state, for the specified distribution and period.

Location Trends Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for, or `ALL` if you ran the report for all distributions.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

TimeBucket

The hour or the day that the data applies to, in Coordinated Universal Time (UTC).

(Locations)

The remaining columns in the report list the locations that CloudFront received requests from. For more information about possible values, see the description of Location in [How Data in the Locations Report Is Related to Data in the CloudFront Access Logs \(p. 35\)](#).

How Data in the Locations Report Is Related to Data in the CloudFront Access Logs

The following list shows how data in the Locations report in the CloudFront console corresponds with values in CloudFront access logs. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Location

The country or U.S. state that the viewer is in. In access logs, the `c-ip` column contains the IP address of the device that the viewer is running on. We use geolocation data to identify the geographic location of the device based on the IP address.

If you're displaying the **Locations** report by country, note that the country list is based on [ISO 3166-2, Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code](#). The country list includes the following additional values:

- **Anonymous Proxy** – The request originated from an anonymous proxy.
- **Satellite Provider** – The request originated from a satellite provider that provides Internet service to multiple countries. Users might be in countries with a high risk of fraud.
- **Europe (Unknown)** – The request originated from an IP in a block that is used by multiple European countries. The country that the request originated from cannot be determined. CloudFront uses **Europe (Unknown)** as the default.

- **Asia/Pacific (Unknown)** – The request originated from an IP in a block that is used by multiple countries in the Asia/Pacific region. The country that the request originated from cannot be determined. CloudFront uses **Asia/Pacific (Unknown)** as the default.

If you're displaying the **Locations** report by U.S. state, note that the report can include U.S. territories and U.S. Armed Forces regions.

Request Count

The total number of requests from the country or U.S. state that the viewer is in, for the specified distribution and period. This value generally corresponds closely with the number of GET requests from IP addresses in that country or state in CloudFront access logs.

Request %

One of the following, depending on the value that you selected for **Details**:

- **Countries** – The requests from this country as a percentage of the total number of requests.
- **U.S. States** – The requests from this state as a percentage of the total number of requests from the United States.

If requests came from more than 50 countries, then you can't calculate **Request %** based on the data in this table because the **Request Count** column doesn't include all of the requests during the specified period.

Bytes

The number of bytes that CloudFront served to viewers in this country or state, for the specified distribution and period. To change the display of data in this column to KB, MB, or GB, click the link in the column heading.

Getting Started with CloudFront

The example in this topic gives you a quick overview of how to use CloudFront to:

- Store the original versions of your objects in one Amazon Simple Storage Service (Amazon S3) bucket.
- Distribute download content such as text or graphics.
- Make your objects accessible to everyone.
- Use the CloudFront domain name in URLs for your objects (for example, `http://d111111abcdef8.cloudfront.net/image.jpg`) instead of your own domain name (for example, `http://www.example.com/image.jpg`).
- Keep your objects in CloudFront edge locations for the default duration of 24 hours. (The minimum duration is 0 seconds.)

For information about how to use CloudFront when you want to use other options, see [Task List for Creating a Web Distribution \(p. 58\)](#) or [Task List for Streaming Media Files Using RTMP \(p. 89\)](#).

You only need to perform a few basic steps to start delivering your content using CloudFront. The first step is signing up. After that, you create a CloudFront distribution, and then use the CloudFront domain name to reference content in your web pages or applications.

Topics

- [Step 1: Sign up for Amazon Web Services \(p. 37\)](#)
- [Step 2: Upload your content to Amazon S3 and grant object permissions \(p. 38\)](#)
- [Step 3: Create a CloudFront Web Distribution \(p. 39\)](#)
- [Step 4: Test your links \(p. 45\)](#)

Step 1: Sign up for Amazon Web Services

If you haven't already done so, sign up for Amazon Web Services at <http://aws.amazon.com>. Just choose **Sign Up Now** and enter any required information.

Step 2: Upload your content to Amazon S3 and grant object permissions

An Amazon S3 bucket is a container that can contain objects or folders. CloudFront can distribute almost any type of object for you using an Amazon S3 bucket as the source, for example, text, images, and videos. You can create multiple buckets, and there is no limit to the amount of data that you can store on Amazon S3.

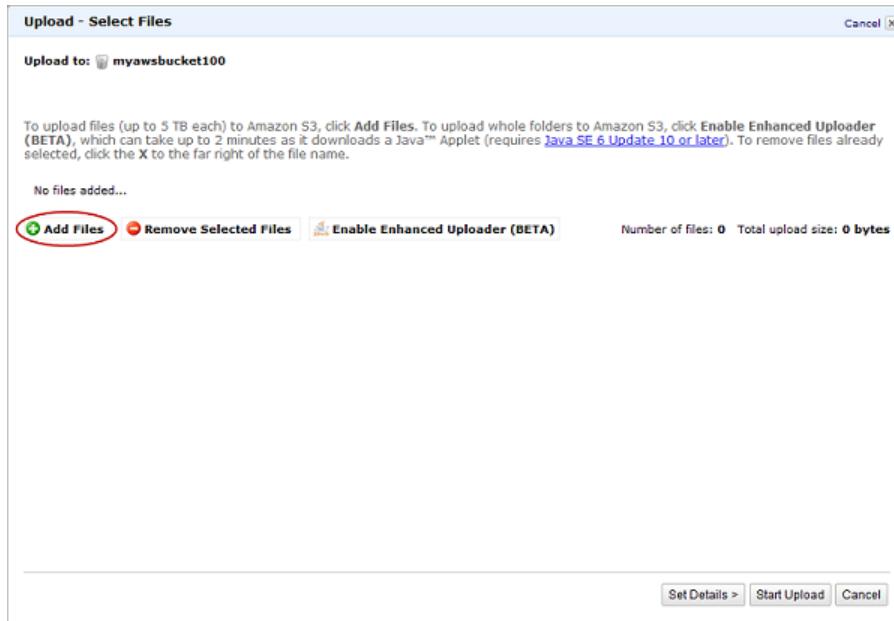
By default, your Amazon S3 bucket and all of the objects in it are private—only the AWS account that created the bucket has permission to read or write the objects in it. If you want to allow anyone to access the objects in your Amazon S3 bucket using CloudFront URLs, you must grant public read permissions to the objects. (This is one of the most common mistakes when working with CloudFront and Amazon S3. You must explicitly grant privileges to each object in an Amazon S3 bucket.)

Note

If you want to restrict who can download your content, you can use the CloudFront private content feature. For more information about distributing private content, see [Serving Private Content through CloudFront \(p. 162\)](#).

To upload your content to Amazon S3 and grant read permission to everyone

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
 2. In the Amazon S3 console, choose **Create Bucket**.
 3. In the **Create Bucket** dialog, enter a bucket name.
- Important**
- For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.
4. Select a region for your bucket. By default, Amazon S3 creates buckets in the US East (N. Virginia) region. We recommend that you choose a region close to you to optimize latency, minimize costs, or to address regulatory requirements.
 5. Choose **Create**.
 6. Select your bucket in the **Buckets** pane, and choose **Upload**.
 7. On the **Upload - Select Files** page, choose **Add Files**, and choose the files that you want to upload.



8. Enable public read privileges for each object that you upload to your Amazon S3 bucket.

- a. Choose **Set Details**.
- b. On the **Set Details** page, choose **Set Permissions**.
- c. On the **Set Permissions** page, choose **Make everything public**.

9. Choose **Start Upload**.

After the upload completes, you can navigate to this item by its URL. In the case of the previous example, the URL would be:

`http://s3.amazonaws.com/example-myawsbucket/filename`

Use your Amazon S3 URL to verify that your content is publicly accessible, but remember that this is not the URL you will use when you are ready to distribute your content.

Step 3: Create a CloudFront Web Distribution

To create a CloudFront web distribution

1. Open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose **Create Distribution**.
3. On the **Select a delivery method for your content** page, in the **Web** section, choose **Get Started**.

Step 1: Select delivery method

Step 2: Create distribution

Select a delivery method for your content.

Web

Create a web distribution if you want to:

- Speed up distribution of static and dynamic content, for example, .html, .css, .php, and graphics.
- Distribute media files using HTTP or HTTPS.
- Add, update, or delete objects, and submit data from web forms.
- Use live streaming to stream an event in real time.

You store your files in an origin — either an Amazon S3 bucket or a web server. After you create the distribution, you can add more origins to the distribution.

Get Started

RTMP

Create an RTMP distribution to speed up distribution of your streaming media files using Adobe Flash Server's RTMP protocol. An RTMP distribution allows an end user to begin playing a media file before it has finished downloading from a CloudFront edge location. Note the following:

- To create an RTMP distribution, you must store the media files in an Amazon S3 bucket.
- To use CloudFront live streaming, create a web distribution.

Get Started

- On the **Create Distribution** page, under **Origin Settings**, choose the Amazon S3 bucket that you created earlier. For **Origin ID**, **Origin Path**, **Restrict Bucket Access**, and **Origin Custom Headers**, accept the default values.

Create Distribution

Origin Settings

| | | |
|------------------------|--|-------|
| Origin Domain Name | myawsbucket100.com.s3.amazonaws.co | i |
| Origin Path | | i |
| Origin ID | S3-myawsbucket100.com | i |
| Restrict Bucket Access | <input type="radio"/> Yes <input checked="" type="radio"/> No | i |
| Origin Custom Headers | Header Name | Value |
| | | i |

- Under **Default Cache Behavior Settings**, accept the default values, and CloudFront will:

- Forward all requests that use the CloudFront URL for your distribution (for example, `http://d111111abcdef8.cloudfront.net/image.jpg`) to the Amazon S3 bucket that you specified in Step 4.
- Allow end users to use either HTTP or HTTPS to access your objects.
- Respond to requests for your objects.
- Cache your objects at CloudFront edge locations for 24 hours.
- Forward only the default request headers to your origin and not cache your objects based on the values in the headers.
- Exclude cookies and query string parameters, if any, when forwarding requests for objects to your origin. (Amazon S3 doesn't process cookies and processes only a limited set of query string parameters.)
- Not be configured to distribute media files in the Microsoft Smooth Streaming format.
- Allow everyone to view your content.
- Not automatically compress your content.

For more information about cache behavior options, see [Cache Behavior Settings \(p. 68\)](#).

Default Cache Behavior Settings

| | | |
|--|--|-------------------|
| Path Pattern | Default (*) | i |
| Viewer Protocol Policy | <input checked="" type="radio"/> HTTP and HTTPS <input type="radio"/> Redirect HTTP to HTTPS <input type="radio"/> HTTPS Only | i |
| Allowed HTTP Methods | <input checked="" type="radio"/> GET, HEAD <input type="radio"/> GET, HEAD, OPTIONS <input type="radio"/> GET, HEAD, OPTIONS, PUT, POST, PATCH, DELETE | i |
| Cached HTTP Methods | GET, HEAD (Cached by default) | i |
| Forward Headers | None (Improves Caching) ▾ | i |
| Object Caching | <input checked="" type="radio"/> Use Origin Cache Headers <input type="radio"/> Customize Learn More | i |
| Minimum TTL | <input type="text" value="0"/> | i |
| Maximum TTL | <input type="text" value="31536000"/> | i |
| Default TTL | <input type="text" value="86400"/> | i |
| Forward Cookies | None (Improves Caching) ▾ | i |
| Forward Query Strings | <input type="radio"/> Yes <input checked="" type="radio"/> No (Improves Caching) | i |
| Smooth Streaming | <input type="radio"/> Yes <input checked="" type="radio"/> No | i |
| Restrict Viewer Access (Use Signed URLs or Signed Cookies) | <input type="radio"/> Yes <input checked="" type="radio"/> No | i |
| Compress Objects Automatically | <input type="radio"/> Yes <input checked="" type="radio"/> No Learn More | i |

6. Under **Distribution Settings**, enter the applicable values:

Price Class

Select the price class that corresponds with the maximum price that you want to pay for CloudFront service. By default, CloudFront serves your objects from edge locations in all CloudFront regions.

For more information about price classes and about how your choice of price class affects CloudFront performance for your distribution, go to [Choosing the Price Class for a CloudFront Distribution \(p. 54\)](#). For information about CloudFront pricing, including how price classes map to CloudFront regions, go to [Amazon CloudFront Pricing](#).

AWS WAF Web ACL

If you want to use AWS WAF to allow or block HTTP and HTTPS requests based on criteria that you specify, choose the web ACL to associate with this distribution. For more information about AWS WAF, see the [AWS WAF Developer Guide](#).

Alternate Domain Names (CNAMEs) (Optional)

Specify one or more domain names that you want to use for URLs for your objects instead of the domain name that CloudFront assigns when you create your distribution. For example, if you want the URL for the object:

/images/image.jpg

to look like this:

http://www.example.com/images/image.jpg

instead of like this:

http://d111111abcdef8.cloudfront.net/images/image.jpg

you would create a CNAME for www.example.com.

Important

If you add a CNAME for www.example.com to your distribution, you also need to create (or update) a CNAME record with your DNS service to route queries for www.example.com to d111111abcdef8.cloudfront.net. You must have permission to create a CNAME record with the DNS service provider for the domain. Typically, this means that you own the domain, but you may also be developing an application for the domain owner. For more information about CNAMEs, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

For the current limit on the number of alternate domain names that you can add to a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

SSL Certificate

Accept the default value, **Default CloudFront Certificate**.

Default Root Object (Optional)

The object that you want CloudFront to request from your origin (for example, index.html) when a viewer requests the root URL of your distribution (<http://www.example.com/>) instead of an object in your distribution (<http://www.example.com/product-description.html>). Specifying a default root object avoids exposing the contents of your distribution.

Logging (Optional)

If you want CloudFront to log information about each request for an object and store the log files in an Amazon S3 bucket, select **On**, and specify the bucket and an optional prefix for the names of the log files. There is no extra charge to enable logging, but you accrue the usual Amazon S3 charges for storing and accessing the files. CloudFront doesn't delete the logs automatically, but you can delete them at any time.

Cookie Logging

In this example, we're using Amazon S3 as the origin for your objects, and Amazon S3 doesn't process cookies, so we recommend that you select **Off** for the value of **Cookie Logging**.

Comment (Optional)

Enter any comments that you want to save with the distribution.

Distribution State

Select **Enabled** if you want CloudFront to begin processing requests as soon as the distribution is created, or select **Disabled** if you do not want CloudFront to begin processing requests after the distribution is created.

Distribution Settings

| | | |
|--|--|--|
| Price Class | <input type="button" value="Use All Edge Locations (Best Performance) ▾"/> i | <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled |
| AWS WAF Web ACL | <input type="button" value="None ▾"/> i | <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled |
| Alternate Domain Names (CNAMEs) | <input style="width: 100%; height: 30px; margin-bottom: 5px;" type="text"/> i | <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled |
| SSL Certificate | <input checked="" type="radio"/> Default CloudFront Certificate (*.cloudfront.net) <small>Choose this option if you want your users to use HTTPS or HTTP to access your content with the CloudFront domain name (such as https://d111111abcdef8.cloudfront.net/logo.jpg). Important: If you choose this option, CloudFront requires that browsers or devices support TLSv1 or later to access your content.</small> <input type="radio"/> Custom SSL Certificate (stored in AWS IAM): <input type="button" value="No certificates available ▾"/> i | |
| Default Root Object | <input style="width: 100%; height: 30px; margin-bottom: 5px;" type="text"/> i | |
| Logging | <input checked="" type="radio"/> On <input type="radio"/> Off | |
| Bucket for Logs | <input style="width: 100%; height: 30px; margin-bottom: 5px;" type="text"/> i | |
| Log Prefix | <input style="width: 100%; height: 30px; margin-bottom: 5px;" type="text"/> i | |
| Cookie Logging | <input checked="" type="radio"/> On <input type="radio"/> Off | |
| Comment | <input style="width: 100%; height: 30px; margin-bottom: 5px;" type="text"/> i | |
| Distribution State | <input checked="" type="radio"/> Enabled <input type="radio"/> Disabled | |
| <input type="button" value="Cancel"/> <input type="button" value="Back"/> <input style="background-color: #0070C0; color: white; font-weight: bold; border: 1px solid #0070C0; border-radius: 5px; padding: 2px 10px;" type="button" value="Create Distribution"/> | | |

7. Choose **Create Distribution**.
8. After CloudFront has created your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. If you chose to enable the distribution, it will then be ready to process requests. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. (It also appears on the **General** tab for a selected distribution.)

Step 4: Test your links

After you've created your distribution, CloudFront knows where your Amazon S3 origin server is, and you know the domain name associated with the distribution. You can create a link to your Amazon S3 bucket content with that domain name, and have CloudFront serve it.

Note

You must wait until the status of your distribution changes to **Deployed** before testing your links.

To link to your objects

1. Copy the following HTML into a new file:
 - Replace <domain name> with the domain name that CloudFront assigned to your distribution.
 - Replace <object name> with the name of a file in your Amazon S3 bucket.

```
<html>
<head>My CloudFront Test</head>
<body>
<p>My text content goes here.</p>
<p>
</body>
</html>
```

For example, if your domain name was d111111abcdef8.cloudfront.net and your object was image.jpg, the URL for the link would be:

<http://d111111abcdef8.cloudfront.net/image.jpg>.

If your object is in a folder within your bucket, include the folder in the URL. For example, if image.jpg is located in an images folder, then the URL would be:

<http://d111111abcdef8.cloudfront.net/images/image.jpg>

2. Save the text in a file that has a .html filename extension.
3. Open your web page in a browser to ensure that you can see your content. If you cannot see the content, confirm that you have performed all of the steps correctly. You can also see the tips in [Troubleshooting \(p. 282\)](#).

The browser returns your page with the embedded image file, served from the edge location that CloudFront determined was appropriate to serve the object.

For more information on using CloudFront, go to [Amazon CloudFront Resources \(p. 355\)](#).

Working with Distributions

Topics

- Overview of Web and RTMP Distributions (p. 47)
- Creating Web and RTMP Distributions (p. 48)
- Listing, Viewing, and Updating CloudFront Distributions (p. 48)
- Deleting a Distribution (p. 49)
- Using Alternate Domain Names (CNAMEs) (p. 50)
- Choosing the Price Class for a CloudFront Distribution (p. 54)
- Using CloudFront with Amazon S3 (p. 54)
- Changes to the CloudFront API (p. 56)

The following table lists the actions you can perform on a distribution and provides links to the corresponding documentation on how to perform the actions using the CloudFront console and the CloudFront API.

| Action | Using the CloudFront Console | Using the CloudFront API: Web Distributions | Using the CloudFront API: RTMP Distributions |
|--|--|---|---|
| Create a distribution | Web Distributions: See Task List for Creating a Web Distribution (p. 58) RTMP Distributions: See Task List for Streaming Media Files Using RTMP (p. 89) | Go to POST Distribution | Go to POST Streaming Distribution |
| List your distributions | See Listing, Viewing, and Updating CloudFront Distributions (p. 48) | Go to GET Distribution List | Go to GET Streaming Distribution List |
| Get all information about a distribution | See Listing, Viewing, and Updating CloudFront Distributions (p. 48) | Go to GET Distribution | Go to GET Streaming Distribution |

| Action | Using the CloudFront Console | Using the CloudFront API: Web Distributions | Using the CloudFront API: RTMP Distributions |
|------------------------------------|---|---|---|
| Get the distribution configuration | See Listing, Viewing, and Updating CloudFront Distributions (p. 48) | Go to GET Distribution Config | Go to GET Streaming Distribution Config |
| Update a distribution | See Listing, Viewing, and Updating CloudFront Distributions (p. 48) | Go to PUT Distribution Config | Go to PUT Streaming Distribution Config |
| Delete a distribution | See Deleting a Distribution (p. 49) | Go to DELETE Distribution | Go to DELETE Streaming Distribution |

Overview of Web and RTMP Distributions

When you want to use CloudFront to distribute your content, you create a distribution and specify configuration settings such as:

- Your origin, which is the Amazon S3 bucket or HTTP server from which CloudFront gets the files that it distributes. You can specify any combination of up to 10 Amazon S3 buckets and/or HTTP servers as your origins.
- Whether you want the files to be available to everyone or you want to restrict access to selected users.
- Whether you want CloudFront to require users to use HTTPS to access your content.
- Whether you want CloudFront to forward cookies and/or query strings to your origin.
- Whether you want CloudFront to prevent users in selected countries from accessing your content.
- Whether you want CloudFront to create access logs.

For the current limit on the number of web and RTMP distributions that you can create for each AWS account, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

The number of files that you can serve per distribution is unlimited.

Web Distributions

You can use web distributions to serve the following content over HTTP or HTTPS:

- Static and dynamic download content, for example, .html, .css, .php, and image files, using HTTP or HTTPS.
- Multimedia content on demand using progressive download and Apple HTTP Live Streaming (HLS). For more information, see the applicable topic in [Working with Web Distributions \(p. 58\)](#).

You can't serve Adobe Flash multimedia content over HTTP or HTTPS, but you can serve it using a CloudFront RTMP distribution. See [RTMP Distributions \(p. 48\)](#) below.

- A live event, such as a meeting, conference, or concert, in real time. For live streaming, you create the distribution automatically by using an AWS CloudFormation stack. For more information, see the applicable live-streaming tutorial in [CloudFront Streaming Tutorials \(p. 286\)](#).

For web distributions, your origin can be either an Amazon S3 bucket or an HTTP server, for example, a web server. For more information about how web distributions work, including the values that you specify when you create a web distribution, see [Working with Web Distributions \(p. 58\)](#). For information about creating a web distribution, see [Task List for Creating a Web Distribution \(p. 58\)](#).

RTMP Distributions

RTMP distributions stream media files using Adobe Media Server and the Adobe Real-Time Messaging Protocol (RTMP). An RTMP distribution must use an Amazon S3 bucket as the origin.

For information about the values you specify when you create an RTMP distribution, see [Working with RTMP Distributions \(p. 87\)](#). For information about creating an RTMP distribution, see [Task List for Streaming Media Files Using RTMP \(p. 89\)](#).

Creating Web and RTMP Distributions

Web distributions: For information about creating web distributions using the CloudFront console, see [Task List for Creating a Web Distribution \(p. 58\)](#). For information about creating web distributions using the CloudFront API, see [POST Distribution](#) in the *Amazon CloudFront API Reference*.

RTMP distributions: For information about creating RTMP distributions using the CloudFront console, see [Task List for Streaming Media Files Using RTMP \(p. 89\)](#). For information about creating RTMP distributions using the CloudFront API, see [POST Streaming Distribution](#) in the *Amazon CloudFront API Reference*.

Listing, Viewing, and Updating CloudFront Distributions

You can use the CloudFront console to list the CloudFront distributions that are associated with your AWS account, view the settings for a distribution, and update most settings.

When you save changes to your distribution configuration, CloudFront starts to propagate the changes to all edge locations. Until your configuration is updated in an edge location, CloudFront continues to serve your content from that location based on the previous configuration. After your configuration is updated in an edge location, CloudFront immediately starts to serve your content from that location based on the new configuration.

Your changes don't propagate to every edge location instantaneously; propagation to all edge locations should take less than 15 minutes. When propagation is complete, the status of your distribution changes from **InProgress** to **Deployed**. While CloudFront is propagating your changes to edge locations, we cannot determine whether a given edge location is serving your content based on the previous configuration or the new configuration.

To List, View, and Update CloudFront Distributions Using the CloudFront Console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the top pane of the CloudFront console, select the distribution that you want to view or update.

Note

The top pane lists all of the distributions that are associated with the AWS account that you used when you signed in to the CloudFront console.

3. To view or edit RTMP distribution settings, skip to Step 4.

To view or edit settings for a web distribution, perform the following steps.

- a. In the **Distribution Settings** pane, click the tab for the settings that you want to change: **General**, **Origins**, or **Behaviors**.
- b. For general settings, click **Edit**.

For origins or cache behaviors, click the origin or cache behavior, and click **Edit**.

- c. Enter or update the applicable values. For information about the fields, see the following topics:

- **General settings:** [Distribution Details \(p. 75\)](#)
- **Origin settings:** [Origin Settings \(p. 64\)](#)
- **Cache behavior settings:** [Cache Behavior Settings \(p. 68\)](#)

- d. Click **Yes, Edit**.

4. To edit or view settings for an RTMP distribution:

- a. In the **Distribution Details** pane, click **Edit**.
- b. Enter or update the applicable values. For information about the fields, see [Values that You Specify When You Create or Update an RTMP Distribution \(p. 90\)](#).
- c. Click **Yes, Edit**.

Deleting a Distribution

If you no longer want to use a distribution, use the following procedure to delete it using the CloudFront console.

You can also delete a distribution using the CloudFront API:

- To delete a web distribution, use the `DELETE Distribution` API action. For more information, go to [DELETE Distribution](#) in the *Amazon CloudFront API Reference*.
- To delete an RTMP distribution, use the `DELETE Streaming Distribution` API action. For more information, go to [DELETE Streaming Distribution](#) in the *Amazon CloudFront API Reference*.

Note

CloudFront lets you create a combined total of up to 100 web and RTMP distributions for an AWS account.

To Delete a CloudFront Distribution Using the CloudFront Console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the right pane of the CloudFront console, find the distribution that you want to delete.
3. If the value of the **State** column is **Disabled**, skip to Step 7.

If the value of **State** is **Enabled** and the value of **Status** is **Deployed**, continue with Step 4 to disable the distribution before deleting it.

- If the value of **State** is **Enabled** and the value of **Status** is **InProgress**, wait until **Status** changes to **Deployed**. Then continue with Step 4 to disable the distribution before deleting it.
4. In the right pane of the CloudFront console, check the check box for the distribution that you want to delete.
 5. Click **Disabled** to disable the distribution, and click **Yes, Disable** to confirm. Then click **Close**.
 6. The value of the **State** column immediately changes to **Disabled**. Wait until the value of the **Status** column changes to **Deployed**.
 7. Check the check box for the distribution that you want to delete.
 8. Click **Delete**, and click **Yes, Delete** to confirm. Then click **Close**.

Using Alternate Domain Names (CNAMEs)

In CloudFront, an alternate domain name, also known as a CNAME, lets you use your own domain name (for example, `www.example.com`) for links to your objects instead of using the domain name that CloudFront assigns to your distribution. Both web and RTMP distributions support alternate domain names.

When you create a distribution, CloudFront returns a domain name for the distribution, for example:

`d111111abcdef8.cloudfront.net`

When you use the CloudFront domain name for your objects, the URL for an object called `/images/image.jpg` is:

`http://d111111abcdef8.cloudfront.net/images/image.jpg`

If you want to use your own domain name, such as `www.example.com`, instead of the `cloudfront.net` domain name that CloudFront assigned to your distribution, you can add an alternate domain name to your distribution for `www.example.com`. You can then use the following URL for `/images/image.jpg`:

`http://www.example.com/images/image.jpg`

Topics

- [Using the * Wildcard in Alternate Domain Names \(p. 50\)](#)
- [Restrictions on Using Alternate Domain Names \(p. 51\)](#)
- [Adding an Alternate Domain Name \(p. 51\)](#)

Using the * Wildcard in Alternate Domain Names

When you add alternate domain names, you can use the `*` wildcard at the beginning of a domain name instead of specifying subdomains individually. For example, with an alternate domain name of `*.example.com`, you can use any domain name that ends with `example.com` in your object URLs, such as `www.example.com`, `product-name.example.com`, and `marketing.product-name.example.com`. The name of an object is the same regardless of the domain name, for example:

`www.example.com/images/image.jpg`

`product-name.example.com/images/image.jpg`

`marketing.product-name.example.com/images/image.jpg`

The alternate domain name must begin with an asterisk and a dot (`*.`). You *cannot* use a wildcard to replace part of a subdomain name, like this: `*domain.example.com`, and you cannot replace a subdomain in the middle of a domain name, like this: `subdomain.*.example.com`.

A wildcard alternate domain name, such as *.example.com, can include another alternate domain name, such as example.com, as long as they're both in the same CloudFront distribution or they're in distributions that were created by using the same AWS account.

Restrictions on Using Alternate Domain Names

Note the following restrictions on using alternate domain names:

Maximum Number of Alternate Domain Names

For the current limit on the number of alternate domain names that you can add to a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

Permission to Change DNS Configuration

If you're adding alternate domain names to your distribution, you need to create CNAME records to route DNS queries for the domain names to your CloudFront distribution. You must have permission to create CNAME records with the DNS service provider for the corresponding domains. Typically, this means that you own the domains, but you may also be developing an application for the domain owner.

Duplicate and Overlapping Alternate Domain Names

You cannot add an alternate domain name to a CloudFront distribution if the alternate domain name already exists in another CloudFront distribution, even if your AWS account owns the other distribution.

However, you can add a wildcard alternate domain name, such as *.example.com, that includes (that overlaps with) a non-wildcard alternate domain name, such as www.example.com. Overlapping domain names can be in the same distribution or in separate distributions as long as both distributions were created by using the same AWS account.

Alternate Domain Names at the Zone Apex for a Domain

When you add an alternate domain name to a distribution, you need to create a CNAME record in your DNS configuration to route DNS queries for the domain name to your CloudFront distribution. However, you can't create a CNAME record for the top node of a DNS namespace, also known as the zone apex; the DNS protocol doesn't allow it. For example, if you register the DNS name example.com, the zone apex is example.com. You can't create a CNAME record for example.com, but you can create CNAME records for www.example.com, newproduct.example.com, and so on.

If you're using Amazon Route 53 as your DNS service, you can create an alias resource record set instead of a CNAME. You can create an alias resource record set for a domain name at the zone apex (example.com). In addition, with an alias resource record set, you don't pay for Amazon Route 53 queries. For more information, go to [Routing Queries to an Amazon CloudFront Distribution](#) in the *Amazon Route 53 Developer Guide*.

Alternate Domain Names and HTTPS

If you want viewers to use HTTPS with an alternate domain names, additional configuration is required. For more information, see [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

Adding an Alternate Domain Name

The following task list describes the process for using the CloudFront console to add an alternate domain name to your distribution so you can use your own domain name in your links instead of the CloudFront domain name that is associated with your distribution.

Note

If you want viewers to use HTTPS with your alternate domain name, see [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

For information about updating your distribution using the CloudFront API, see [Working with Distributions \(p. 46\)](#).

Adding an Alternate Domain Name Using the CloudFront Console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the CloudFront console, use the steps below to update your distribution to include your domain name as an alternate domain name in the **Alternate Domain Names (CNAMEs)** field.
 - a. In the top pane of the CloudFront console, select the distribution that you want to update, and click **Distribution Settings**.
 - b. On the **General** tab, click **Edit**.
 - c. Add the applicable alternate domain names in the **Alternate Domain Names (CNAMEs)** field. Separate domain names with commas or put each one on a new line.
 - d. **Web distributions only:** For **SSL Certificate**, choose the applicable option:
 - **If you don't want to use SSL** – Click **Default CloudFront Certificate**.
 - **If you do want to use SSL** – Click **Custom SSL Certificate**, and choose a certificate from the list. Note that the list can include both certificates provisioned by AWS Certificate Manager and certificates that you purchased from another certificate authority and uploaded to the IAM certificate store.

If you uploaded a certificate to the IAM certificate store but it doesn't appear in the list, review the procedure [To use alternate domain names with HTTPS \(p. 238\)](#) to confirm that you correctly uploaded the certificate to the IAM certificate store.

If you choose this setting, we recommend that you use only an alternate domain name in your object URLs (<https://example.com/logo.jpg>). If you use your CloudFront distribution domain name (<https://d111111abcdef8.cloudfront.net/logo.jpg>) and the viewer supports SNI, then CloudFront behaves normally. However, a viewer that does not support SNI exhibits one of the following behaviors, depending on the value of **Clients Supported**:

- **All Clients:** If the viewer doesn't support SNI, it displays a warning because the CloudFront domain name doesn't match the domain name in your SSL certificate.
- **Only Clients that Support Server Name Indication (SNI):** CloudFront drops the connection with the viewer without returning the object.

- e. **Web distributions only:** Choose the applicable option for **Clients Supported**:
 - **All Clients:** CloudFront serves your HTTPS content using dedicated IP addresses. If you select this option, you incur additional charges when you associate your SSL certificate with a distribution that is enabled. For more information, see <http://aws.amazon.com/cloudfront/pricing>.
 - **Only Clients that Support Server Name Indication (SNI):** Older browsers or other clients that don't support SNI must use another method to access your content.

For more information, see [Choosing How CloudFront Serves HTTPS Requests \(p. 234\)](#).

- f. Click **Yes, Edit**.
3. In the CloudFront console, on the **General** tab for your distribution, confirm that the status of your distribution has changed to **Deployed**. If you try to use an alternate domain name before the updates to your distribution have been deployed, the links you create in the following steps might not work.
4. Using the method provided by your DNS service provider, add a CNAME resource record set to the hosted zone for your domain. This new CNAME resource record set will redirect DNS queries from

your domain (for example, www.example.com) to the CloudFront domain name for your distribution (for example, d111111abcdef8.cloudfront.net). For more information, see the documentation provided by your DNS service provider.

If you're using Amazon Route 53 as your DNS service, you can create an alias resource record set instead of a CNAME. With an alias resource record set, you don't pay for Amazon Route 53 queries. In addition, you can create an alias resource record set for a domain name at the zone apex (example.com), which DNS doesn't allow for CNAMEs. For more information, go to [Routing Queries to an Amazon CloudFront Distribution](#) in the *Amazon Route 53 Developer Guide*.

Important

If you already have an existing CNAME record for your domain name, update that resource record set or replace it with a new one that points to the CloudFront domain name for your distribution.

In addition, confirm that your CNAME resource record set points to your distribution's domain name and not to one of your origin servers.

5. Using dig or a similar tool, confirm that the CNAME resource record set that you created in Step 4 points to the domain name for your distribution. For more information about dig, go to <http://www.kloth.net/services/dig.php>.

The following example shows a dig request on the images.example.com domain, as well as the relevant part of the response.

```
[prompt]> dig images.example.com

; <>> DiG 9.3.3rc2 <>> images.example.com
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15917
;; flags: qr rd ra; QUERY: 1, ANSWER: 9, AUTHORITY: 2, ADDITIONAL: 0

;; QUESTION SECTION:
;images.example.com.      IN      A

;; ANSWER SECTION:
. 10800 IN CNAME d111111abcdef8.cloudfront.net.
...
...
```

The line in the Answer Section shows a CNAME resource record set that routes queries for images.example.com to the CloudFront distribution domain name d111111abcdef8.cloudfront.net. The CNAME resource record set is configured correctly if the name on the right side of CNAME is the domain name for your CloudFront distribution. If that is any other value, for example, the domain name for your Amazon S3 bucket, then the CNAME resource record set is configured incorrectly. In that case, go back to Step 4 and correct the CNAME record to point to the domain name for your distribution.

6. Test the alternate domain name by creating some test links that use your domain name in the URL instead of the CloudFront domain name for your distribution.
7. In your application, change the links for your objects to use your alternate domain name instead of the domain name of your CloudFront distribution.

Choosing the Price Class for a CloudFront Distribution

CloudFront has edge locations all over the world. Our cost for each edge location varies and, as a result, the price that we charge you varies depending on the edge location from which CloudFront serves your requests.

CloudFront edge locations are grouped into geographic regions, and we've grouped regions into price classes. The default price class includes all regions. Another price class includes most regions (the United States; Europe; Hong Kong, Korea, and Singapore; Japan; and India regions) but excludes the most-expensive regions. A third price class includes only the least-expensive regions (the United States and Europe regions).

By default, CloudFront responds to requests for your objects based only on performance: objects are served from the edge location for which latency is lowest for that viewer. If you're willing to accept higher latency for your viewers in some geographic regions in return for lower cost, you can choose a price class that doesn't include all CloudFront regions. Although CloudFront will serve your objects only from the edge locations in that price class, it still serves content from the edge location that has the lowest latency among the edge locations in your selected price class. However, some of your viewers, especially those in geographic regions that are not in your price class, may see higher latency than if your content were being served from all CloudFront edge locations. For example, if you choose the price class that includes only the United States and Europe, viewers in Australia and in Asia may experience higher latency than if you choose the price class that includes Australia and Asia.

If you choose a price class that does not include all edge locations, CloudFront may still occasionally serve requests for your content from an edge location in a region that is not included in your price class. When this happens, you are not charged the rate for the more expensive region from which your objects were served. Instead, you're charged the rate for the least-expensive region in your selected price class.

You can choose a price class when you create or update a CloudFront web distribution or RTMP distribution. To find the applicable topic about creating or updating a web or an RTMP distribution using the CloudFront console or API, see [Working with Distributions \(p. 46\)](#).

If you're creating or updating a distribution by using the CloudFront API, one of the AWS SDKs, or AWS CloudFormation, see the applicable topic for a list of valid values (search for `PriceClass`):

- **Web distributions** – [DistributionConfig Complex Type](#)
- **RTMP distributions** – [StreamingDistributionConfig Complex Type](#)

For more information about CloudFront pricing and price classes, go to [Amazon CloudFront Pricing](#).

Using CloudFront with Amazon S3

You can store your content in an Amazon S3 bucket and use CloudFront to distribute the content. This topic explains how to use CloudFront with your S3 bucket, and how to update your CloudFront distribution if you move the S3 bucket to a different region.

Topics

- [Adding CloudFront When You're Distributing Content from Amazon S3 \(p. 55\)](#)
- [Moving an Amazon S3 Bucket to a Different Region \(p. 56\)](#)

Adding CloudFront When You're Distributing Content from Amazon S3

If you store your objects in an Amazon S3 bucket, you can either have your users get your objects directly from S3, or you can configure CloudFront to get your objects from S3 and distribute them to your users.

Using CloudFront can be more cost effective if your users access your objects frequently because, at higher usage, the price for CloudFront data transfer is lower than the price for Amazon S3 data transfer. In addition, downloads are faster with CloudFront than with Amazon S3 alone because your objects are stored closer to your users.

Note

If you want CloudFront to respect Amazon S3 cross-origin resource sharing settings, configure CloudFront to forward the `Origin` header to Amazon S3. For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

If you currently distribute content directly from your Amazon S3 bucket using your own domain name (such as `example.com`) instead of the domain name of your Amazon S3 bucket (such as `MyAWSBucket.s3.amazonaws.com`), you can add CloudFront with no disruption by using the following procedure.

To add CloudFront when you're already distributing your content from Amazon S3

1. Create a CloudFront distribution using the procedure described in the applicable topic:
 - [Task List for Creating a Web Distribution \(p. 58\)](#)
 - [Task List for Streaming Media Files Using RTMP \(p. 89\)](#)

When you create the distribution, specify the name of your Amazon S3 bucket as the origin server.

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, see [Bucket Restrictions and Limitations in the Amazon Simple Storage Service Developer Guide](#).

If you're using a CNAME with Amazon S3, specify the CNAME for your distribution, too.

2. Create a test web page that contains links to publicly readable objects in your Amazon S3 bucket, and test the links. For this initial test, use the CloudFront domain name of your distribution in the object URLs, for example, `http://d111111abcdef8.cloudfront.net/images/image.jpg`.

For more information about the format of CloudFront URLs, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

3. If you're using Amazon S3 CNAMEs, your application uses your domain name (for example, `example.com`) to reference the objects in your Amazon S3 bucket instead of using the name of your bucket (for example, `myawsbucket.s3.amazonaws.com`). To continue using your domain name to reference objects instead of using the CloudFront domain name for your distribution (for example, `d111111abcdef8.cloudfront.net`), you need to update your settings with your DNS service provider.

For Amazon S3 CNAMEs to work, your DNS service provider must have a CNAME resource record set for your domain that currently routes queries for the domain to your Amazon S3 bucket. For example, if a user requests this object:

`http://example.com/images/image.jpg`

the request is automatically rerouted, and the user sees this object:

`http://myawsbucket.s3.amazonaws.com/images/image.jpg`

To route queries to your CloudFront distribution instead of your Amazon S3 bucket, you need to use the method provided by your DNS service provider to update the CNAME resource record set for your domain. This updated CNAME record will start to redirect DNS queries from your domain to the CloudFront domain name for your distribution. For more information, see the documentation provided by your DNS service provider.

Note

If you're using Amazon Route 53 as your DNS service, you can use either a CNAME resource record set or an alias resource record set. For information about editing resource record sets, see [Editing Resource Record Sets](#). For information about alias resource record sets, see [Choosing Between Alias and Non-Alias Resource Record Sets](#). Both topics are in the *Amazon Route 53 Developer Guide*.

For more information about using CNAMEs with CloudFront, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

After you update the CNAME resource record set, it can take up to 72 hours for the change to propagate throughout the DNS system, although it usually happens faster. During this time, some requests for your content will continue to be routed to your Amazon S3 bucket, and others will be routed to CloudFront.

Moving an Amazon S3 Bucket to a Different Region

If you're using Amazon S3 as the origin for a CloudFront distribution and you move the bucket to a different region, CloudFront can take up to an hour to update its records to include the change of region when both of the following are true:

- You're using a CloudFront origin access identity (OAI) to restrict access to the bucket
- You move the bucket to an Amazon S3 region that requires Signature Version 4 for authentication

When you're using OAIs, CloudFront uses the region (among other values) to calculate the signature that it uses to request objects from your bucket. For more information about OAIs, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#). For a list of Amazon S3 regions and the signature versions that they support, see [Amazon Simple Storage Service \(Amazon S3\)](#) in the "Regions and Endpoints" chapter of the *Amazon Web Services General Reference*.

To force a faster update to CloudFront's records, you can update your CloudFront distribution, for example, by updating the **Comment** field on the **General** tab in the CloudFront console. When you update a distribution, CloudFront immediately checks on the region that your bucket is in; propagation of the change to all edge locations should take less than 15 minutes.

Changes to the CloudFront API

Beginning with the 2012-05-05 version of the CloudFront API, we made substantial changes to the format of the XML document that you include in the request body when you create or update a web distribution or an RTMP distribution, and when you invalidate objects. With previous versions of the API, we discovered that it was too easy to accidentally delete one or more values for an element that accepts multiple values, for example, CNAMEs and trusted signers. Our changes for the 2012-05-05 release are intended to prevent these accidental deletions and to notify you when there's a mismatch between the number of values you say you're specifying in the `Quantity` element and the number of values you're actually specifying.

Note the following about using the 2012-05-05 API version or later with web and RTMP distributions that were created using earlier API versions:

- You cannot use versions of the API earlier than 2012-05-05 to update a web distribution that was created or updated using the 2012-05-05 or later CloudFront API.
- You can use the new API version to get a list of distributions, get information about a distribution, or get distribution configuration. CloudFront returns an XML document in the new XML format.
- To update a distribution that was created using an earlier API version, use the 2012-05-05 or later version of GET Distribution or GET Streaming Distribution to get an XML document in the new XML format, change the data as applicable, and use the 2012-05-05 or later version of PUT Distribution Config or PUT Streaming Distribution Config to submit the changes to CloudFront.
- You can use the new API to delete a distribution that was created using an earlier API version. The distribution must already be disabled.

Working with Web Distributions

This section describes how you configure and manage CloudFront web distributions. For a basic explanation of distributions, see [Working with Distributions \(p. 46\)](#). For information about CloudFront RTMP distributions, see [Working with RTMP Distributions \(p. 87\)](#).

Topics

- [Task List for Creating a Web Distribution \(p. 58\)](#)
- [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#)
- [Testing Your Web Distribution \(p. 60\)](#)
- [Using Amazon S3 Origins and Custom Origins for Web Distributions \(p. 61\)](#)
- [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#)
- [Values that CloudFront Displays in the Console When You Create or Update a Web Distribution \(p. 80\)](#)
- [Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins \(p. 81\)](#)
- [Using AWS WAF to Control Access to Your Content \(p. 82\)](#)
- [Restricting the Geographic Distribution of Your Content \(p. 82\)](#)
- [Configuring On-Demand Smooth Streaming \(p. 85\)](#)
- [Configuring On-Demand Progressive Downloads \(p. 86\)](#)
- [Configuring On-Demand Apple HTTP Live Streaming \(HLS\) \(p. 86\)](#)

Task List for Creating a Web Distribution

The following task list summarizes the process for creating a web distribution.

To Create a Web Distribution

1. Create one or more Amazon S3 buckets or configure HTTP servers as your origin servers. An origin is the location where you store the original version of your web content. When CloudFront gets a request for your files, it goes to the origin to get the files that it distributes at edge locations. You can use any combination of Amazon S3 buckets and HTTP servers as your origin servers.

If you're using Amazon S3, note that the name of your bucket must be all lowercase and cannot contain spaces.

If you're using an Amazon EC2 server or another custom origin, review [Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins \(p. 81\)](#).

For the current limit on the number of origins that you can create for a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

2. Upload your content to your origin servers. If you don't want to restrict access to your content using CloudFront signed URLs, make the objects publicly readable.

Caution

You are responsible for ensuring the security of your origin server. You must ensure that CloudFront has permission to access the server and that the security settings are appropriate to safeguard your content.

3. Create your CloudFront web distribution:
 - For more information about creating a web distribution using the CloudFront console, see [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#).
 - For information about creating a web distribution using the CloudFront API, go to [POST Distribution](#) in the *Amazon CloudFront API Reference*.
4. Optional: If you created your distribution using the CloudFront console, create more cache behaviors or origins for your distribution. For more information, see [To List, View, and Update CloudFront Distributions Using the CloudFront Console \(p. 48\)](#).
5. Test your web distribution. For more information, see [Testing Your Web Distribution \(p. 60\)](#).
6. Develop your website or application to access your content using the domain name that CloudFront returned after you created your distribution in Step 3. For example, if CloudFront returns d111111abcdef8.cloudfront.net as the domain name for your distribution, the URL for the file image.jpg in an Amazon S3 bucket or in the root directory on an HTTP server will be <http://d111111abcdef8.cloudfront.net/image.jpg>.

If you specified one or more alternate domain names (CNAMEs) when you created your distribution, you can use your own domain name. In that case, the URL for image.jpg might be <http://www.example.com/image.jpg>.

Note the following:

- If you want to use signed URLs to restrict access to your content, see [Serving Private Content through CloudFront \(p. 162\)](#).
- If you want to serve compressed content, see [Serving Compressed Files \(p. 135\)](#).
- For information about CloudFront request and response behavior for Amazon S3 and custom origins, see [Request and Response Behavior \(p. 139\)](#).

Creating or Updating a Web Distribution Using the CloudFront Console

The procedures in this topic explain how to create or update a web distribution using the CloudFront console. If you want to create a web distribution using the CloudFront API, go to [POST Distribution](#) in the *Amazon CloudFront API Reference*. If you want to update a web distribution using the CloudFront API, go to [PUT DistributionConfig](#) in the *Amazon CloudFront API Reference*.

For the current limit on the number of web distributions that you can create for each AWS account, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit,

go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

- To create a CloudFront web distribution using the CloudFront console (p. 60)
- To update a CloudFront web distribution using the CloudFront console (p. 60)

To create a CloudFront web distribution using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose **Create Distribution**.
3. On the first page of the **Create Distribution Wizard**, in the **Web** section, choose **Get Started**.
4. Specify settings for the distribution. For more information, see [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).
5. Choose **Create Distribution**.
6. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. If you chose to enable the distribution, it will then be ready to process requests. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. (It also appears on the **General** tab for a selected distribution.)

7. When your distribution is deployed, confirm that you can access your content using your new CloudFront URL or CNAME. For more information, see [Testing Your Web Distribution \(p. 60\)](#).

To update a CloudFront web distribution using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the ID for the distribution that you want to update.
3. Update the applicable values. For more information, see [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).
4. Choose **Create Distribution**.
5. After you change settings, the value of the **Status** column for your distribution changes to **InProgress** while CloudFront propagates the changes to edge locations. When **Status** changes to **Deployed**, the distribution is ready to process requests. (The value of the **State** column for the distribution must also be **Enabled**.) This should take less than 15 minutes after you save the last change.

Testing Your Web Distribution

After you've created your distribution, CloudFront knows where your origin server is, and you know the domain name associated with the distribution. You can create links to your objects using the CloudFront domain name, and CloudFront will serve the objects to your web page or application.

Note

You must wait until the status of the distribution changes to **Deployed** before you can test your links.

To create links to objects in a web distribution

1. Copy the following HTML code into a new file, replace `domain-name` with your distribution's domain name, and replace `object-name` with the name of your object.

```
<html>
<head>My CloudFront Test</head>
<body>
<p>My text content goes here.</p>
<p>
</body>
</html>
```

For example, if your domain name were d111111abcdef8.cloudfront.net and your object were image.jpg, the URL for the link would be:

http://d111111abcdef8.cloudfront.net/image.jpg.

If your object is in a folder on your origin server, then the folder must also be included in the URL. For example, if image.jpg were located in the images folder on your origin server, then the URL would be:

http://d111111abcdef8.cloudfront.net/images/image.jpg

2. Save the HTML code in a file that has a .html filename extension.
3. Open your web page in a browser to ensure that you can see your object.

The browser returns your page with the embedded image file, served from the edge location that CloudFront determined was appropriate to serve the object.

Using Amazon S3 Origins and Custom Origins for Web Distributions

When you create a web distribution, you specify where CloudFront sends requests for the files that it distributes to edge locations. CloudFront supports using Amazon S3 buckets and HTTP servers (for example, web servers) as origins.

Using Amazon S3 Buckets for Your Origin

When you use Amazon S3 as an origin for your distribution, you place any objects that you want CloudFront to deliver in an Amazon S3 bucket. You can use any method that is supported by Amazon S3 to get your objects into Amazon S3, for example, the Amazon S3 console or API, or a third-party tool. You can create a hierarchy in your bucket to store the objects, just as you would with any other Amazon S3 bucket.

Using an existing Amazon S3 bucket as your CloudFront origin server doesn't change the bucket in any way; you can still use it as you normally would to store and access Amazon S3 objects at the standard Amazon S3 price. You incur regular Amazon S3 charges for storing the objects in the bucket. For more information about the charges to use CloudFront, see [CloudFront Reports \(p. 15\)](#).

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

When you specify the Amazon S3 bucket that you want CloudFront to get objects from, how you specify the bucket name depends on whether you have configured the bucket as a website endpoint:

The bucket is not configured as a website endpoint

In general, use the following format:

bucket-name.s3.amazonaws.com

If your bucket is in the US Standard region and you want Amazon S3 to route requests to a facility in Northern Virginia, use the following format:

bucket-name.s3-external-1.amazonaws.com

When you specify the bucket name in this format, you can use the following CloudFront features:

- Configure CloudFront to communicate with your Amazon S3 bucket using SSL. For more information, see [Using an HTTPS Connection to Access Your Objects \(p. 229\)](#).
- Use an origin access identity to require that your users access your content using CloudFront URLs, not by using Amazon S3 URLs. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).
- Update the content of your bucket by submitting POST and PUT requests to CloudFront. For more information, see [HTTP Methods \(p. 141\)](#) in the topic [How CloudFront Processes and Forwards Requests to Your Amazon S3 Origin Server \(p. 139\)](#).

The bucket is configured as a website endpoint

Enter the Amazon S3 static website hosting endpoint for your bucket. This value appears in the Amazon S3 console, on the **Properties** page under **Static Website Hosting**.

When you specify the bucket name in this format, you can use Amazon S3 redirects and Amazon S3 custom error documents. (CloudFront also provides custom error pages. For more information, see [Customizing Error Responses \(p. 127\)](#).) For more information about Amazon S3 features, see the [Amazon S3 documentation](#).

Do not specify the bucket using the following formats:

- The Amazon S3 path style, s3.amazonaws.com/*bucket-name*
- The Amazon S3 CNAME, if any

Using Amazon EC2 or Other Custom Origins

A custom origin is an HTTP server, for example, a web server. The HTTP server can be an Amazon EC2 instance or an HTTP server that you manage privately. When you use a custom origin, you specify the DNS name of the server, along with the HTTP and HTTPS ports and the protocol that you want CloudFront to use when fetching objects from your origin.

Most CloudFront features are supported when you use a custom origin with the following exceptions:

- RTMP distributions**—Not supported.
- Private content**—Although you can use a signed URL to distribute content from a custom origin, for CloudFront to access the custom origin, the origin must remain publicly accessible. For more information, see [Serving Private Content through CloudFront \(p. 162\)](#).

For information about requirements and recommendations when using custom origins, see [Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins \(p. 81\)](#).

Values that You Specify When You Create or Update a Web Distribution

When you create a new web distribution or update an existing distribution, you specify the following values. For information about creating or updating a web distribution using the CloudFront console, see the applicable topic:

- [Working with Web Distributions \(p. 58\)](#)
- [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#)

[Delivery Method \(p. 64\)](#)

[Origin Settings \(p. 64\)](#)

- [Origin Domain Name \(p. 65\)](#)
- [Origin Path \(p. 66\)](#)
- [Origin ID \(p. 66\)](#)
- [Restrict Bucket Access \(Amazon S3 Only\) \(p. 66\)](#)
- [Origin Access Identity \(Amazon S3 Only\) \(p. 66\)](#)
- [Comment for New Identity \(Amazon S3 Only\) \(p. 67\)](#)
- [Your Identities \(Amazon S3 Only\) \(p. 67\)](#)
- [Grant Read Permissions on Bucket \(Amazon S3 Only\) \(p. 67\)](#)
- [Origin SSL Protocols \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#)
- [Origin Protocol Policy \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#)
- [HTTP Port \(Amazon EC2 and Other Custom Origins Only\) \(p. 68\)](#)
- [HTTPS Port \(Amazon EC2 and Other Custom Origins Only\) \(p. 68\)](#)
- [Origin Custom Headers \(p. 68\)](#)

[Cache Behavior Settings \(p. 68\)](#)

- [Path Pattern \(p. 69\)](#)
- [Origin \(Existing Distributions Only\) \(p. 70\)](#)
- [Viewer Protocol Policy \(p. 70\)](#)
- [Allowed HTTP Methods \(p. 71\)](#)
- [Cached HTTP Methods \(p. 71\)](#)
- [Forward Headers \(p. 71\)](#)
- [Whitelist Headers \(p. 72\)](#)
- [Object Caching \(p. 72\)](#)
- [Minimum TTL \(p. 72\)](#)
- [Default TTL \(p. 73\)](#)
- [Maximum TTL \(p. 73\)](#)
- [Forward Cookies \(Amazon EC2 and Other Custom Origins Only\) \(p. 73\)](#)
- [Whitelist Cookies \(Amazon EC2 and Other Custom Origins Only\) \(p. 73\)](#)
- [Forward Query Strings \(p. 74\)](#)
- [Smooth Streaming \(p. 74\)](#)
- [Restrict Viewer Access \(Use Signed URLs\) \(p. 74\)](#)
- [Trusted Signers \(p. 74\)](#)

- AWS Account Numbers (p. 75)
- Compress Objects Automatically (p. 75)

Distribution Details (p. 75)

- Price Class (p. 75)
- AWS WAF Web ACL (p. 75)
- Alternate Domain Names (CNAMEs) (p. 76)
- SSL Certificate (p. 76)
- Clients Supported (p. 77)
- Minimum SSL Protocol Version (p. 77)
- Default Root Object (p. 77)
- Logging (p. 77)
- Bucket for Logs (p. 78)
- Log Prefix (p. 78)
- Cookie Logging (p. 78)
- Comment (p. 78)
- Distribution State (p. 78)

Custom Error Pages and Error Caching (p. 79)

- Error Code (p. 79)
- Response Page Path (p. 79)
- Response Code (p. 79)
- Error Caching Minimum TTL (p. 79)

Restrictions (p. 79)

- Enable Geo Restriction (p. 79)
- Restriction Type (p. 80)
- Countries (p. 80)

Delivery Method

You specify the delivery method when you create a distribution. For a web distribution, this value is always **Web**. You can't change the delivery method for an existing distribution.

Origin Settings

When you create or update a distribution, you provide information about one or more locations—known as origins—where you store the original versions of your web content. CloudFront gets your web content from your origins and serves it to viewers via a world-wide network of edge servers. Each origin is either an Amazon S3 bucket or an HTTP server, for example, a web server.

For the current limit on the number of origins that you can create for a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

If you want to delete an origin, you must first edit or delete the cache behaviors that are associated with that origin.

Caution

If you delete an origin, confirm that files that were previously served by that origin are available in another origin and that your cache behaviors are now routing requests for those files to the new origin.

When you create or update a distribution, you specify the following values for each origin.

Origin Domain Name

The DNS domain name of the Amazon S3 bucket or HTTP server from which you want CloudFront to get objects for this origin, for example:

- **Amazon S3 bucket** – myawsbucket.s3.amazonaws.com
- **Amazon EC2 instance** – ec2-203-0-113-25.compute-1.amazonaws.com
- **Elastic Load Balancing load balancer** –
my-load-balancer-1234567890.us-west-2.elb.amazonaws.com

If your origin is an HTTP server, type the domain name of the resource. The files must be publicly readable.

If your origin is an Amazon S3 bucket, in the CloudFront console, choose in the **Origin Domain Name** field, and a list enumerates the Amazon S3 buckets that are associated with the current AWS account. Note the following:

- If the bucket is configured as a website, enter the Amazon S3 static website hosting endpoint for your bucket; do not select the bucket name from the list in the **Origin Domain Name** field. The static website hosting endpoint appears in the Amazon S3 console, on the **Properties** page under **Static Website Hosting**.
- If you configured Amazon S3 Transfer Acceleration for your bucket, do not specify the s3-accelerate endpoint for **Origin Domain Name**.
- If you're using a bucket from a different AWS account and if the bucket is not configured as a website, type the name in the following format:

bucket-name.s3.amazonaws.com

If your bucket is in the US Standard region and you want Amazon S3 to route requests to a facility in Northern Virginia, use the following format:

bucket-name.s3-external-1.amazonaws.com

If your bucket is in the EU (Frankfurt) region, you can also use the following format:

bucket-name.s3.eu-central-1.amazonaws.com

- The files must be publicly readable unless you secure your content in Amazon S3 by using a CloudFront origin access identity. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Important

If the origin is an Amazon S3 bucket, the bucket name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

When you change the value of **Origin Domain Name** for an origin, CloudFront immediately begins replicating the change to CloudFront edge locations. Until the distribution configuration is updated in a given edge location, CloudFront will continue to forward requests to the previous HTTP server or Amazon

S3 bucket. As soon as the distribution configuration is updated in that edge location, CloudFront begins to forward requests to the new HTTP server or Amazon S3 bucket.

Changing the origin does not require CloudFront to repopulate edge caches with objects from the new origin. As long as the viewer requests in your application have not changed, CloudFront will continue to serve objects that are already in an edge cache until the TTL on each object expires or until seldom-requested objects are evicted.

Origin Path

If you want CloudFront to request your content from a directory in your Amazon S3 bucket or your custom origin, enter the directory path, beginning with a /. CloudFront appends the directory path to the value of **Origin Domain Name**, for example, **cf-origin.example.com/production/images**. Do not add a / at the end of the path.

For example, suppose you've specified the following values for your distribution:

- **Origin Domain Name** – An Amazon S3 bucket named **myawsbucket**
- **Origin Path** – **/production**
- **Alternate Domain Names (CNAMEs)** – **example.com**

When a user enters **example.com/index.html** in a browser, CloudFront sends a request to Amazon S3 for **myawsbucket/production/index.html**.

When a user enters **example.com/acme/index.html** in a browser, CloudFront sends a request to Amazon S3 for **myawsbucket/production/acme/index.html**.

Origin ID

A string that uniquely distinguishes this origin from other origins in this distribution. If you create cache behaviors in addition to the default cache behavior, you use the origin ID that you specify here to identify the origin to which you want CloudFront to route a request when the request matches the path pattern for that cache behavior. For more information, see [Cache Behavior Settings \(p. 68\)](#).

Restrict Bucket Access (Amazon S3 Only)

Choose **Yes** if you want to require users to access objects in an Amazon S3 bucket by using only CloudFront URLs, not by using Amazon S3 URLs. Then specify the applicable values.

Choose **No** if you want users to be able to access objects using either CloudFront URLs or Amazon S3 URLs.

For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

For information about how to require users to access objects on a custom origin by using only CloudFront URLs, see [Using Custom Headers to Restrict Access to Your Content on a Custom Origin \(p. 113\)](#).

Origin Access Identity (Amazon S3 Only)

If you chose **Yes** for **Restrict Bucket Access**, choose whether to create a new origin access identity or use an existing one that is associated with your AWS account. If you already have an origin access identity, we recommend that you reuse it to simplify maintenance. For more information about origin access identities, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Comment for New Identity (Amazon S3 Only)

If you chose **Create a New Identity for Origin Access Identity**, enter a comment that identifies the new origin access identity. CloudFront will create the origin access identity when you create this distribution.

Your Identities (Amazon S3 Only)

If you chose **Use an Existing Identity for Origin Access Identity**, choose the origin access identity that you want to use. You cannot use an origin access identity that is associated with another AWS account.

Grant Read Permissions on Bucket (Amazon S3 Only)

If you want CloudFront to automatically grant the origin access identity the permission to read objects in your Amazon S3 bucket, choose **Yes, Update Bucket Policy**.

Important

If you choose **Yes, Update Bucket Policy**, CloudFront updates the bucket policy to grant the specified origin access identity the permission to read objects in your bucket. However, CloudFront does not remove existing permissions in the bucket policy or permissions on individual objects. If users currently have permission to access the objects in your bucket using Amazon S3 URLs, they will still have that permission after CloudFront updates your bucket policy. To view or change the existing bucket policy and the existing permissions on the objects in your bucket, use a method provided by Amazon S3. For more information, see [Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket \(p. 168\)](#).

If you want to update permissions manually, for example, if you want to update ACLs on your objects instead of updating bucket permissions, choose **No, I will Update Permissions**.

Origin SSL Protocols (Amazon EC2 and Other Custom Origins Only)

Choose the SSL protocols that CloudFront can use when establishing an HTTPS connection with your origin. The SSLv3 protocol is less secure, so we recommend that you choose SSLv3 only if your origin doesn't support TLSv1 or later.

If the origin is an Amazon S3 bucket, CloudFront always uses TLSv1.2.

Origin Protocol Policy (Amazon EC2 and Other Custom Origins Only)

The protocol policy that you want CloudFront to use when fetching objects from your origin server.

Important

If your Amazon S3 bucket is configured as a website endpoint, you must specify **HTTP Only**. Amazon S3 doesn't support HTTPS connections in that configuration.

Choose the applicable value:

- **HTTP Only**: CloudFront uses only HTTP to access the origin.
- **HTTPS Only**: CloudFront uses only HTTPS to access the origin.
- **Match Viewer**: CloudFront communicates with your origin using HTTP or HTTPS, depending on the protocol of the viewer request. CloudFront caches the object only once even if viewers make requests using both HTTP and HTTPS protocols.

Important

For HTTPS viewer requests that CloudFront forwards to this origin, one of the domain names in the SSL certificate on your origin server must match the domain name that you specify for **Origin Domain Name**. Otherwise, CloudFront responds to the viewer requests with an HTTP status code 502 (Bad Gateway) instead of the requested object. For more information, see [How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin \(p. 230\)](#).

HTTP Port (Amazon EC2 and Other Custom Origins Only)

Optional. The HTTP port that the custom origin listens on. Valid values include ports 80, 443, and 1024 to 65535. The default value is port 80.

HTTPS Port (Amazon EC2 and Other Custom Origins Only)

Optional. The HTTPS port that the custom origin listens on. Valid values include ports 80, 443, and 1024 to 65535. The default value is port 443.

Origin Custom Headers

If you want CloudFront to include custom headers whenever it forwards a request to your origin, specify the following values:

Header Name

The name of a header that you want CloudFront to forward to your origin.

Value

The value for the header that you specified in the **Custom Header** field.

For more information, see [Forwarding Custom Headers to Your Origin \(Web Distributions Only\) \(p. 112\)](#).

For the current limit on the maximum number of custom headers that you can forward to the origin, the maximum length of a custom header name and value, and the total length of all header names and values, see [Limits \(p. 353\)](#).

Cache Behavior Settings

A cache behavior lets you configure a variety of CloudFront functionality for a given URL path pattern for files on your website. For example, one cache behavior might apply to all `.jpg` files in the `images` directory on a web server that you're using as an origin server for CloudFront. The functionality you can configure for each cache behavior includes:

- The path pattern.
- If you have configured multiple origins for your CloudFront distribution, which origin you want CloudFront to forward your requests to.
- Whether to forward query strings to your origin.
- Whether accessing the specified files requires signed URLs.
- Whether to require users to use HTTPS to access those files.
- The minimum amount of time that those files stay in the CloudFront cache regardless of the value of any `Cache-Control` headers that your origin adds to the files.

When you create a new distribution, you specify settings for the default cache behavior, which automatically forwards all requests to the origin that you specify when you create the distribution. After you create a distribution, you can create additional cache behaviors that define how CloudFront responds when it

receives a request for objects that match a path pattern, for example, `*.jpg`. If you create additional cache behaviors, the default cache behavior is always the last to be processed. Other cache behaviors are processed in the order in which they're listed in the CloudFront console or, if you're using the CloudFront API, the order in which they're listed in the `DistributionConfig` element for the distribution. For more information, see [Path Pattern \(p. 69\)](#).

When you create a cache behavior, you specify the one origin from which you want CloudFront to get objects. As a result, if you want CloudFront to distribute objects from all of your origins, you must have at least as many cache behaviors (including the default cache behavior) as you have origins. For example, if you have two origins and only the default cache behavior, the default cache behavior will cause CloudFront to get objects from one of the origins, but the other origin will never be used.

For the current limit on the number of cache behaviors that you can add to a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

Path Pattern

A path pattern (for example, `images/* .jpg`) specifies which requests you want this cache behavior to apply to. When CloudFront receives an end-user request, the requested path is compared with path patterns in the order in which cache behaviors are listed in the distribution. The first match determines which cache behavior is applied to that request. For example, suppose you have three cache behaviors with the following three path patterns, in this order:

- `images/* .jpg`
- `images/*`
- `*.gif`

Note

You can optionally include a slash (/) at the beginning of the path pattern, for example, `/images/* .jpg`. CloudFront behavior is the same with or without the leading `/`.

A request for the file `images/sample.gif` doesn't satisfy the first path pattern, so the associated cache behaviors are not applied to the request. The file does satisfy the second path pattern, so the cache behaviors associated with the second path pattern are applied even though the request also matches the third path pattern.

Note

When you create a new distribution, the value of **Path Pattern** for the default cache behavior is set to `*` (all files) and cannot be changed. This value causes CloudFront to forward all requests for your objects to the origin that you specified in the [Origin Domain Name \(p. 65\)](#) field. If the request for an object does not match the path pattern for any of the other cache behaviors, CloudFront applies the behavior that you specify in the default cache behavior.

Caution

Define path patterns and their sequence carefully or you may give users undesired access to your content. For example, suppose a request matches the path pattern for two cache behaviors. The first cache behavior does not require signed URLs and the second cache behavior does require signed URLs. Users will be able to access the objects without using a signed URL because CloudFront processes the cache behavior associated with the first match.

The path you specify applies to requests for all files in the specified directory and in subdirectories below the specified directory. CloudFront does not consider query strings or cookies when evaluating the path pattern. For example, if an `images` directory contains `product1` and `product2` subdirectories, the path pattern `images/* .jpg` applies to requests for any `.jpg` file in the `images`, `images/product1`, and `images/product2` directories. If you want to apply a different cache behavior to the files in the `images/product1` directory than the files in the `images` and `images/product2` directories, create a

separate cache behavior for `images/product1` and move that cache behavior to a position above (before) the cache behavior for the `images` directory.

You can use the following wildcard characters in your path pattern:

- * matches 0 or more characters.
- ? matches exactly 1 character.

The following examples show how the wildcard characters work:

| Path pattern | Files that match the path pattern |
|---------------------------|---|
| <code>*.jpg</code> | All .jpg files |
| <code>images/*.jpg</code> | All .jpg files in the <code>images</code> directory and in subdirectories under the <code>images</code> directory |
| <code>a*.jpg</code> | <ul style="list-style-type: none"> • All .jpg files for which the filename begins with <code>a</code>, for example, <code>apple.jpg</code> and <code>appalachian_trail_2012_05_21.jpg</code> • All .jpg files for which the file path begins with <code>a</code>, for example, <code>abra/cadabra/magic.jpg</code>. |
| <code>a???.jpg</code> | All .jpg files for which the filename begins with <code>a</code> and is followed by exactly two other characters, for example, <code>ant.jpg</code> and <code>abe.jpg</code> |
| <code>*.doc*</code> | All files for which the filename extension begins with <code>.doc</code> , for example, <code>.doc</code> , <code>.docx</code> , and <code>.docm</code> files. You can't use the path pattern <code>*.doc?</code> in this case, because that path pattern wouldn't apply to requests for <code>.doc</code> files; the <code>?</code> wildcard character replaces exactly one character. |

The maximum length of a path pattern is 255 characters. The value can contain any of the following characters:

- A-Z, a-z

Path patterns are case sensitive, so the path pattern `*.jpg` doesn't apply to the file `LOGO.JPG`.

- 0-9
- _ - . * \$ / ~ " ' @ : +
- &, passed and returned as `&`;

Origin (Existing Distributions Only)

Enter the value of **Origin ID** for an existing origin. This identifies the origin that you want CloudFront to route requests to when a request (such as `http://example.com/logo.jpg`) matches the path pattern for a cache behavior (such as `*.jpg`) or for the default cache behavior (*).

Viewer Protocol Policy

Choose the protocol policy that you want viewers to use to access your content in CloudFront edge locations:

- **HTTP and HTTPS:** Viewers can use both protocols.

- **Redirect HTTP to HTTPS:** Viewers can use both protocols, but HTTP requests are automatically redirected to HTTPS requests.
- **HTTPS Only:** Viewers can only access your content if they're using HTTPS.

For more information, see [Using an HTTPS Connection to Access Your Objects \(p. 229\)](#).

Allowed HTTP Methods

Specify the HTTP methods that you want CloudFront to process and forward to your origin:

- **GET, HEAD:** You can use CloudFront only to get objects from your origin or to get object headers.
- **GET, HEAD, OPTIONS:** You can use CloudFront only to get objects from your origin, get object headers, or retrieve a list of the options that your origin server supports.
- **GET, HEAD, OPTIONS, PUT, POST, PATCH, DELETE:** You can use CloudFront to get, add, update, and delete objects, and to get object headers. In addition, you can perform other POST operations such as submitting data from a web form.

Note

CloudFront caches responses to `GET` and `HEAD` requests and, optionally, `OPTIONS` requests. CloudFront does not cache responses to requests that use the other methods.

If you use an Amazon S3 bucket as the origin for your distribution and if you use CloudFront origin access identities, `POST` requests aren't supported in some Amazon S3 regions and `PUT` requests in those regions require an additional header. For more information, see [Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication \(p. 170\)](#).

Caution

If you choose **GET, HEAD, OPTIONS** or **GET, HEAD, OPTIONS, PUT, POST, PATCH, DELETE**, you might need to restrict access to your Amazon S3 bucket or to your custom origin to prevent users from performing operations that you don't want them to perform. The following examples explain how to restrict access:

- **If you're using Amazon S3 as an origin for your distribution:** Create a CloudFront origin access identity to restrict access to your Amazon S3 content, and grant the origin access identity the applicable permissions. For example, if you configure CloudFront to accept and forward these methods *only* because you want to use `PUT`, you must still configure Amazon S3 bucket policies or ACLs to handle `DELETE` requests appropriately. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).
- **If you're using a custom origin:** Configure your origin server to handle all methods. For example, if you configure CloudFront to accept and forward these methods *only* because you want to use `POST`, you must still configure your origin server to handle `DELETE` requests appropriately.

Cached HTTP Methods

Specify whether you want CloudFront to cache the response from your origin when a viewer submits an `OPTIONS` request. CloudFront always caches the response to `GET` and `HEAD` requests.

Forward Headers

Specify whether you want CloudFront to forward request headers to your origin server and to cache objects based on header values:

- **All** – CloudFront forwards all headers to your origin for a cache behavior.

Important

If you configure CloudFront to forward all headers to your origin, CloudFront doesn't cache the objects associated with this cache behavior. Instead, it sends every request to the origin.

- **Whitelist** – CloudFront forwards only the specified headers to the origin. Use **Whitelist Headers** to choose the headers that you want CloudFront to forward.
- **None (Improves Caching)** – CloudFront forwards default headers to the origin, but it doesn't cache your objects based on the header values.

If you're using an Amazon S3 bucket as your origin, note that Amazon S3 processes only three headers: `Access-Control-Request-Headers`, `Access-Control-Request-Method`, and `Origin`. It ignores all other headers in a request.

For more information about forwarding headers to the origin, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#). For a list of HTTP headers and information about whether CloudFront forwards the header to the origin by default, see [HTTP Request Headers and CloudFront Behavior \(p. 149\)](#).

Whitelist Headers

Specify the headers that you want CloudFront to consider when caching your objects. Select headers from the list of available headers and choose **Add**. To forward a custom header, enter the name of the header in the field, and choose **Add Custom**.

For the current limit on the number of headers that you can whitelist for each cache behavior, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

Object Caching

If your origin server is adding a `Cache-Control` header to your objects to control how long the objects stay in the CloudFront cache and if you don't want to change the `Cache-Control` value, choose **Use Origin Cache Headers**.

To specify a minimum and maximum time that your objects stay in the CloudFront cache regardless of `Cache-Control` headers, and a default time that your objects stay in the CloudFront cache when the `Cache-Control` header is missing from an object, choose **Customize**. Then, in the **Minimum TTL**, **Default TTL**, and **Maximum TTL** fields, specify the applicable value.

For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Minimum TTL

Specify the minimum amount of time, in seconds, that you want objects to stay in CloudFront caches before CloudFront forwards another request to your origin to determine whether the object has been updated. The default value for **Minimum TTL** is 0 seconds.

Important

If you configure CloudFront to forward all headers to your origin for a cache behavior, CloudFront never caches the associated objects. Instead, CloudFront forwards all requests for those objects to the origin. In that configuration, the value of **Minimum TTL** must be 0.

To specify a value for **Minimum TTL**, you must choose the **Customize** option for the **Object Caching** setting.

For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Default TTL

Specify the default amount of time, in seconds, that you want objects to stay in CloudFront caches before CloudFront forwards another request to your origin to determine whether the object has been updated. The value that you specify for **Default TTL** applies only when your origin does *not* add HTTP headers such as Cache-Control max-age, Cache-Control s-maxage, or Expires to objects. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

To specify a value for **Default TTL**, you must choose the **Customize** option for the **Object Caching** setting.

The default value for **Default TTL** is 86400 seconds (one day). If you change the value of **Minimum TTL** to more than 86400 seconds, then the default value of **Default TTL** changes to the value of **Minimum TTL**.

Maximum TTL

Specify the maximum amount of time, in seconds, that you want objects to stay in CloudFront caches before CloudFront queries your origin to see whether the object has been updated. The value that you specify for **Maximum TTL** applies only when your origin adds HTTP headers such as Cache-Control max-age, Cache-Control s-maxage, or Expires to objects. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

To specify a value for **Maximum TTL**, you must choose the **Customize** option for the **Object Caching** setting.

The default value for **Maximum TTL** is 31536000 seconds (one year). If you change the value of **Minimum TTL** or **Default TTL** to more than 31536000 seconds, then the default value of **Maximum TTL** changes to the value of **Default TTL**.

Forward Cookies (Amazon EC2 and Other Custom Origins Only)

Specify whether you want CloudFront to forward cookies to your origin server and, if so, which ones. If you choose to forward only selected cookies (a whitelist of cookies), enter the cookie names in the **Whitelist Cookies** field. If you choose **All**, CloudFront forwards all cookies regardless of how many your application uses.

Amazon S3 doesn't process cookies, and forwarding cookies to the origin reduces cacheability. For cache behaviors that are forwarding requests to an Amazon S3 origin, choose **None** for **Forward Cookies**.

For more information about forwarding cookies to the origin, go to [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).

Whitelist Cookies (Amazon EC2 and Other Custom Origins Only)

If you chose **Whitelist** in the **Forward Cookies** list, then in the **Whitelist Cookies** field, enter the names of cookies that you want CloudFront to forward to your origin server for this cache behavior. Enter each cookie name on a new line.

You can specify the following wildcards to specify cookie names:

- * matches 0 or more characters in the cookie name
- ? matches exactly one character in the cookie name

For example, suppose viewer requests for an object include a cookie named:

`userid_member-number`

where each of your users has a unique value for `member-number`. You want CloudFront to cache a separate version of the object for each member. You could accomplish this by forwarding all cookies to your origin, but viewer requests include some cookies that you don't want CloudFront to cache. Alternatively, you could specify the following value as a cookie name, which causes CloudFront to forward to the applicable origin all of the cookies that begin with `userid_`:

`userid_*`

For the current limit on the number of cookie names that you can whitelist for each cache behavior, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

Forward Query Strings

If your origin server returns different versions of an object based on a query string in the URL, choose **Yes**. If your origin returns the same version of an object regardless of the query string, choose **No**. This increases the likelihood that CloudFront can serve a request from the cache, which improves performance and reduces the load on your origin. For more information about query strings, see [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#).

Smooth Streaming

Choose **Yes** if you want to distribute media files in the Microsoft Smooth Streaming format using the origin that is associated with this cache behavior. Otherwise, choose **No**.

Note

If you specify **Yes**, you can still distribute other content using this cache behavior if the content matches the value of **Path Pattern**.

For more information, see [Configuring On-Demand Smooth Streaming \(p. 85\)](#).

Restrict Viewer Access (Use Signed URLs)

If you want requests for objects that match the **PathPattern** for this cache behavior to use public URLs, choose **No**.

If you want requests for objects that match the **PathPattern** for this cache behavior to use signed URLs, choose **Yes**. Then specify the AWS accounts that you want to use to create signed URLs; these accounts are known as trusted signers.

For more information about trusted signers, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

Trusted Signers

Choose which AWS accounts you want to use as trusted signers for this cache behavior:

- **Self:** Use the account with which you're currently signed into the AWS Management Console as a trusted signer. If you're currently signed in as an IAM user, the associated AWS account is added as a trusted signer.
- **Specify Accounts:** Enter account numbers for trusted signers in the **AWS Account Numbers** field.

To create signed URLs, an AWS account must have at least one active CloudFront key pair.

Caution

If you're updating a distribution that you're already using to distribute content, add trusted signers only when you're ready to start generating signed URLs for your objects. After you add trusted signers to a distribution, users must use signed URLs to access the objects that match the `PathPattern` for this cache behavior.

AWS Account Numbers

If you want to create signed URLs using AWS accounts in addition to or instead of the current account, enter one AWS account number per line in this field. Note the following:

- The accounts that you specify must have at least one active CloudFront key pair. For more information, see [Creating CloudFront Key Pairs for Your Trusted Signers \(p. 172\)](#).
- You can't create CloudFront key pairs for IAM users, so you can't use IAM users as trusted signers.
- For information about how to get the AWS account number for an account, see [How Do I Get Security Credentials?](#) in the *Amazon Web Services General Reference*.
- If you enter the account number for the current account, CloudFront automatically checks the **Self** checkbox and removes the account number from the **AWS Account Numbers** list.

Compress Objects Automatically

If you want CloudFront to automatically compress files of certain types when viewer requests include `Accept-Encoding: gzip` in the request header, choose **Yes**. When CloudFront compresses your content, downloads are faster because the files are smaller, and your web pages render faster for your users. For more information, see [Serving Compressed Files \(p. 135\)](#).

Distribution Details

The following values apply to the entire distribution.

Price Class

Choose the price class that corresponds with the maximum price that you want to pay for CloudFront service. By default, CloudFront serves your objects from edge locations in all CloudFront regions.

For more information about price classes and about how your choice of price class affects CloudFront performance for your distribution, see [Choosing the Price Class for a CloudFront Distribution \(p. 54\)](#). For information about CloudFront pricing, including how price classes map to CloudFront regions, go to [Amazon CloudFront Pricing](#).

AWS WAF Web ACL

If you want to use AWS WAF to allow or block requests based on criteria that you specify, choose the web ACL to associate with this distribution.

AWS WAF is a web application firewall that lets you monitor the HTTP and HTTPS requests that are forwarded to CloudFront, and lets you control access to your content. Based on conditions that you specify, such as the IP addresses that requests originate from or the values of query strings, CloudFront responds to requests either with the requested content or with an HTTP 403 status code (Forbidden). You can also configure CloudFront to return a custom error page when a request is blocked. For more information about AWS WAF, see the [AWS WAF Developer Guide](#).

Alternate Domain Names (CNAMEs)

Optional. Specify one or more domain names that you want to use for URLs for your objects instead of the domain name that CloudFront assigns when you create your distribution. For example, if you want the URL for the object:

/images/image.jpg

to look like this:

http://www.example.com/images/image.jpg

instead of like this:

http://d111111abcdef8.cloudfront.net/images/image.jpg

add a CNAME for www.example.com.

Important

If you add a CNAME for www.example.com to your distribution, you also need to create (or update) a CNAME record with your DNS service to route queries for www.example.com to d111111abcdef8.cloudfront.net. You must have permission to create a CNAME record with the DNS service provider for the domain. Typically, this means that you own the domain, but you may also be developing an application for the domain owner.

For the current limit on the number of alternate domain names that you can add to a distribution, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

For more information about alternate domain names, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#). For more information about CloudFront URLs, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

SSL Certificate

If you want viewers to use HTTPS to access your objects, choose the applicable setting. In addition, if you choose **Custom SSL Certificate**, choose the certificate that you want to use:

- **Default CloudFront Certificate (*.cloudfront.net)** – If you want to use the CloudFront domain name in the URLs for your objects, such as https://d111111abcdef8.cloudfront.net/image1.jpg, choose this option. Also choose this option if you want viewers to use HTTP to access your objects.
- **Custom SSL Certificate** – If you want to use your own domain name in the URLs for your objects, such as https://example.com/image1.jpg, choose this option and then choose the applicable certificate. Note that the list can include both certificates provisioned by AWS Certificate Manager and certificates that you purchased from another certificate authority and uploaded to the IAM certificate store. For more information, see [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

If you choose this setting, we recommend that you use only an alternate domain name in your object URLs (<https://example.com/logo.jpg>). If you use your CloudFront distribution domain name (<https://d111111abcdef8.cloudfront.net/logo.jpg>) and the viewer supports SNI, then CloudFront behaves normally. However, a viewer that does not support SNI exhibits one of the following behaviors, depending on the value of **Clients Supported**:

- **All Clients**: If the viewer doesn't support SNI, it displays a warning because the CloudFront domain name doesn't match the domain name in your SSL certificate.
- **Only Clients that Support Server Name Indication (SNI)**: CloudFront drops the connection with the viewer without returning the object.

Clients Supported

If you specified one or more alternate domain names and you specified an SSL certificate in the IAM certificate store, choose how you want CloudFront to serve HTTPS requests, either a method that works for all clients or one that works for most clients:

- **All Clients:** Any client can access your content. However, you must request permission to use this feature, and you incur additional monthly charges.
- **Only Clients that Support Server Name Indication (SNI):** All modern browsers can access your content because they all support SNI. However, some browsers still in use don't support SNI. Users with these browsers must access your content using some other method, for example, by getting your objects directly from the origin.

For more information, see [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

Minimum SSL Protocol Version

Specify the minimum version of the SSL protocol that you want CloudFront to use—**SSLv3** or **TLSv1**—for HTTPS connections. CloudFront will serve your objects only to browsers or devices that support at least the SSL version that you specify. The TLSv1 protocol is more secure, so we recommend that you specify **SSLv3** only if your users are using browsers or devices that don't support TLSv1.

If you selected **Custom SSL Certificate** and you selected **Only Clients that Support Server Name Indication (SNI)**, CloudFront uses TLSv1, which is the minimum allowed SSL protocol for SNI.

Default Root Object

Optional. The object that you want CloudFront to request from your origin (for example, `index.html`) when a viewer requests the root URL of your distribution (`http://www.example.com/`) instead of an object in your distribution (`http://www.example.com/product-description.html`). Specifying a default root object avoids exposing the contents of your distribution.

The maximum length of the name is 255 characters. The name can contain any of the following characters:

- A-Z, a-z
- 0-9
- _ - . * \$ / ~ ^
- &, passed and returned as `&`

When you specify the default root object, enter only the object name, for example, `index.html`. Do not add a `/` before the object name.

For more information, see [Specifying a Default Root Object \(Web Distributions Only\) \(p. 132\)](#).

Logging

Whether you want CloudFront to log information about each request for an object and store the log files in an Amazon S3 bucket. You can enable or disable logging at any time. There is no extra charge if you enable logging, but you accrue the usual Amazon S3 charges for storing and accessing the files in an Amazon S3 bucket. You can delete the logs at any time. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Bucket for Logs

If you chose **On** for **Logging**, the Amazon S3 bucket that you want CloudFront to store access logs in, for example, `myawslogbucket.s3.amazonaws.com`. If you enable logging, CloudFront records information about each end-user request for an object and stores the files in the specified Amazon S3 bucket. You can enable or disable logging at any time. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Log Prefix

Optional. If you chose **On** for **Logging**, specify the string, if any, that you want CloudFront to prefix to the access log filenames for this distribution, for example, `exampleprefix/`. The trailing slash (/) is optional but recommended to simplify browsing your log files. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Cookie Logging

If you want CloudFront to include cookies in access logs, choose **On**. If you choose to include cookies in logs, CloudFront logs all cookies regardless of how you configure the cache behaviors for this distribution: forward all cookies, forward no cookies, or forward a specified list of cookies to the origin.

Amazon S3 doesn't process cookies, so unless your distribution also includes an Amazon EC2 or other custom origin, we recommend that you choose **Off** for the value of **Cookie Logging**.

For more information about cookies, go to [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).

Comment

Optional. When you create a distribution, you can include a comment of up to 128 characters. You can update the comment at any time.

Distribution State

Indicates whether you want the distribution to be enabled or disabled once it's deployed:

- *Enabled* means that as soon as the distribution is fully deployed you can deploy links that use the distribution's domain name and users can retrieve content. Whenever a distribution is enabled, CloudFront accepts and handles any end-user requests for content that use the domain name associated with that distribution.

When you create, modify, or delete a CloudFront distribution, it takes time for your changes to propagate to the CloudFront database. An immediate request for information about a distribution might not show the change. Propagation usually completes within minutes, but a high system load or network partition might increase this time.

- *Disabled* means that even though the distribution might be deployed and ready to use, users can't use it. Whenever a distribution is disabled, CloudFront doesn't accept any end-user requests that use the domain name associated with that distribution. Until you switch the distribution from disabled to enabled (by updating the distribution's configuration), no one can use it.

You can toggle a distribution between disabled and enabled as often as you want. Follow the process for updating a distribution's configuration. For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

Custom Error Pages and Error Caching

You can have CloudFront return an object to the viewer (for example, an HTML file) when your Amazon S3 or custom origin returns an HTTP 4xx or 5xx status code to CloudFront. You can also specify how long an error response from your origin or a custom error page is cached in CloudFront edge caches. For more information, see [Customizing Error Responses \(p. 127\)](#).

Note

The following values aren't included in the Create Distribution wizard, so you can configure custom error pages only when you update a distribution.

Error Code

The HTTP status code for which you want CloudFront to return a custom error page. You can configure CloudFront to return custom error pages for none, some, or all of the HTTP status codes that CloudFront caches.

Response Page Path

The path to the custom error page (for example, /4xx-errors/403-forbidden.html) that you want CloudFront to return to a viewer when your origin returns the HTTP status code that you specified for **Error Code** (for example, 403). If you want to store your objects and your custom error pages in different locations, your distribution must include a cache behavior for which the following is true:

- The value of **Path Pattern** matches the path to your custom error messages. For example, suppose you saved custom error pages for 4xx errors in an Amazon S3 bucket in a directory named /4xx-errors. Your distribution must include a cache behavior for which the path pattern routes requests for your custom error pages to that location, for example, /4xx-errors/*.
- The value of **Origin** specifies the value of **Origin ID** for the origin that contains your custom error pages.

Response Code

The HTTP status code that you want CloudFront to return to the viewer along with the custom error page.

Error Caching Minimum TTL

The minimum amount of time that you want CloudFront to cache error responses from your origin server.

Restrictions

If you need to prevent users in selected countries from accessing your content, you can configure your CloudFront distribution either to allow users in a whitelist of specified countries to access your content or to not allow users in a blacklist of specified countries to access your content. For more information, see [Restricting the Geographic Distribution of Your Content \(p. 82\)](#).

Note

The following values aren't included in the Create Distribution wizard, so you can configure geo restrictions only when you update a distribution.

Enable Geo Restriction

Whether you want to prevent users in selected countries from accessing your content. There is no additional charge for configuring geo restriction.

Restriction Type

How you want to specify the countries from which your users can access your content:

- **Whitelist:** The **Countries** list includes all of the countries from which you *do* want your users to access your content.
- **Blacklist:** The **Countries** list includes all of the countries from which you *do not* want your users to access your content.

Countries

The countries that you want to add to your whitelist or blacklist. To add a country, select it in the list on the left and choose **Add**. Note the following:

- To add multiple consecutive countries, select the first country, press and hold the Shift key, select the last country, and choose **Add**.
- To add multiple non-consecutive countries, select the first country, press and hold the Ctrl key, select the remaining countries, and choose **Add**.
- To find a country in the left list, enter the first few characters of the country's full name.
- The two-letter code before the name of each country is the value that you enter if you want to create or update a distribution by using the CloudFront API. We use the International Organization for Standardization country codes. For an easy-to-use list, sortable by code and by country name, see the Wikipedia entry [ISO 3166-1 alpha-2](#).

Values that CloudFront Displays in the Console When You Create or Update a Web Distribution

When you create a new web distribution or update an existing distribution, CloudFront displays the following information in the CloudFront console.

Note

Active trusted signers, the AWS accounts that have an active CloudFront key pair and can be used to create valid signed URLs, are currently not visible in the CloudFront console.

Distribution ID (General Tab)

When you perform an action on a distribution using the CloudFront API, you use the distribution ID to specify which distribution you want to perform the action on, for example, EDFDVBD6EXAMPLE. You can't change the distribution ID.

Distribution Status (General Tab)

The possible status values for a distribution are listed in the following table.

| Value | Description |
|------------|--|
| InProgress | The distribution is still being created or updated. |
| Deployed | The distribution has been created or updated and the changes have been fully propagated through the CloudFront system. |

Note

In addition to ensuring that the status for a distribution is **Deployed**, you must enable the distribution before users can use CloudFront to access your content. For more information, see [Distribution State \(p. 78\)](#).

Last Modified (General Tab)

The date and time that the distribution was last modified, using ISO 8601 format, for example, 2012-05-19T19:37:58Z. For more information, go to <http://www.w3.org/TR/NOTE-datetime>.

Domain Name (General Tab)

You use the distribution's domain name in the links to your objects. For example, if your distribution's domain name is d11111abcdef8.cloudfront.net, the link to /images/image.jpg would be http://d11111abcdef8.cloudfront.net/images/image.jpg. You can't change the CloudFront domain name for your distribution. For more information about CloudFront URLs for links to your objects, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

If you specified one or more alternate domain names (CNAMEs), you can use your own domain names for links to your objects instead of using the CloudFront domain name. For more information about CNAMEs, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#).

Note

CloudFront domain names are unique. Your distribution's domain name was never used for a previous distribution and will never be reused for another distribution in the future.

Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins

Follow these guidelines for using Amazon EC2 instances and other custom origins with CloudFront.

- Host and serve the same content on all servers.
- Log the `x-Amz-Cf-Id` header entries on all servers; CloudFront requires this information for debugging.
- Restrict access requests to the HTTP and HTTPS ports that your custom origin listens on.
- Synchronize the clocks of all servers in your implementation.
- Use redundant servers to handle failures.
- For information about using a custom origin to serve private content, see [Using an HTTP Server for Private Content \(p. 164\)](#).
- For information about request and response behavior and about supported HTTP status codes, see [Request and Response Behavior \(p. 139\)](#).

If you use Amazon Elastic Compute Cloud for your custom origins, we recommend that you do the following:

1. Use an Amazon Machine Image that automatically installs the software for a web server. For more information, see the [Amazon EC2 documentation](#).
2. Use an Elastic Load Balancing load balancer to handle traffic across multiple Amazon EC2 instances and to isolate your application from changes to Amazon EC2 instances. For example, if you use a load balancer, you can add and delete Amazon EC2 instances without changing your application. For more information, see the [Elastic Load Balancing documentation](#).

3. When you create your CloudFront distribution, specify the URL of the load balancer for the domain name of your origin server. For more information, see [Working with Web Distributions \(p. 58\)](#).

Using AWS WAF to Control Access to Your Content

AWS WAF is a web application firewall that lets you monitor the HTTP and HTTPS requests that are forwarded to CloudFront, and lets you control access to your content. Based on conditions that you specify, such as the IP addresses that requests originate from or the values of query strings, CloudFront responds to requests either with the requested content or with an HTTP 403 status code (Forbidden). You can also configure CloudFront to return a custom error page when a request is blocked. For more information about AWS WAF, see the [AWS WAF Developer Guide](#).

After you create an AWS WAF web access control list (web ACL), you create or update a web distribution and associate the distribution with a web ACL. You can associate as many CloudFront distributions as you want with the same web ACL or with different web ACLs. For information about creating a web distribution and associating it with a web ACL, see [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#).

To associate or disassociate a web ACL and an existing distribution, or change the web ACL that is associated with a distribution, perform the following procedure.

To associate or disassociate an AWS WAF web ACL and an existing CloudFront distribution by using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the ID for the distribution that you want to update.
3. On the **General** tab, choose **Edit**.
4. On the **Distribution Settings** page, in the **AWS WAF Web ACL** list, choose the web ACL that you want to associate with this distribution.

If you want to disassociate the distribution from all web ACLs, choose **None**. If you want to associate the distribution with a different web ACL, choose the new web ACL.

5. Choose **Yes, Edit**.
6. Repeat steps 2 through 5 for other distributions, if any, for which you want to add, delete, or change associations with AWS WAF web ACLs.
7. After you change settings, the value of the **Status** column for the distributions that you updated changes to **InProgress** while CloudFront propagates the changes to edge locations. When **Status** changes to **Deployed** for a distribution, the distribution is ready to use AWS WAF when it processes requests. (The value of the **State** column for the distribution must also be **Enabled**.) This should take less than 15 minutes after you save the last change to a distribution.

Restricting the Geographic Distribution of Your Content

You can use *geo restriction*, also known as *geoblocking*, to prevent users in specific geographic locations from accessing content that you're distributing through a CloudFront web distribution. To use geo restriction, you have two options:

- Use the CloudFront geo restriction feature. Use this option to restrict access to all of the files that are associated with a distribution and to restrict access at the country level.
- Use a third-party geolocation service. Use this option to restrict access to a subset of the files that are associated with a distribution or to restrict access at a finer granularity than the country level.

Topics

- [Using CloudFront Geo Restriction \(p. 83\)](#)
- [Using a Third-Party Geolocation Service \(p. 84\)](#)

Using CloudFront Geo Restriction

When a user requests your content, CloudFront typically serves the requested content regardless of where the user is located. If you need to prevent users in specific countries from accessing your content, you can use the CloudFront geo restriction feature to do one of the following:

- Allow your users to access your content only if they're in one of the countries on a whitelist of approved countries.
- Prevent your users from accessing your content if they're in one of the countries on a blacklist of banned countries.

For example, if a request comes from a country where, for copyright reasons, you are not authorized to distribute your content, you can use CloudFront geo restriction to block the request.

Note

CloudFront determines the location of your users by using a third-party GeolP database. The accuracy of the mapping between IP addresses and countries varies by region. Based on recent tests, the overall accuracy is 99.8%.

Here's how geo restriction works:

1. Suppose you have rights to distribute your content only in Liechtenstein. You update your CloudFront web distribution and add a whitelist that contains only Liechtenstein. (Alternatively, you could add a blacklist that contains every country except Liechtenstein.)
2. A user in Monaco requests your content, and DNS routes the request to the CloudFront edge location in Milan, Italy.
3. The edge location in Milan looks up your distribution and determines that the user in Monaco is not allowed to download your content.
4. CloudFront returns an HTTP status code of 403 (Forbidden) to the user.

You can optionally configure CloudFront to return a custom error message to the user, and you can specify how long you want CloudFront to cache the error response for the requested object; the default value is five minutes. For more information, see [Customizing Error Responses \(p. 127\)](#).

Geo restriction applies to an entire web distribution. If you need to apply one restriction to part of your content and a different restriction (or no restriction) to another part of your content, you must either create separate CloudFront web distributions or use a third-party geolocation service.

If you enable CloudFront access logging, you can identify the requests that CloudFront rejected by searching for the log entries for which the value of `sc-status` (the HTTP status code) is 403. However, using only the access logs, you can't distinguish a request that CloudFront rejected based on the location of the user from a request that CloudFront rejected because the user didn't have permission to access the object for another reason. If you have a third-party geolocation service such as Digital Element or MaxMind, you can identify the location of requests based on the IP address in the `c-ip` (client IP) column in the access logs. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

The following procedure explains how to use the CloudFront console to add geo restriction to an existing web distribution. For information about how to use the console to create a web distribution, see [Working with Web Distributions \(p. 58\)](#).

To use the CloudFront console to add geo restriction to your CloudFront web distribution

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Select the distribution that you want to update.
3. In the **Distribution Settings** pane, choose the **Restrictions** tab.
4. Choose **Edit**.
5. Enter the applicable values. For more information, see [Restrictions \(p. 79\)](#).
6. Choose **Yes, Edit**.

Using a Third-Party Geolocation Service

The CloudFront geo restriction feature lets you control distribution of your content at the country level for all files that you're distributing with a given web distribution. If you have geographic restrictions on where your content can be distributed and the restrictions don't follow country boundaries, or if you want to limit access to only some of the files that you're distributing through CloudFront, you can combine CloudFront with a third-party geolocation service. This can allow you to control access to your content based not only on country but also based on city, zip or postal code, or even latitude and longitude.

When you're using a third-party geolocation service, we recommend that you use CloudFront signed URLs, which let you specify an expiration date and time after which the URL is no longer valid. In addition, we recommend that you use an Amazon S3 bucket as your origin because you can then use a CloudFront origin access identity to prevent users from accessing your content directly from the origin. For more information about signed URLs and origin access identities, see [Serving Private Content through CloudFront \(p. 162\)](#).

The following task list explains how to control access to your files by using a third-party geolocation service.

Task list for restricting access to files in a CloudFront distribution based on geographic location

1. Get an account with a geolocation service.
2. Upload your content to an Amazon Simple Storage Service (S3) bucket. For more information, see the [Amazon S3 documentation](#).
3. Configure Amazon CloudFront and Amazon S3 to serve private content. For more information, see [Serving Private Content through CloudFront \(p. 162\)](#).
4. Write your web application to do the following:
 - a. Send the IP address for each user request to the geolocation service.
 - b. Evaluate the return value from the geolocation service to determine whether the user is in a location to which you want CloudFront to distribute your content.
 - c. Based on whether you want to distribute your content to the user's location, either generate a signed URL for your CloudFront content, or return HTTP status code 403 (Forbidden) to the user. Alternatively, you can configure CloudFront to return a custom error message. For more information, see [Customizing Error Responses \(p. 127\)](#).

For more information, refer to the documentation for the geolocation service that you're using.

You can use a web server variable to get the IP addresses of the users who are visiting your website. Note the following caveats:

- If your web server is not connected to the Internet through a load balancer, you can use a web server variable to get the remote IP address. However, this IP address isn't always the user's IP address—it can also be the IP address of a proxy server, depending on how the user is connected to the Internet.
- If your web server is connected to the Internet through a load balancer, a web server variable might contain the IP address of the load balancer, not the IP address of the user. In this configuration, we recommend that you use the last IP address in the `X-Forwarded-For` http header. This header typically contains more than one IP address, most of which are for proxies or load balancers. The last IP address in the list is the one most likely to be associated with the user's geographic location.

If your web server is not connected to a load balancer, we recommend that you use web server variables instead of the `X-Forwarded-For` header to avoid IP address spoofing.

Configuring On-Demand Smooth Streaming

You can use CloudFront for on-demand streaming of media files that you've transcoded into the Microsoft Smooth Streaming format. To distribute Smooth Streaming content on demand, you have two options:

- As the origin for your distribution, specify a web server that can stream files that have been transcoded into Microsoft Smooth Streaming format.
- Enable Smooth Streaming in a CloudFront distribution. Smooth Streaming is a property of cache behaviors, which means that you can use one distribution to distribute Smooth Streaming media files as well as other content.

If you enable Smooth Streaming, note the following:

- You can still distribute other content using the same cache behavior if the content matches the value of **Path Pattern** for that cache behavior.
- CloudFront can use either an Amazon S3 bucket or a custom origin for Smooth Streaming media files. However, CloudFront cannot use a Microsoft IIS Server as an origin if the server is configured for Smooth Streaming.
- You cannot invalidate media files in the Smooth Streaming format. If you want to update files before they expire, you must rename them. For more information, see [Adding, Removing, or Replacing Objects in a Distribution \(p. 114\)](#).

For information about Smooth Streaming clients, see [Smooth Streaming Primer](#) on the Microsoft website.

To use CloudFront to stream media files that have been encoded in the Microsoft Smooth Streaming format without using a web server that can stream files in Smooth Streaming format, perform the following tasks:

1. Transcode your media files into Smooth Streaming fragmented-MP4 format. For a list of applications that can transcode into Smooth Streaming format, see [Smooth Streaming Primer](#) on the Microsoft website.
2. Do one of the following:
 - **If you're using the CloudFront console:** When you create a web distribution, enable Smooth Streaming in the default cache behavior. Alternatively, you can enable Smooth Streaming in the default cache behavior and/or one or more custom cache behaviors in an existing CloudFront web distribution.

- **If you're using the CloudFront API:** Add the `SmoothStreaming` element to the `DistributionConfig` complex type for the default cache behavior and/or one or more custom cache behaviors.
3. Upload the files in your Smooth Streaming presentations to the applicable origin.
 4. Create either a `clientaccesspolicy.xml` or a `crossdomainpolicy.xml` file, and add it to a location that is accessible at the root of your distribution, for example, `http://d111111abcdef8.cloudfront.net/clientaccesspolicy.xml`. For more information, see [Making a Service Available Across Domain Boundaries](#) on the Microsoft Developer Network website.
 5. For links in your application, specify the client manifest in the following format:
`http://d111111abcdef8.cloudfront.net/video/presentation.ism/Manifest`

Configuring On-Demand Progressive Downloads

To use CloudFront to distribute media files using progressive download, perform the following tasks:

1. Transcode your media files, if applicable.
2. Create a CloudFront web distribution. No special settings are required.
3. Upload your files to the origin that you specified when you created your distribution.
4. For links in your application (for example, a media player), specify the name of the media file in the same format that you use for other objects that you're distributing using CloudFront. For more information, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

Configuring On-Demand Apple HTTP Live Streaming (HLS)

To use CloudFront to stream media files in Apple HTTP Live Streaming (HLS) format, perform the following tasks:

1. Transcode your media files into HLS format. You can use any transcoding application that supports HLS format, for example, [Amazon Elastic Transcoder](#).
2. Create a CloudFront web distribution. No special settings are required.
3. Upload your files to the origin that you specified when you created your distribution.
4. For links in your application (for example, a media player), specify the master playlist in the same format that you use for other objects that you're distributing using CloudFront. For more information, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

Working with RTMP Distributions

Topics

- [How RTMP Distributions Work \(p. 87\)](#)
- [Task List for Streaming Media Files Using RTMP \(p. 89\)](#)
- [Creating an RTMP Distribution Using the CloudFront Console \(p. 90\)](#)
- [Values that You Specify When You Create or Update an RTMP Distribution \(p. 90\)](#)
- [Values that CloudFront Displays in the Console When You Create or Update an RTMP Distribution \(p. 95\)](#)
- [Configuring the Media Player \(p. 96\)](#)
- [Using an Amazon S3 Bucket as the Origin for an RTMP Distribution \(p. 96\)](#)
- [Creating Multiple RTMP Distributions for an Origin Server \(p. 97\)](#)
- [Restricting Access Using Crossdomain.xml \(p. 97\)](#)
- [Error Codes for RTMP Distributions \(p. 98\)](#)
- [Troubleshooting RTMP Distributions \(p. 98\)](#)

This section describes how you configure and manage RTMP distributions. For information about how to create an RTMP distribution, see [Task List for Streaming Media Files Using RTMP \(p. 89\)](#).

How RTMP Distributions Work

To stream media files using CloudFront, you provide two types of files to your end users:

- Your media files
- A media player, for example, JW Player, Flowplayer, or Adobe Flash

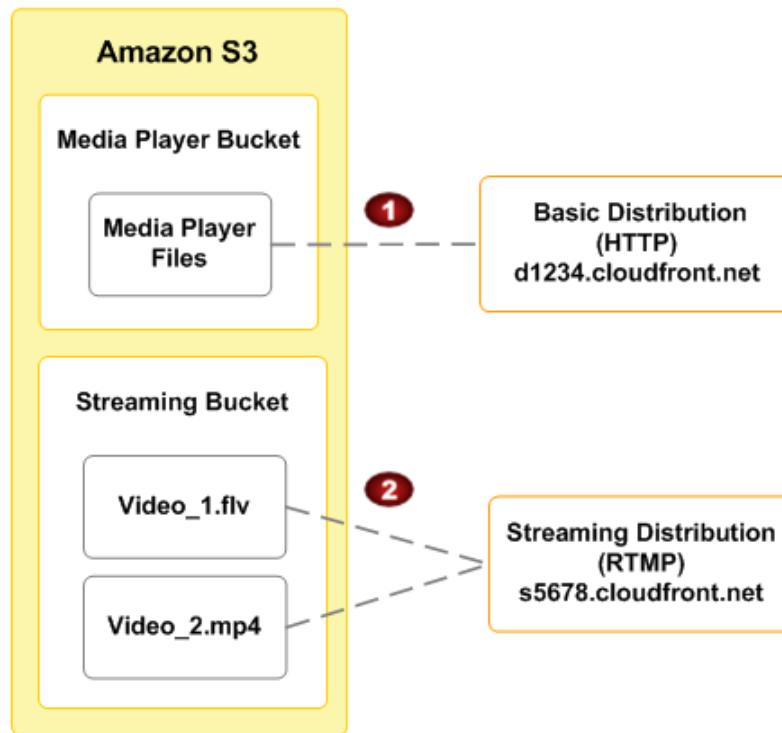
End users view your media files using the media player that you provide for them; they do not use the media player (if any) that is already installed on their computer or other device.

When an end user streams your media file, the media player begins to play the content of the file while the file is still being downloaded from CloudFront. The media file is not stored locally on the end user's system.

To use CloudFront to serve both the media player and the media files, you need two types of distributions: a web distribution for the media player, and an RTMP distribution for the media files. Web distributions serve files over HTTP, while RTMP distributions stream media files over RTMP (or a variant of RTMP).

The following example assumes that your media files and your media player are stored in different buckets in Amazon S3, but that isn't required—you can store media files and your media player in the same Amazon S3 bucket. You can also make the media player available to end users in other ways, for example, using CloudFront and a custom origin. However, the media files must use an Amazon S3 bucket as the origin.

In the following diagram, your site serves a cached copy of the media player to each end user through the `d1234.cloudfront.net` domain. The media player then accesses cached copies of your media files through the `s5678.cloudfront.net` domain.



- | | |
|----------|---|
| 1 | Your media player bucket holds the media player and is the origin server for a regular HTTP distribution. In this example, the domain name for the distribution is <code>d1234.cloudfront.net</code> . (The <code>d</code> in <code>d1234.cloudfront.net</code> indicates that this is a web distribution.) |
| 2 | Your streaming media bucket holds your media files and is the origin server for an RTMP distribution. In this example, the domain name for the distribution is <code>s5678.cloudfront.net</code> . (The <code>s</code> in <code>s5678.cloudfront.net</code> indicates that this is an RTMP distribution.) |

When you configure CloudFront to distribute media files, CloudFront uses Adobe Flash Media Server 3.5 as the streaming server and streams your media files using Adobe's Real-Time Messaging Protocol (RTMP). CloudFront accepts RTMP requests over port 1935 and port 80.

CloudFront supports the following variants of the RTMP protocol:

- **RTMP**—Adobe's Real-Time Message Protocol
- **RTMPT**—Adobe streaming tunneled over HTTP

- **RTMPE**—Adobe encrypted
- **RTMPTE**—Adobe encrypted tunneled over HTTP

For a basic summary of RTMP and the file formats that Adobe Flash Media Server supports, go to [Overview of Streaming with Flash Media Server 3](#) on the Adobe website. The overview includes information about supported codecs and containers.

CloudFront supports all of the features in Adobe Flash Media Server 3.5 related to *dynamic streaming*, which lets you switch between streams of different qualities during playback. For more information, go to [Dynamic streaming in Flash Media Server 3.5: Part 1](#) on the Adobe website.

To serve streamed content, you need to provide your end users with a media player. You can write your own player using Adobe Flash. For more information, go to <http://www.adobe.com/products/flashplayer/>. Alternatively, you can use an existing player. For more information, see the following tutorials:

- [On-Demand Video Streaming Using CloudFront and Adobe Flash Player \(p. 338\)](#)
- [On-Demand Video Streaming Using CloudFront and Flowplayer for Adobe Flash \(p. 343\)](#)
- [On-Demand Video Streaming Using CloudFront and JW Player \(p. 348\)](#)

Task List for Streaming Media Files Using RTMP

This section summarizes the general process for configuring on-demand streaming using the Adobe RTMP protocol for any media player. If you're using Adobe Flash Player, Flowplayer, or JW Player for your media player, see the applicable tutorial instead:

- [On-Demand Video Streaming Using CloudFront and Adobe Flash Player \(p. 338\)](#)
- [On-Demand Video Streaming Using CloudFront and Flowplayer for Adobe Flash \(p. 343\)](#)
- [On-Demand Video Streaming Using CloudFront and JW Player \(p. 348\)](#)

The following task list summarizes the process for creating a web distribution.

To Create an RTMP Distribution

1. Create an Amazon S3 bucket for your media files. If you are using a different Amazon S3 bucket for your media player, create an Amazon S3 bucket for the media player files, too.
The names of your buckets must be all lowercase and cannot contain spaces.
2. Choose and configure a media player to play your media files. For more information, refer to the documentation for the media player.
3. Upload the files for your media player to the origin from which you want CloudFront to get the files. If you are using an Amazon S3 bucket as the origin for the media player, make the files (not the bucket) publicly readable.
4. Create a web distribution for your media player. (You can also use an existing distribution.) For more information, see [Task List for Creating a Web Distribution \(p. 58\)](#).
5. Upload your media files to the Amazon S3 bucket that you created for the media files, and make the content (not the bucket) publicly readable.

Important

Media files in a Flash Video container must include the .flv filename extension, or the media will not stream.

You can put media player files and media files in the same bucket.

6. Create an RTMP distribution for your media files:

- For more information about creating a web distribution using the CloudFront console, see [Creating an RTMP Distribution Using the CloudFront Console \(p. 90\)](#).
 - For information about creating a web distribution using the CloudFront API, go to [POST Streaming Distribution](#) in the *Amazon CloudFront API Reference*.
7. Configure your media player. For more information, see [Configuring the Media Player \(p. 96\)](#).

If you have trouble getting your content to play, see [Troubleshooting RTMP Distributions \(p. 98\)](#).

Creating an RTMP Distribution Using the CloudFront Console

The following procedure explains how to create an RTMP distribution using the CloudFront console. If you want to create an RTMP distribution using the CloudFront API, go to [POST Streaming Distribution](#) in the *Amazon CloudFront API Reference*.

For the current limit on the number of RTMP distributions that you can create for each AWS account, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

To create an RTMP distribution using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Click **Create Distribution**.
3. On the first page of the **Create Distribution Wizard**, in the **RTMP** section, choose **Get Started**.
4. Specify settings for the distribution. For more information, see [Values that You Specify When You Create or Update an RTMP Distribution \(p. 90\)](#).
5. Click **Create Distribution**.
6. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. If you chose to enable the distribution, it will then be ready to process requests. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. The domain name also appears on the **General** tab for a selected distribution.

Values that You Specify When You Create or Update an RTMP Distribution

To stream media files using CloudFront, you create an RTMP distribution and specify the following values.

Topics

- [Origin Domain Name \(Amazon S3 Bucket\) \(p. 91\)](#)
- [Restrict Bucket Access \(Amazon S3 Only\) \(p. 92\)](#)
- [Origin Access Identity \(Amazon S3 Only\) \(p. 92\)](#)
- [Comment for New Identity\(Amazon S3 Only\) \(p. 92\)](#)

- [Your Identities \(Amazon S3 Only\) \(p. 92\)](#)
- [Grant Read Permissions on Bucket \(Amazon S3 Only\) \(p. 92\)](#)
- [Price Class \(p. 92\)](#)
- [Alternate Domain Names \(CNAMEs\) \(p. 93\)](#)
- [Logging \(p. 93\)](#)
- [Bucket for Logs \(p. 93\)](#)
- [Log Prefix \(p. 93\)](#)
- [Comment \(p. 93\)](#)
- [Distribution State \(p. 93\)](#)
- [Restrict Viewer Access \(Use Signed URLs\) \(p. 94\)](#)
- [Trusted Signers \(p. 94\)](#)
- [AWS Account Numbers \(p. 94\)](#)

Origin Domain Name (Amazon S3 Bucket)

The DNS domain name of the Amazon S3 bucket from which you want CloudFront to get objects for this origin, for example, `myawsbucket.s3.amazonaws.com`. In the CloudFront console, click in the **Origin Domain Name** field, and a list enumerates the Amazon S3 buckets that are associated with the current AWS account. To use a bucket from a different AWS account, type the domain name of the bucket in the following format:

`bucket-name.s3.amazonaws.com`

If your bucket is in the US Standard region and you want Amazon S3 to route requests to a facility in Northern Virginia, use the following format:

`bucket-name.s3-external-1.amazonaws.com`

If you configured Amazon S3 Transfer Acceleration for your bucket, do not specify the `s3-accelerate` endpoint for **Origin Domain Name**.

The files must be publicly readable unless you secure your content in Amazon S3 by using a CloudFront origin access identity. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Important

The bucket name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

When you change the bucket from which CloudFront gets objects for the current origin, CloudFront immediately begins replicating the change to CloudFront edge locations. Until the distribution configuration is updated in a given edge location, CloudFront will continue to forward requests to the previous Amazon S3 bucket. As soon as the distribution configuration is updated in that edge location, CloudFront begins to forward requests to the new Amazon S3 bucket.

Changing the bucket does not require CloudFront to repopulate edge caches with objects from the new origin. As long as the viewer requests in your application have not changed, CloudFront will continue to serve objects that are already in an edge cache until the TTL on each object expires or until seldom-requested objects are evicted.

For more information, see [Using an Amazon S3 Bucket as the Origin for an RTMP Distribution \(p. 96\)](#).

Restrict Bucket Access (Amazon S3 Only)

Click **Yes** if you want to require end users to access objects in an Amazon S3 bucket by using only CloudFront URLs, not by using Amazon S3 URLs. Then specify the applicable values.

Click **No** if you want end users to be able to access objects using either CloudFront URLs or Amazon S3 URLs.

For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Origin Access Identity (Amazon S3 Only)

If you chose **Yes** for **Restrict Bucket Access**, choose whether to create a new origin access identity or use an existing one that is associated with your AWS account. If you already have an origin access identity, we recommend that you reuse it to simplify maintenance. For more information about origin access identities, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Comment for New Identity(Amazon S3 Only)

If you chose **Create a New Identity** for **Origin Access Identity**, enter a comment that identifies the new origin access identity. CloudFront will create the origin access identity when you create this distribution.

Your Identities (Amazon S3 Only)

If you chose **Use an Existing Identity** for **Origin Access Identity**, choose the origin access identity that you want to use. You cannot use an origin access identity that is associated with another AWS account.

Grant Read Permissions on Bucket (Amazon S3 Only)

If you want CloudFront to automatically grant the origin access identity the permission to read objects in your Amazon S3 bucket, click **Yes, Update Bucket Policy**.

Important

If you click **Yes, Update Bucket Policy**, CloudFront updates the bucket policy to grant the specified origin access identity the permission to read objects in your bucket. However, CloudFront does not remove existing permissions in the bucket policy or permissions on individual objects. If users currently have permission to access the objects in your bucket using Amazon S3 URLs, they will still have that permission after CloudFront updates your bucket policy. To view or change the existing bucket policy and the existing permissions on the objects in your bucket, use a method provided by Amazon S3. For more information, see [Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket \(p. 168\)](#).

If you want to update permissions manually, for example, if you want to update ACLs on your objects instead of updating bucket permissions, click **No, I will Update Permissions**.

Price Class

The price class that corresponds with the maximum price that you want to pay for CloudFront service. By default, CloudFront serves your objects from edge locations in all CloudFront regions.

For more information about price classes and about how your choice of price class affects CloudFront performance for your distribution, see [Choosing the Price Class for a CloudFront Distribution \(p. 54\)](#). For information about CloudFront pricing, including how price classes map to CloudFront regions, go to [Amazon CloudFront Pricing](#).

Alternate Domain Names (CNAMEs)

Optional. You can associate one or more CNAME aliases with a distribution so that you can use your domain name (for example, example.com) in the URLs for your objects instead of using the domain name that CloudFront assigned when you created your distribution. For more information, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Logging

Whether you want CloudFront to log information about each request for an object and store the log files in an Amazon S3 bucket. You can enable or disable logging at any time. There is no extra charge if you enable logging, but you accrue the usual Amazon S3 charges for storing and accessing the files in an Amazon S3 bucket. You can delete the logs at any time. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Bucket for Logs

If you chose **On** for **Logging**, the Amazon S3 bucket that you want CloudFront to store access logs in, for example, myawslogbucket.s3.amazonaws.com. If you enable logging, CloudFront records information about each end-user request for an object and stores the files in the specified Amazon S3 bucket. You can enable or disable logging at any time. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Log Prefix

Optional. If you chose **On** for **Logging**, specify the string, if any, that you want CloudFront to prefix to the access log filenames for this distribution, for example, exampleprefix/. The trailing slash (/) is optional but recommended to simplify browsing your log files. For more information about CloudFront access logs, see [Access Logs \(p. 256\)](#).

Comment

Optional. When you create a distribution, you can include a comment of up to 128 characters. You can update the comment at any time.

Distribution State

When you create a distribution, you must specify whether you want the distribution to be enabled or disabled after it's created:

- *Enabled* means that as soon as the distribution is fully deployed you can deploy links that use the distribution's domain name and end users can retrieve content. Whenever a distribution is enabled, CloudFront accepts and processes any end-user requests for content that use the domain name associated with that distribution.

When you create, modify, or delete a CloudFront distribution, it takes time for your changes to propagate to the CloudFront database. An immediate request for information about a distribution might not show the change. Propagation usually completes within minutes, but a high system load or network partition might increase this time.

- *Disabled* means that even though the distribution might be deployed and ready to use, end users can't use it. When a distribution is disabled, CloudFront doesn't accept any end-user requests that use the domain name associated with that distribution. Until you switch the distribution from disabled to enabled (by updating the distribution's configuration), no one can use it.

You can toggle a distribution between disabled and enabled as often as you want. For information about updating a distribution's configuration, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

Restrict Viewer Access (Use Signed URLs)

If you want requests for objects served by this distribution to use public URLs, click **No**. If you want requests to use signed URLs, click **Yes**. Then specify the AWS accounts that you want to use to create signed URLs; these accounts are known as trusted signers.

For more information about trusted signers, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

Trusted Signers

Choose which AWS accounts you want to use as trusted signers for this distribution:

- **Self:** Use the account with which you're currently signed into the AWS Management Console as a trusted signer. If you're currently signed in as an IAM user, the associated AWS account is added as a trusted signer.
- **Specify Accounts:** Enter account numbers for trusted signers in the **AWS Account Numbers** field.

To create signed URLs, an AWS account must have at least one active CloudFront key pair.

Caution

If you're updating a distribution that you're already using to distribute content, add trusted signers only when you're ready to start generating signed URLs for your objects. After you add trusted signers to a distribution, users must use signed URLs to access the objects served by this distribution.

AWS Account Numbers

If you want to create signed URLs using AWS accounts in addition to or instead of the current account, enter one AWS account number per line in this field. Note the following:

- The accounts that you specify must have at least one active CloudFront key pair. For more information, see [Creating CloudFront Key Pairs for Your Trusted Signers \(p. 172\)](#).
- You can't create CloudFront key pairs for IAM users, so you can't use IAM users as trusted signers.
- For information about how to get the AWS account number for an account, see [How Do I Get Security Credentials?](#) in the *Amazon Web Services General Reference*.
- If you enter the account number for the current account, CloudFront automatically checks the **Self** checkbox and removes the account number from the **AWS Account Numbers** list.

Values that CloudFront Displays in the Console When You Create or Update an RTMP Distribution

When you create a new RTMP distribution or update an existing distribution, CloudFront displays the following information in the CloudFront console.

Note

Active trusted signers, the AWS accounts that have an active CloudFront key pair and can be used to create valid signed URLs, are currently not visible in the CloudFront console.

Distribution ID

When you perform an action on a distribution using the CloudFront API, you use the distribution ID to specify which distribution you want to perform the action on, for example, EDFDVBD6EXAMPLE. You can't change the distribution ID.

Status

The possible status values for a distribution are listed in the following table.

| Value | Description |
|------------|--|
| InProgress | The distribution is still being created or updated. |
| Deployed | The distribution has been created or updated and the changes have been fully propagated through the CloudFront system. |

In addition to ensuring that the status for a distribution is **Deployed**, you must enable the distribution before end users can use CloudFront to access your content. For more information, see [Distribution State \(p. 93\)](#).

Last Modified

The date and time that the distribution was last modified, using ISO 8601 format, for example, 2012-05-19T19:37:58Z. For more information, go to <http://www.w3.org/TR/NOTE-datetime>.

Domain Name

You use the distribution's domain name in the links to your objects, unless you're using alternate domain names (CNAMEs). For example, if your distribution's domain name is d111111abcdef8.cloudfront.net, the link to the example /images/image.jpg file would be <http://d111111abcdef8.cloudfront.net/images/image.jpg>. You can't change the CloudFront domain name for your distribution. For more information about CloudFront URLs for links to your objects, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

If you specified one or more alternate domain names (CNAMEs), you can use your own domain names for links to your objects instead of using the CloudFront domain name. For more information about CNAMEs, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#).

Note

CloudFront domain names are unique. Your distribution's domain name was never used for a previous distribution and will never be reused for another distribution in the future.

Configuring the Media Player

To play a media file, you must configure the media player with the correct path to the file. How you configure the media depends on which media player you're using and how you're using it.

When you configure the media player, the path you specify to the media file must contain the characters `cfx/st` immediately after the domain name, for example:

```
rtmp://s5c39gqb8ow64r.cloudfront.net/cfx/st/mediafile.flv.
```

Note

CloudFront follows Adobe's FMS naming requirements. Different players have their own rules about how to specify streams. The example above is for JW Player. Check your player's documentation. For example, Adobe's Flash Media Server does not allow the `.flv` extension to be present on the play path. Many players remove the `.flv` extension for you.

Your media player might ask for the path separate from the file name. For example, with the JW Player wizard, you specify a `streamer` and `file` variable:

- **streamer**—`rtmp://s5c39gqb8ow64r.cloudfront.net/cfx/st` (with no trailing slash)
- **file**—`mediafile.flv`

If you've stored the media files in a directory in your bucket (for example, `videos/mediafile.flv`), then the variables for JW Player would be:

- **streamer**—`rtmp://s5c39gqb8ow64r.cloudfront.net/cfx/st` (with no trailing slash)
- **file**—`videos/mediafile.flv`

To use the JW Player wizard, go to the [Setup Wizard](#) page on the JW Player website.

MPEG Files

To serve MP3 audio files or H.264/MPEG-4 video files, you might need to prefix the file name with `mp3:` or `mp4:`. Some media players can be configured to add the prefix automatically. The media player might also require you to specify the file name without the file extension (for example, `magicvideo` instead of `magicvideo.mp4`).

Using an Amazon S3 Bucket as the Origin for an RTMP Distribution

When you create a distribution, you specify where CloudFront gets the files that it distributes to edge locations. For an RTMP distribution, you must use an Amazon S3 bucket; custom origins are not supported. To get your objects into your bucket, you can use any method supported by Amazon S3, for example, the Amazon S3 API or a third-party tool. You can create a hierarchy in your bucket just as you would with any other Amazon S3 bucket. You incur regular Amazon S3 charges for storing the objects in the bucket. For more information about the charges to use CloudFront, see [CloudFront Reports \(p. 15\)](#).

Using an existing Amazon S3 bucket as your CloudFront origin server doesn't change the bucket in any way; you can still use it as you normally would to store and access Amazon S3 objects (at the normal Amazon S3 prices).

You can use the same Amazon S3 bucket for both RTMP and web distributions.

Note

After you create an RTMP distribution, you can't change its origin server. If you need to change the Amazon S3 bucket for an RTMP distribution, you must create a new distribution that uses the new bucket and update either your links or your DNS records to use the domain name for the new distribution. You can then delete the original distribution. For more information, see [Deleting a Distribution \(p. 49\)](#).

When you specify the name of the Amazon S3 bucket that you want CloudFront to get objects from, you generally use the following format:

`bucket-name.s3.amazonaws.com`

If your bucket is in the US Standard region and you want Amazon S3 to route requests to a facility in Northern Virginia, use the following format:

`bucket-name.s3-external-1.amazonaws.com`

Do not specify the name of the bucket using the following values:

- The Amazon S3 path style, `s3.amazonaws.com/bucket-name`
- The Amazon S3 CNAME, if any

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

Creating Multiple RTMP Distributions for an Origin Server

You typically create one RTMP distribution per Amazon S3 bucket, but you can choose to create multiple RTMP distributions for the same bucket. For example, if you had two distributions for an Amazon S3 bucket, you could reference a single media file using either distribution. In this case, if you had a media file called `media.flv` in your origin server, CloudFront would work with each distribution as though it referenced an individual `media.flv` object: one `media.flv` accessible through one distribution, and another `media.flv` accessible through the other distribution.

Restricting Access Using Crossdomain.xml

The Adobe Flash Media Server `crossdomain.xml` file specifies which domains can access media files in a particular domain. CloudFront supplies a default file that allows all domains to access the media files in your RTMP distribution, and you cannot change this behavior. If you include a more restrictive `crossdomain.xml` file in your Amazon S3 bucket, CloudFront ignores it.

Error Codes for RTMP Distributions

The following table lists the error codes that CloudFront can send to your media player. The errors are part of the string returned with `Event.info.application.message` or `Event.info.description`.

| Error | Description |
|--------------------------|---|
| DistributionNotFound | The distribution was not found. |
| DistributionTypeMismatch | The distribution is not an RTMP distribution. |
| InvalidInstance | The instance is invalid. |
| InvalidURI | The URI is invalid. |

Troubleshooting RTMP Distributions

If you're having trouble getting your media files to play, check the following items.

| Item to Check | Description |
|---|--|
| Separate distributions for the media player files and media files | The media player must be served by a regular HTTP distribution (for example, domain name d111111abcdef8.cloudfront.net), and media files must be served by an RTMP distribution (for example, domain name s5c39gqb8ow64r.cloudfront.net). Make sure you're not using the same distribution for both. |
| /cfx/st in the file path | Confirm that the path for the file includes /cfx/st. You don't need to include /cfx/st in the path to the object in the Amazon S3 bucket. For more information, see Configuring the Media Player (p. 96) . |
| File names in the file path | Some media players require that you include the file name extension (for example, mp4:) before the file name in the file path. Some media players also require that you exclude the file name extension (for example, .mp4) from the file path. For more information, see MPEG Files (p. 96) . Note The names of the media files in your Amazon S3 bucket must always include the applicable file name extension. |
| Port 1935 on your firewall | Adobe Flash Media Server uses port 1935 for RTMP. Make sure your firewall has this port open. If it doesn't, the typical message returned is "Unable to play video." You can also switch to RTMPT to tunnel over HTTP using port 80. |
| Adobe Flash Player messaging | By default, the Adobe Flash Player won't display a message if the video file it's trying to play is missing. Instead, it waits for the file to show up. You might want to change this behavior to give your end users a better experience. To instead have the player send a message if the video is missing, use <code>play("vid", 0, -1)</code> instead of <code>play("vid")</code> . |

Working with Objects

Topics

- [Format of URLs for CloudFront Objects \(p. 99\)](#)
- [How CloudFront Processes HTTP and HTTPS Requests \(p. 102\)](#)
- [Increasing the Proportion of Requests that Are Served from CloudFront Edge Caches \(p. 102\)](#)
- [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#)
- [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#)
- [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#)
- [Forwarding Custom Headers to Your Origin \(Web Distributions Only\) \(p. 112\)](#)
- [Adding, Removing, or Replacing Objects in a Distribution \(p. 114\)](#)
- [Customizing Error Responses \(p. 127\)](#)
- [How CloudFront Processes Partial Requests for an Object \(Range GETs\) \(p. 132\)](#)
- [Specifying a Default Root Object \(Web Distributions Only\) \(p. 132\)](#)
- [Serving Compressed Files \(p. 135\)](#)

This section describes how you work with objects in CloudFront.

Format of URLs for CloudFront Objects

Topics

- [Format of Public URLs for Objects in Amazon S3 \(p. 100\)](#)
- [Format of Public URLs for Objects in a Custom Origin \(p. 101\)](#)
- [How Public URLs Affect the Invalidation of Directories \(p. 101\)](#)
- [Format of Signed URLs \(p. 101\)](#)

When you create a distribution, you receive the CloudFront domain name associated with that distribution. You use that domain name when creating the links to your objects. If you have another domain name that you'd rather use (for example, www.example.com), you can add a CNAME alias. For more information, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

When you create URLs to give end users access to objects in your CloudFront distribution, the URLs are either public URLs or signed URLs:

Public URLs allow users to access the following objects:

- Objects on which there are no restrictions.
- Objects in an Amazon S3 bucket that end users must access through CloudFront but that don't require a signed URL. These objects can't be accessed using an Amazon S3 URL.

Signed URLs are required to access the objects that are specified by a cache behavior that you have configured to require signed URLs. Note that if a request for an object (for example, `image.jpg`) matches the path patterns for two or more cache behaviors, CloudFront will process the request based on the cache behavior that is listed first in the distribution. If the first cache behavior doesn't require signed URLs and the second cache behavior does require signed URLs, end users will be able to access `image.jpg` without a signed URL.

For more information about cache behaviors, including path patterns, see [Cache Behavior Settings \(p. 68\)](#). For more information about signed URLs, see [Serving Private Content through CloudFront \(p. 162\)](#).

Format of Public URLs for Objects in Amazon S3

A public URL for an object in an Amazon S3 bucket uses this format:

`http://<CloudFront domain name>/<object name in Amazon S3 bucket>`

Important

If the distribution serves streaming content, additional characters are required in the path to the file. For more information, see [Configuring the Media Player \(p. 96\)](#).

For example, suppose you have an Amazon S3 bucket called `mybucket`. The bucket contains a publicly readable object named `/images/image.jpg`.

You create a CloudFront distribution and specify `mybucket.s3.amazonaws.com` as the origin server for this distribution. CloudFront returns `d11111abcdef8.cloudfront.net` as the domain name for the distribution and `EDFDVBD6EXAMPLE` as the distribution ID.

The URL you give to end users to access the object in this example is:

`http://d11111abcdef8.cloudfront.net/images/image.jpg`

For web distributions, if you're storing your content in more than one Amazon S3 bucket, the format of URLs is the same—URLs don't include any information about your Amazon S3 buckets. To route requests to the applicable bucket, you create an origin for each bucket and create one or more cache behaviors that route requests to each origin. The path pattern in a cache behavior specifies which requests are routed to the origin (the Amazon S3 bucket) that is associated with that cache behavior. For more information about the settings for origins and for cache behaviors in a CloudFront distribution, see [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

For more information about names and paths for Amazon S3 buckets, see [Virtual Hosting of Buckets](#) in the [Amazon Simple Storage Service Developer Guide](#).

Anytime an end user accesses that object, CloudFront serves the object from the appropriate edge location. If the object isn't in that edge location, CloudFront goes to the origin server associated with the `EDFDVBD6EXAMPLE` distribution (`mybucket.s3.amazonaws.com`) and gets a copy of the object for the edge location to serve to the end user.

Format of Public URLs for Objects in a Custom Origin

The format of public URLs for objects in a custom origin are much like public URLs for objects in Amazon S3:

```
http://<CloudFront domain name>/<object name in custom origin>
```

If your object is in a folder on your origin server, then the CloudFront URL must include the name of the folder. For example, if `image.jpg` is located in the `images` folder, then the URL is:

```
http://d111111abcdef8.cloudfront.net/images/image.jpg
```

CloudFront gets objects from the domain that you specified when you created the distribution, using the object path and name in the public URL. For example, if the domain for your custom origin is `example.com` and the object path and name is `/images/image.jpg`, CloudFront will get the object from the following location:

```
http://example.com/images/image.jpg
```

If you're storing your content on more than one custom origin, the format of URLs is the same—URLs don't include any information about the custom origin. To route requests to the applicable custom origin, you add an origin to your distribution for each custom origin and create one or more cache behaviors that route requests to each origin. The path pattern in a cache behavior specifies which requests are routed to the origin that is associated with that cache behavior. For more information about the settings for origins and for cache behaviors in a CloudFront distribution, see [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

How Public URLs Affect the Invalidation of Directories

If you use CloudFront URLs that give end users access to directories, we recommend that you always use the same URL format, either with a trailing slash (/) or without, for example:

```
http://d111111abcdef8.cloudfront.net/images/
```

```
http://d111111abcdef8.cloudfront.net/images
```

Browsers and other web applications will resolve both formats to the same directory. However, CloudFront stores public URLs exactly as they appear in the request. If you want to invalidate a directory, you'll need to specify the exact same directory, including or excluding the slash. If you don't have a standard for how you specify directories, you'll need to invalidate the directory with and without the slash to ensure that CloudFront removes the directory from the edge location. If you've reached the limit for free invalidations for the month, you'll pay for both invalidations even though only one of the directories exists.

Format of Signed URLs

Signed URLs allow end users to access objects in a distribution that is configured to serve private content. The URLs include extra information that restricts access to the cached objects. For information about the format of signed URLs, see [Serving Private Content through CloudFront \(p. 162\)](#).

How CloudFront Processes HTTP and HTTPS Requests

For Amazon S3 origins, CloudFront accepts requests in both HTTP and HTTPS protocols for objects in a CloudFront distribution by default. CloudFront then forwards the requests to your Amazon S3 bucket using the same protocol in which the requests were made.

For custom origins, when you create your distribution, you can specify how CloudFront accesses your origin: HTTP only, or matching the protocol that is used by the viewer. For more information about how CloudFront handles HTTP and HTTPS requests for custom origins, see [Protocols \(p. 153\)](#).

For information about how to restrict your web distribution so that end users can only access objects using HTTPS, see [Using an HTTPS Connection to Access Your Objects \(p. 229\)](#). (This option doesn't apply to RTMP distributions, which use the RTMP protocol.)

Note

The charge for HTTPS requests is higher than the charge for HTTP requests. For more information about billing rates, go to the [CloudFront pricing plan](#).

Increasing the Proportion of Requests that Are Served from CloudFront Edge Caches

One of the purposes of using CloudFront is to reduce the number of requests that your origin server responds to. This reduces the load on your origin server and also reduces latency because more objects are served from CloudFront edge locations, which are closer to your users. The more requests that CloudFront is able to serve from edge caches as a proportion of all requests (the greater the cache hit ratio), the fewer requests that CloudFront needs to forward to your origin to get the latest version or a unique version of an object.

You can view the percentage of viewer requests that are hits, misses, and errors in the CloudFront console. For more information, see [CloudFront Cache Statistics Reports \(p. 16\)](#) in the *Amazon CloudFront Developer Guide*.

The following sections explain how to improve your cache hit ratio.

Topics

- [Specifying How Long CloudFront Caches Your Objects \(p. 102\)](#)
- [Caching Based on Query String Parameters \(p. 103\)](#)
- [Caching Based on Cookie Values \(p. 103\)](#)
- [Caching Based on Request Headers \(p. 104\)](#)
- [Serving Media Content by Using HTTP \(p. 104\)](#)

Specifying How Long CloudFront Caches Your Objects

To increase your cache hit ratio, you can configure your origin to add a `Cache-Control max-age` directive to your objects, and specify the longest practical value for `max-age`. The shorter the cache duration, the more frequently CloudFront forwards another request to your origin to determine whether

the object has changed and, if so, to get the latest version. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Caching Based on Query String Parameters

If you configure CloudFront to cache based on query string parameters, you can improve caching if you do the following:

- Configure CloudFront to forward only the query strings for which your origin will return unique objects.
- Use the same case (uppercase or lowercase) for all instances of the same parameter. For example, if one request contains `parameter1=A` and another contains `parameter1=a`, CloudFront forwards separate requests to your origin when a request contains `parameter1=A` and when a request contains `parameter1=a`. CloudFront then separately caches the corresponding objects returned by your origin separately even if the objects are identical. If you use just `A` or `a`, CloudFront forwards fewer requests to your origin.
- List parameters in the same order. As with differences in case, if one request for an object contains the query string `parameter1=a¶meter2=b` and another request for the same object contains `parameter2=b¶meter1=a`, CloudFront forwards both requests to your origin and separately caches the corresponding objects even if they're identical. If you always use the same order for parameters, CloudFront forwards fewer requests to your origin.

For more information, see [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#). If you want to review the query strings that CloudFront forwards to your origin, enable CloudFront access logs and see the values in the `cs-uri-query` column of your log files. For more information, see [Access Logs \(p. 256\)](#).

Caching Based on Cookie Values

If you configure CloudFront to cache based on cookie values, you can improve caching if you do the following:

- Configure CloudFront to forward only specified cookies instead of forwarding all cookies. For the cookies that you configure CloudFront to forward to your origin, CloudFront forwards every combination of cookie name and value, and separately caches the objects that your origin returns, even if they're all identical.

For example, suppose that viewers include two cookies in every request, that each cookie has three possible values, and that all combinations of cookie values are possible. CloudFront forwards up to six different requests to your origin for each object. If your origin returns different versions of an object based on only one of the cookies, then CloudFront is forwarding more requests to your origin than necessary and is needlessly caching multiple identical versions of the object.

- Create separate cache behaviors for static and dynamic content, and configure CloudFront to forward cookies to your origin only for dynamic content.

For example, suppose you have just one cache behavior for your distribution and that you're using the distribution both for dynamic content, such as `.php` files, and for `.css` files that rarely change. CloudFront caches separate versions of your `.css` files based on cookie values, so each CloudFront edge location forwards a request to your origin for every new cookie value or combination of cookie values.

If you create a cache behavior for which the path pattern is `*.css` and for which CloudFront doesn't cache based on cookie values, then CloudFront forwards requests for `.css` files to your origin only for the first request that an edge location receives for a given `.css` file and for the first request after a `.css` file expires.

- If possible, create separate cache behaviors for dynamic content for which cookie values are unique for each user (such as a user ID) and dynamic content that varies based on a smaller number of unique values.

For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#). If you want to review the cookies that CloudFront forwards to your origin, enable CloudFront access logs and see the values in the `cs(Cookie)` column of your log files. For more information, see [Access Logs \(p. 256\)](#).

Caching Based on Request Headers

If you configure CloudFront to cache based on request headers, you can improve caching if you do the following:

- Configure CloudFront to forward and cache based only specified headers instead of forwarding and caching based on all headers. For the headers that you specify, CloudFront forwards every combination of header name and value and separately caches the objects that your origin returns even if they're all identical.

Note

CloudFront always forwards to your origin the headers specified in the following topics:

- How CloudFront Processes and Forwards Requests to Your Amazon S3 Origin Server > [HTTP Request Headers that CloudFront Removes or Updates \(p. 142\)](#)
- How CloudFront Processes and Forwards Requests to Your Custom Origin Server > [HTTP Request Headers and CloudFront Behavior \(p. 149\)](#)

When you configure CloudFront to cache based on request headers, you don't change the headers that CloudFront forwards, only whether CloudFront caches objects based on the header values.

- Try to avoid caching based on request headers that have large numbers of unique values.

For example, if you want to serve different sizes of an image based on the user's device, then don't configure CloudFront to cache based on the `User-Agent` header, which has an enormous number of possible values. Instead, configure CloudFront to cache based on the CloudFront device-type headers `CloudFront-Is-Desktop-Viewer`, `CloudFront-Is-Mobile-Viewer`, `CloudFront-Is-SmartTV-Viewer`, and `CloudFront-Is-Tablet-Viewer`. In addition, if you're returning the same version of the image for tablets and desktops, then forward only the `CloudFront-Is-Tablet-Viewer` header, not the `CloudFront-Is-Desktop-Viewer` header.

For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

Serving Media Content by Using HTTP

When you use HTTP to serve media content, we recommend that you use an HTTP-based dynamic streaming protocol such as Apple HTTP Dynamic Streaming (Apple HDS), Apple HTTP Live Streaming (Apple HLS), Microsoft Smooth Streaming, or MPEG-DASH. For dynamic-streaming protocols, a video is divided into a lot of small segments that are typically just a few seconds long each. If your users commonly stop watching before the end of a video (for example, because they close their viewer during the credits), CloudFront has still cached all of the small segments up to that point in the video. If you're using a protocol for which a video is served in a single, large file and a user stops watching before the end, CloudFront might not cache the entire video, and it might need to request the video from your origin again the next time that CloudFront receives a request for it.

Configuring CloudFront to Cache Based on Query String Parameters

For web distributions, you can choose whether you want CloudFront to forward query string parameters to your origin. For RTMP distributions, you cannot configure CloudFront to forward query string parameters to your origin.

For both types of distributions, if you enable logging, CloudFront logs the full URL, including query string parameters. For web distributions, this is true regardless of whether you have configured CloudFront to forward query strings. For more information about CloudFront logging, see [Access Logs \(p. 256\)](#).

For more information, see the applicable topic:

- [Query String Parameters and Web Distributions \(p. 105\)](#)
- [Query String Parameters and RTMP Distributions \(p. 106\)](#)

Query String Parameters and Web Distributions

For web distributions, you can specify whether you want CloudFront to include query strings when it forwards requests to your origin. For example, you can specify whether you want CloudFront to forward the `?parameter1=a` part of the following URL:

`http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=a`

If you configure CloudFront to forward query strings to your origin, CloudFront will include the query string portion of the URL when caching the object. For example, the following query strings cause CloudFront to cache three objects. This is true even if your origin always returns the same `image.jpg` regardless of the query string:

- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=a`
- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=b`
- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=c`

If your origin returns different versions of an object (for example, `/images/image.jpg`) based on the query string, select **Yes** for **Forward Query Strings** in the CloudFront console or specify `true` for the value of the `QueryString` element in the `DistributionConfig` complex type when you're using the CloudFront API.

If your origin returns the same version of an object regardless of the query string, select **No** or `false`. This increases the likelihood that CloudFront can serve a request from the cache, which improves performance and reduces the load on your origin.

The order of parameters matters in query strings. If you configure CloudFront to forward query strings to your origin, the following query strings cause CloudFront to cache two objects:

- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=a¶meter2=b`
- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter2=b¶meter1=a`

Case also matters in query strings. If you configure CloudFront to forward query strings to your origin, the following query strings cause CloudFront to cache two objects:

- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=a`
- `http://d111111abcdef8.cloudfront.net/images/image.jpg?parameter1=A`

If you're using signed URLs to restrict access to your content (if you added trusted signers to your distribution), CloudFront removes the following query string parameters before forwarding the rest of the URL to your origin:

- Expires
- Key-Pair-Id
- Policy
- Signature

This means that if you're using signed URLs and you're configuring CloudFront to forward query string parameters to your origin, your own query string parameters cannot be named Expires, Key-Pair-Id, Policy, or Signature.

Query String Parameters and RTMP Distributions

For RTMP distributions, when CloudFront requests an object from the origin server, it removes any query string parameters. For example, if CloudFront receives the following request and media.flv is not already in the CloudFront cache:

```
http://d111111abcdef8.cloudfront.net/media/media.flv?parameter1=a
```

it sends the following URL to your origin server:

```
http://d111111abcdef8.cloudfront.net/media/media.flv
```

Configuring CloudFront to Cache Objects Based on Cookies

For web distributions, you can choose whether you want CloudFront to forward cookies to your origin and to cache separate versions of your objects based on cookie values in viewer requests.

For Real Time Messaging Protocol (RTMP) distributions, you cannot configure CloudFront to process cookies. When CloudFront requests an object from the origin server, it removes any cookies before forwarding the request to your origin. If your origin returns any cookies along with the object, CloudFront removes them before returning the object to the viewer. For RTMP distributions, CloudFront does not cache cookies in edge caches.

Important

Amazon S3 and some HTTP servers do not process cookies. Do not configure CloudFront cache behaviors to forward cookies to an origin that doesn't process cookies, or you'll adversely affect cacheability and, therefore, performance. For more information about cache behaviors, see [Cache Behavior Settings \(p. 68\)](#).

For HTTP and HTTPS web distributions, you can choose whether you want CloudFront to forward cookies to your origin. For RTMP distributions, you cannot configure CloudFront to process cookies.

For web distributions, CloudFront by default doesn't consider cookies when caching your objects in edge locations. If your origin returns two objects and they differ only by the values in the Set-Cookie header, CloudFront caches only one version of the object.

You can configure CloudFront to forward to your origin some or all of the cookies in viewer requests. CloudFront uses the cookies in viewer requests to uniquely identify an object in the cache. For example, suppose that requests for locations.html contain a country cookie that has a value of either uk or fr. When you configure CloudFront to cache your objects based on the value of the country cookie,

CloudFront forwards requests for `locations.html` to the origin and includes the `country` cookie and cookie values. Your origin returns `locations.html`, and CloudFront caches the object once for requests in which the value of the `country` cookie is `uk` and once for requests in which the value is `fr`.

Note

If you configure CloudFront to forward cookies to your origin, CloudFront caches based on cookie values. This is true even if your origin ignores the cookie values in the request and, in the previous example, always returns the same version of `locations.html` to CloudFront. As a result, CloudFront forwards more requests to your origin server for the same object, which slows performance and increases the load on your origin server. If your origin server does not vary its response based on the value of a given cookie, we recommend that you do not configure CloudFront to forward that cookie to your origin.

You can configure each cache behavior in a web distribution to do one of the following:

- **Forward all cookies to your origin** – CloudFront forwards viewer requests to your origin, including all cookies. When your origin returns a response, CloudFront caches the response, and the cookies and cookie values in the viewer request. (If your origin returns cookies that were not in the viewer request, CloudFront does not cache them.) CloudFront returns to the viewer the requested object and all cookies and cookie values, including cookies that were not in the viewer request.
- **Forward a whitelist of cookies that you specify** – CloudFront removes any cookies that aren't on the whitelist before forwarding requests to your origin. CloudFront caches the response from your origin as well as the specified cookies and their values. (If your origin returns both whitelisted cookies and cookies that aren't on your whitelist, CloudFront caches only the whitelisted cookies.) CloudFront also returns to the viewer the object, including the specified cookies and cookie values. If the response from the origin includes cookies that aren't on the whitelist, CloudFront returns those cookies to the viewer, too.

For information about specifying wildcards in cookie names, see [Whitelist Cookies \(Amazon EC2 and Other Custom Origins Only\) \(p. 73\)](#).

For the current limit on the number of cookie names that you can whitelist for each cache behavior, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

- **Don't forward cookies to your origin** – CloudFront doesn't cache your objects based on cookie values. In addition, CloudFront removes the `Cookie` header from requests that it forwards to your origin and removes the `Set-Cookie` header from responses that it returns to your viewers.

Note the following about specifying the cookies that you want to forward:

Access Logs

If you configure CloudFront to log requests and to log cookies, CloudFront logs all cookies and all cookie attributes, even if you configure CloudFront not to forward cookies to your origin or if you configure CloudFront to forward only a specified list of cookies. For more information about CloudFront logging, see [Access Logs \(p. 256\)](#).

Case Sensitivity

Cookie names and values are both case sensitive. For example, if two cookies for the same object are identical except for case, CloudFront will cache the object twice.

CloudFront Sorts Cookies

CloudFront sorts the cookies in natural order by cookie name before forwarding the request to your origin.

If-Modified-Since and If-None-Match

`If-Modified-Since` and `If-None-Match` conditional requests are not supported.

Suspending Caching Based on Cookies

If you want CloudFront to temporarily stop caching cookies and cookie attributes, configure your origin server to add the following header in responses to CloudFront:

no-cache="Set-Cookie"

Total Length of Cookie Names

The total number of bytes in all of the cookie names that you configure CloudFront to forward to your origin can't exceed:

512 – (the number of cookies that you're forwarding)

For example, if you configure CloudFront to forward 10 cookies to your origin, the combined length of the names of the 10 cookies can't exceed 502 bytes (512 – 10). If you configure CloudFront to forward all cookies to your origin, the length of cookie names doesn't matter.

For information about using the CloudFront console to update a distribution so CloudFront forwards cookies to the origin, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#). For information about using the CloudFront API to update a distribution, see [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*.

Configuring CloudFront to Cache Objects Based on Request Headers

For web distributions, CloudFront lets you choose whether you want CloudFront to forward headers to your origin and to cache separate versions of a specified object based on the header values in viewer requests. This allows you to serve different versions of your content based on the device the user is using, the location of the viewer, the language the viewer is using, and a variety of other criteria. For RTMP distributions, you cannot configure CloudFront to cache based on header values.

Topics

- [Headers and Web Distributions \(p. 108\)](#)
- [Headers and RTMP Distributions \(p. 112\)](#)

Headers and Web Distributions

By default, CloudFront doesn't consider headers when caching your objects in edge locations. If your origin returns two objects and they differ only by the values in the request headers, CloudFront caches only one version of the object.

You can configure CloudFront to forward headers to the origin, which causes CloudFront to cache multiple versions of an object based on the values in one or more request headers. For example, suppose viewer requests for `logo.jpg` contain a custom `Product` header that has a value of either `Acme` or `Apex`. When you configure CloudFront to cache your objects based on the value of the `Product` header, CloudFront forwards requests for `logo.jpg` to the origin and includes the `Product` header and header values. CloudFront caches `logo.jpg` once for requests in which the value of the `Product` header is `Acme` and once for requests in which the value is `Apex`.

You can configure each cache behavior in a web distribution to do one of the following:

- Forward all headers to your origin

Important

If you configure CloudFront to forward all headers to your origin, CloudFront doesn't cache the objects associated with this cache behavior. Instead, it sends every request to the origin.

- Forward a whitelist of headers that you specify. CloudFront caches your objects based on the values in all of the specified headers. CloudFront also forwards the headers that it forwards by default, but it caches your objects based only on the headers that you specify.
- Forward only the default headers. In this configuration, CloudFront doesn't cache your objects based on the values in the request headers.

For the current limit on the number of headers that you can whitelist for each cache behavior, see [Amazon CloudFront Limits](#) in the *Amazon Web Services General Reference*. To request a higher limit, go to <https://console.aws.amazon.com/support/home#/case/create?issueType=service-limit-increase&limitType=service-code-cloudfront-distributions>.

For information about using the CloudFront console to update a distribution so CloudFront forwards headers to the origin, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#). For information about using the CloudFront API to update an existing web distribution, see [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*.

Topics

- [Selecting the Headers on Which You Want CloudFront to Base Caching \(p. 109\)](#)
- [Configuring CloudFront to Respect Cross-Origin Resource Sharing \(CORS\) Settings \(p. 110\)](#)
- [Configuring CloudFront to Cache Objects Based on the Device Type \(p. 110\)](#)
- [Configuring CloudFront to Cache Objects Based on the Language of the Viewer \(p. 111\)](#)
- [Configuring CloudFront to Cache Objects Based on the Location of the Viewer \(p. 111\)](#)
- [Configuring CloudFront to Cache Objects Based on the Protocol of the Request \(p. 111\)](#)
- [How Caching Based on Headers Affects Performance \(p. 111\)](#)
- [How the Case of Headers and Header Values Affects Caching \(p. 111\)](#)
- [Headers that CloudFront Returns to the Viewer \(p. 111\)](#)

Selecting the Headers on Which You Want CloudFront to Base Caching

The headers that you can forward to the origin and that CloudFront bases caching on depend on whether you're using an Amazon S3 bucket or a custom origin.

- **Amazon S3** – You can configure CloudFront to forward and to cache your objects based only on three headers: `Access-Control-Request-Headers`, `Access-Control-Request-Method`, and `Origin`. Forwarding these headers allows CloudFront to distribute content for websites that are enabled for cross-origin resource sharing (CORS). You can't configure CloudFront to forward custom headers to Amazon S3. For more information, see [Configuring CloudFront to Respect Cross-Origin Resource Sharing \(CORS\) Settings \(p. 110\)](#).
- **Custom origin** – You can configure CloudFront to cache based on the value of any request header except the following:
 - `Accept-Encoding`
 - `Connection`
 - `Cookie` – If you want to forward and cache based on cookies, you use a separate setting in your distribution. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).
 - `Proxy-Authorization`
 - `TE`
 - `Upgrade`

You can configure CloudFront to cache objects based on values in the `Date` and `User-Agent` headers, but we don't recommend it. These headers have a lot of possible values, and caching based on their values would cause CloudFront to forward significantly more requests to your origin.

For a full list of HTTP request headers and how CloudFront processes them, see the applicable topic:

- **Amazon S3 origin** – [HTTP Request Headers that CloudFront Removes or Updates \(p. 142\)](#)
- **Custom origin** – [HTTP Request Headers and CloudFront Behavior \(p. 149\)](#)

Configuring CloudFront to Respect Cross-Origin Resource Sharing (CORS) Settings

If you enabled cross-origin resource sharing (CORS) on an Amazon S3 bucket or a custom origin, you can configure CloudFront to respect the CORS settings. Configure CloudFront to forward a whitelist of headers and include the applicable headers in the list of headers to forward, depending on whether you're using Amazon S3 or a custom origin:

Amazon S3

- When you want `OPTIONS` responses to be cached, configure CloudFront to forward the following headers: `Origin`, `Access-Control-Request-Headers`, and `Access-Control-Request-Method`.
- When you don't want `OPTIONS` responses to be cached, configure CloudFront to forward the `Origin` header. You can also configure CloudFront to forward `Access-Control-Request-Headers` and `Access-Control-Request-Method` headers, but it's not required.

Custom origins – Forward the `Origin` header along with any other headers required by your origin.

For more information about CORS and Amazon S3, see [Enabling Cross-Origin Resource Sharing](#) in the *Amazon Simple Storage Service Developer Guide*.

Configuring CloudFront to Cache Objects Based on the Device Type

If you want CloudFront to cache different versions of your objects based on the device a user is using to view your content, configure CloudFront to forward the applicable headers to your custom origin:

- `CloudFront-Is-Desktop-Viewer`
- `CloudFront-Is-Mobile-Viewer`
- `CloudFront-Is-SmartTV-Viewer`
- `CloudFront-Is-Tablet-Viewer`

Based on the value of the `User-Agent` header, CloudFront sets the value of these headers to `true` or `false` before forwarding the request to your origin. If a device falls into more than one category, more than one value might be `true`. For example, for some tablet devices, CloudFront might set both `CloudFront-Is-Mobile-Viewer` and `CloudFront-Is-Tablet-Viewer` to `true`.

Configuring CloudFront to Cache Objects Based on the Language of the Viewer

If you want CloudFront to cache different versions of your objects based on the language specified in the request, program your application to include the language in the `Accept-Language` header, and configure CloudFront to forward the `Accept-Language` header to your origin.

Configuring CloudFront to Cache Objects Based on the Location of the Viewer

If you want CloudFront to cache different versions of your objects based on the country that the request came from, configure CloudFront to forward the `CloudFront-Viewer-Country` header to your origin. CloudFront automatically converts the IP address that the request came from into a two-letter country code. For an easy-to-use list of country codes, sortable by code and by country name, see the Wikipedia entry [ISO 3166-1 alpha-2](#).

Configuring CloudFront to Cache Objects Based on the Protocol of the Request

If you want CloudFront to cache different versions of your objects based on the protocol of the request, HTTP or HTTPS, configure CloudFront to forward the `CloudFront-Forwarded-Proto` header to your origin.

How Caching Based on Headers Affects Performance

When you configure CloudFront to cache based on one or more headers and the headers have more than one possible value, CloudFront forwards more requests to your origin server for the same object. This slows performance and increases the load on your origin server. If your origin server returns the same object regardless of the value of a given header, we recommend that you don't configure CloudFront to cache based on that header.

If you configure CloudFront to forward more than one header, the order of the headers in viewer requests doesn't affect caching as long as the values are the same. For example, if one request contains the headers `A:1,B:2` and another request contains `B:2,A:1`, CloudFront caches just one copy of the object.

How the Case of Headers and Header Values Affects Caching

When CloudFront caches based on header values, it doesn't consider the case of the header name, but it does consider the case of the header value:

- If viewer requests include both `Product : Acme` and `product : Acme`, CloudFront caches an object only once. The only difference between them is the case of the header name, which doesn't affect caching.
- If viewer requests include both `Product : Acme` and `Product : acme`, CloudFront caches an object twice, because the value is `Acme` in some requests and `acme` in others.

Headers that CloudFront Returns to the Viewer

Configuring CloudFront to forward and cache headers does not affect which headers CloudFront returns to the viewer. CloudFront returns all of the headers that it gets from the origin with a few exceptions. For more information, see the applicable topic:

- **Amazon S3 origins** – See [HTTP Response Headers that CloudFront Removes or Updates \(p. 144\)](#).
- **Custom origins** – See [HTTP Response Headers that CloudFront Removes or Updates \(p. 156\)](#).

Headers and RTMP Distributions

For RTMP distributions, you cannot configure CloudFront to cache your content based on the headers in viewer requests.

Forwarding Custom Headers to Your Origin (Web Distributions Only)

You can configure CloudFront to include custom headers whenever it forwards a request to your origin. You can specify the names and values of custom headers for each origin, both for custom origins and for Amazon S3 buckets. Custom headers have a variety of uses, such as the following:

- You can identify the requests that are forwarded to your custom origin by CloudFront. This is useful if you want to know whether users are bypassing CloudFront or if you're using more than one CDN and you want information about which requests are coming from each CDN. (If you're using an Amazon S3 origin and you enable [Amazon S3 server access logging](#), the logs don't include header information.)
- If you've configured more than one CloudFront distribution to use the same origin, you can specify different custom headers for the origins in each distribution and use the logs for your web server to distinguish between the requests that CloudFront forwards for each distribution.
- If some of your users use viewers that don't support cross-origin resource sharing (CORS), you can configure CloudFront to forward the `Origin` header to your origin. That will cause your origin to return the `Access-Control-Allow-Origin` header for every request.
- You can use custom headers together and, optionally, signed URLs or signed cookies, to control access to content on a custom origin. If you configure your custom origin to respond to requests only if they include a custom header, you can prevent users from bypassing CloudFront and submitting requests directly to your origin.

Topics

- [Configuring CloudFront to Forward Custom Headers to Your Origin \(p. 112\)](#)
- [Custom Headers that CloudFront Can't Forward to Your Origin \(p. 113\)](#)
- [Using Custom Headers for Cross-Origin Resource Sharing \(CORS\) \(p. 113\)](#)
- [Using Custom Headers to Restrict Access to Your Content on a Custom Origin \(p. 113\)](#)

Configuring CloudFront to Forward Custom Headers to Your Origin

To configure a web distribution to forward custom headers to your origin, you update the configuration of the applicable origins by using one of the following methods:

CloudFront console

When you create or update a distribution, specify header names and values in the **Origin Custom Headers** settings. For more information, see [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#).

CloudFront API

For each origin that you want to forward custom headers to, add header names and values to the `CustomHeaders` section of the `DistributionConfig` complex type. For more information, see [POST Distribution](#) (to create a new distribution) or [PUT Distribution Config](#) (to update an existing distribution).

If the header names and values that you specify are not already present in the viewer request, CloudFront adds them. If a header is present, CloudFront overwrites the header value before forwarding the request to the origin.

For the current limits related to forwarding custom headers to the origin, see [Limits \(p. 353\)](#).

Custom Headers that CloudFront Can't Forward to Your Origin

You can't configure CloudFront to forward the following custom headers to your origin.

| | |
|---------------------|----------------------------------|
| Accept-Encoding | Proxy-Authenticate |
| Cache-Control | Proxy-Authorization |
| Connection | Proxy-Connection |
| Content-Length | Range |
| Cookie | Request-Range |
| Host | TE |
| If-Match | Trailer |
| If-Modified-Since | Transfer-Encoding |
| If-None-Match | Upgrade |
| If-Range | Via |
| If-Unmodified-Since | Headers that begin with X-Amz-* |
| Max-Forwards | Headers that begin with X-Edge-* |
| Pragma | X-Real-Ip |

Using Custom Headers for Cross-Origin Resource Sharing (CORS)

You can configure CloudFront to always forward the applicable headers to your origin to accommodate viewers that don't automatically include those headers in requests. You also need to configure CloudFront to respect CORS settings. For more information, see [Configuring CloudFront to Respect Cross-Origin Resource Sharing \(CORS\) Settings \(p. 110\)](#).

Using Custom Headers to Restrict Access to Your Content on a Custom Origin

If you're using a custom origin, you can use custom headers to prevent users from bypassing CloudFront and requesting content directly from your origin. You can also optionally restrict access to your content by requiring that your users access your objects by using either signed URLs or signed cookies. For more information about private content, see [Serving Private Content through CloudFront \(p. 162\)](#).

To require that users access your content through CloudFront, change the following settings in your CloudFront distributions:

Origin Custom Headers

Configure CloudFront to forward custom headers to your origin. See [Configuring CloudFront to Forward Custom Headers to Your Origin \(p. 112\)](#).

Viewer Protocol Policy

Configure your distribution to require viewers to use HTTPS to access CloudFront. See [Viewer Protocol Policy \(p. 70\)](#).

Origin Protocol Policy

Configure your distribution to require CloudFront to use the same protocol as viewers to forward requests to the origin. See [Origin Protocol Policy \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#).

The combination of **Viewer Protocol Policy** and **Origin Protocol Policy** ensure that your custom headers are encrypted between the viewer and your origin. However, we recommend that you periodically perform the following tasks to rotate the custom headers that CloudFront forwards to your origin:

1. Update your CloudFront distribution to begin forwarding a new header to your custom origin.
2. Update your application to accept the new header as confirmation that the request is coming from CloudFront.
3. When viewer requests no longer include the header that you're replacing, update your application to no longer accept the old header as confirmation that the request is coming from CloudFront.

Adding, Removing, or Replacing Objects in a Distribution

For information about adding objects to a distribution, see [Adding Objects that You Want CloudFront to Distribute \(p. 114\)](#).

When you replace objects in your distribution, we recommend that you use versioned object names. For more information, see [Updating Existing Objects Using Versioned Object Names \(p. 115\)](#). You can also replace objects with objects that have the same name. See [Updating Existing Objects Using the Same Object Names \(p. 115\)](#). Regardless of how you choose to replace objects in your distribution, we recommend that you specify when objects should be removed from the CloudFront cache. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

If you need to quickly remove objects from a distribution, you can invalidate them. For more information, see [Invalidate Objects \(Web Distributions Only\) \(p. 121\)](#).

Adding Objects that You Want CloudFront to Distribute

When you want CloudFront to start distributing additional objects, you add the objects to one of the origins that you specified for the distribution, and you expose a CloudFront link to the objects. A CloudFront edge location doesn't fetch the new objects from an origin until the edge location receives viewer requests for the objects. For more information, see [How CloudFront Delivers Content \(p. 4\)](#).

When you add an object that you want CloudFront to distribute, ensure that you add it to one of the Amazon S3 buckets specified in your distribution or, for a custom origin, to a directory in the specified domain. In addition, confirm that the path pattern in the applicable cache behavior sends requests to the correct origin. For example, suppose the path pattern for a cache behavior is *.html. If no other cache behaviors are configured to forward requests to that origin, CloudFront will never distribute .jpg files that you upload to the origin.

CloudFront servers don't determine the MIME type for the objects they serve. When you upload an object to your origin, you should set the Content-Type header field for the object.

Updating Existing Objects Using Versioned Object Names

When you update existing objects in a CloudFront distribution, we recommend that you include some sort of version identifier either in your object names or in your directory names to give yourself better control over your content. This identifier might be a date-time stamp, a sequential number, or some other method of distinguishing two versions of the same object.

For example, instead of naming a graphic file image.jpg, you might call it image_1.jpg. When you want to start serving a new version of the file, you'd name the new file image_2.jpg, and you'd update the links in your web application or website to point to image_2.jpg. Alternatively, you might put all graphics in an images_v1 directory and, when you want to start serving new versions of one or more graphics, you'd create a new images_v2 directory, and you'd update your links to point to that directory. With versioning, you don't have to wait for an object to expire before CloudFront begins to serve a new version of it, and you don't have to pay for object invalidation.

Even if you version your objects, we still recommend that you set an expiration date. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Note

Specifying versioned object names or directory names is not related to Amazon S3 object versioning.

Updating Existing Objects Using the Same Object Names

Although you can update existing objects in a CloudFront distribution and use the same object names, we don't recommend it. CloudFront distributes objects to edge locations only when the objects are requested, not when you put new or updated objects in your origin. If you update an existing object in your origin with a newer version that has the same name, an edge location won't get that new version from your origin until both of the following occur:

- The old version of the object in the cache expires. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).
- There's an end user request for the object at that edge location.

If you use the same names when you replace objects, you can't control when CloudFront starts to serve the new files. By default, CloudFront caches objects in edge locations for 24 hours. (For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).) For example, if you're replacing all of the objects on an entire website:

- Objects for the less popular pages may not be in any edge locations. The new versions of these objects will start being served on the next request.
- Objects for some pages may be in some edge locations and not in others, so your end users will see different versions depending on which edge location they're served from.
- New versions of the objects for the most popular pages might not be served for up to 24 hours because CloudFront might have retrieved the objects for those pages just before you replaced the objects with new versions.

Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration)

You can control how long your objects stay in a CloudFront cache before CloudFront forwards another request to your origin. Reducing the duration allows you to serve dynamic content. Increasing the duration means your users get better performance because your objects are more likely to be served directly from the edge cache. A longer duration also reduces the load on your origin.

Typically, CloudFront serves an object from an edge location until the cache duration that you specified passes—that is, until the object expires. After it expires, the next time the edge location gets a user request for the object, CloudFront forwards the request to the origin server to verify that the cache contains the latest version of the object. The response from the origin depends on whether the object has changed:

- If the CloudFront cache already has the latest version, the origin returns a 304 status code (Not Modified).
- If the CloudFront cache does not have the latest version, the origin returns a 200 status code (OK) and the latest version of the object.

If an object in an edge location isn't frequently requested, CloudFront might evict the object—remove the object before its expiration date—to make room for objects that have been requested more recently.

By default, each object automatically expires after 24 hours. For web distributions, you can change the default behavior in two ways:

- To change the cache duration for all objects that match the same path pattern, you can change the CloudFront settings for **Minimum TTL**, **Maximum TTL**, and **Default TTL** for a cache behavior. For information about the individual settings, see [Minimum TTL](#), [Maximum TTL](#), and [Default TTL](#). To use these settings, you must choose the **Customize** option for the [Object Caching](#) setting.
- To change the cache duration for an individual object, you can configure your origin to add a Cache-Control max-age or Cache-Control s-maxage directive, or an Expires header field to the object. For more information, see [Using Headers to Control Cache Duration for Individual Objects \(p. 117\)](#).

For more information about how **Minimum TTL**, **Default TTL**, and **Maximum TTL** interact with Cache-Control max-age and Cache-Control s-maxage directives and the Expires header field, see [Specifying the Amount of Time that CloudFront Caches Objects for Web Distributions \(p. 117\)](#).

You can also control how long errors (for example, 404, Not Found) stay in a CloudFront cache before CloudFront tries again to get the requested object by forwarding another request to your origin. For more information, see [How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin \(p. 158\)](#).

Topics

- [Using Headers to Control Cache Duration for Individual Objects \(p. 117\)](#)
- [Specifying the Amount of Time that CloudFront Caches Objects for Web Distributions \(p. 117\)](#)
- [Specifying the Minimum Time that CloudFront Caches Objects for RTMP Distributions \(p. 120\)](#)
- [Adding Headers to Your Objects Using the Amazon S3 Console \(p. 121\)](#)

Using Headers to Control Cache Duration for Individual Objects

You can use the `Cache-Control` and `Expires` headers to control how long objects stay in the cache. Settings for **Minimum TTL**, **Default TTL**, and **Maximum TTL** also affect cache duration, but here's an overview of how headers can affect cache duration:

- The `Cache-Control max-age` directive lets you specify how long (in seconds) that you want an object to remain in the cache before CloudFront gets the object again from the origin server. The minimum expiration time CloudFront supports is 0 seconds for web distributions and 3600 seconds for RTMP distributions. The maximum value is 100 years. Specify the value in the following format:

`Cache-Control: max-age=seconds`

For example, the following directive tells CloudFront to keep the associated object in the cache for 3600 seconds (one hour):

`Cache-Control: max-age=3600`

If you want objects to stay in CloudFront edge caches for a different duration than they stay in browser caches, you can use the `Cache-Control max-age` and `Cache-Control s-maxage` directives together. For more information, see [Specifying the Amount of Time that CloudFront Caches Objects for Web Distributions \(p. 117\)](#).

- The `Expires` header field lets you specify an expiration date and time using the format specified in [RFC 2616, Hypertext Transfer Protocol -- HTTP/1.1 Section 3.3.1, Full Date](#), for example:

Sat, 27 Jun 2015 23:59:59 GMT

We recommend that you use the `Cache-Control max-age` directive instead of the `Expires` header field to control object caching. If you specify values both for `Cache-Control max-age` and for `Expires`, CloudFront uses only the value of `Cache-Control max-age`.

For more information, see [Specifying the Amount of Time that CloudFront Caches Objects for Web Distributions \(p. 117\)](#).

You cannot use the HTTP `Cache-Control` or `Pragma` header fields in a `GET` request from a viewer to force CloudFront to go back to the origin server for the object. CloudFront ignores those header fields in viewer requests.

For more information about the `Cache-Control` and `Expires` header fields, see the following sections in [RFC 2616, Hypertext Transfer Protocol -- HTTP/1.1](#):

- [Section 14.9 Cache Control](#)
- [Section 14.21 Expires](#)

For an example of how to add `Cache-Control` and `Expires` header fields using the AWS SDK for PHP, see [Upload an Object Using the AWS SDK for PHP](#) in the *Amazon Simple Storage Service Developer Guide*. Some third-party tools are also able to add these fields.

Specifying the Amount of Time that CloudFront Caches Objects for Web Distributions

For web distributions, you can use `Cache-Control` or `Expires` headers, and CloudFront minimum, maximum, and default TTL values to control the amount of time in seconds that CloudFront keeps an

object in the cache before forwarding another request to the origin. Headers values also determine how long a browser keeps an object in the cache before forwarding another request to CloudFront.

Important

If you configure CloudFront to forward all headers to your origin for a cache behavior, CloudFront never caches the associated objects. Instead, CloudFront forwards all requests for those objects to the origin. In that configuration, the value of minimum TTL must be 0. For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

To specify values for [Minimum TTL](#), [Maximum TTL](#), and [Default TTL](#), you must choose the **Customize** option for the [Object Caching](#) setting.

| Origin Configuration | Minimum TTL = 0 Seconds | Minimum TTL > 0 Seconds |
|---|--|---|
| The origin adds a Cache-Control max-age directive to objects | <p>CloudFront caching</p> <p>CloudFront caches objects for the lesser of the value of the Cache-Control max-age directive or the value of the CloudFront maximum TTL.</p> <p>Browser caching</p> <p>Browsers cache objects for the value of the Cache-Control max-age directive.</p> | <p>CloudFront caching</p> <p>CloudFront caching depends on the values of the CloudFront minimum TTL and maximum TTL and the Cache-Control max-age directive:</p> <ul style="list-style-type: none"> • Minimum TTL < max-age < maximum TTL • max-age < minimum TTL • max-age > maximum TTL <p>Browser caching</p> <p>Browsers cache objects for the value of the Cache-Control max-age directive.</p> |
| The origin does not add a Cache-Control max-age directive to objects | <p>CloudFront caching</p> <p>CloudFront caches objects for the value of the CloudFront default TTL.</p> <p>Browser caching</p> <p>Depends on the browser.</p> | <p>CloudFront caching</p> <p>CloudFront caches objects for the greater of the value of the CloudFront minimum TTL or default TTL.</p> <p>Browser caching</p> <p>Depends on the browser.</p> |

Amazon CloudFront Developer Guide
Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration)

| Origin Configuration | Minimum TTL = 0 Seconds | Minimum TTL > 0 Seconds |
|---|---|--|
| The origin adds Cache-Control max-age and Cache-Control s-maxage directives to objects | <p>CloudFront caching</p> <p>CloudFront caches objects for the lesser of the value of the Cache-Control s-maxage directive or the value of the CloudFront maximum TTL.</p> <p>Browser caching</p> <p>Browsers cache objects for the value of the Cache-Control max-age directive.</p> | <p>CloudFront caching</p> <p>CloudFront caching depends on the values of the CloudFront minimum TTL and maximum TTL and the Cache-Control s-maxage directive:</p> <ul style="list-style-type: none"> • Minimum TTL < s-maxage < maximum TTL CloudFront caches objects for the value of the Cache-Control s-maxage directive. • s-maxage < minimum TTL CloudFront caches objects for the value of the CloudFront minimum TTL. • s-maxage > maximum TTL CloudFront caches objects for the value of the CloudFront maximum TTL. <p>Browser caching</p> <p>Browsers cache objects for the value of the Cache-Control max-age directive.</p> |

| Origin Configuration | Minimum TTL = 0 Seconds | Minimum TTL > 0 Seconds |
|---|---|--|
| The origin adds an <code>Expires</code> header to objects | <p>CloudFront caching</p> <p>CloudFront caches objects until the date in the <code>Expires</code> header or for the value of the CloudFront maximum TTL, whichever is sooner.</p> <p>Browser caching</p> <p>Browsers cache objects until the date in the <code>Expires</code> header.</p> | <p>CloudFront caching</p> <p>CloudFront caching depends on the values of the CloudFront minimum TTL and maximum TTL and the <code>Expires</code> header:</p> <ul style="list-style-type: none"> • Minimum TTL < <code>Expires</code> < maximum TTL CloudFront caches objects until the date and time in the <code>Expires</code> header. • <code>Expires</code> < minimum TTL CloudFront caches objects for the value of the CloudFront minimum TTL. • <code>Expires</code> > maximum TTL CloudFront caches objects for the value of the CloudFront maximum TTL. <p>Browser caching</p> <p>Browsers cache objects until the date and time in the <code>Expires</code> header.</p> |
| Origin adds <code>Cache-Control: no-cache, no-store, and/or private</code> directives to objects | <p>CloudFront and browsers respect the headers.</p> <p>For an exception to how CloudFront handles the <code>Cache-Control: no-cache</code> header, see Simultaneous Requests for the Same Object (Traffic Spikes) (p. 154).</p> | <p>CloudFront caching</p> <p>CloudFront caches objects for the value of the CloudFront minimum TTL.</p> <p>Browser caching</p> <p>Browsers respect the headers.</p> |

For information about how to change settings for web distributions using the CloudFront console, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#). For information about how to change settings for web distributions using the CloudFront API, see [PUT Config](#).

Specifying the Minimum Time that CloudFront Caches Objects for RTMP Distributions

For RTMP distributions, CloudFront keeps objects in edge caches for 24 hours by default. You can add `Cache-Control` or `Expires` headers to your objects to change the amount of time that CloudFront keeps objects in edge caches before it forwards another request to the origin. The minimum duration is 3600 seconds (one hour). If you specify a lower value, CloudFront uses 3600 seconds.

Adding Headers to Your Objects Using the Amazon S3 Console

Note

Using the Amazon S3 console, you can only add headers to one object at a time, but with some third-party tools, you can add headers to multiple Amazon S3 objects at a time. For more information about third-party tools that support Amazon S3, perform a web search on [AWS s3 third party tools](#).

To add a Cache-Control or Expires header field to Amazon S3 objects using the Amazon S3 console

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3>.
2. In the Amazon S3 console, in the buckets pane, click the name of the bucket that contains the files.
3. In the list of objects, select the first object to which you want to add a header field.
4. Click **Actions** and click **Properties**.
5. In the right pane, expand **Metadata**.
6. Click **Add More Metadata**.
7. In the **Key** list, click **Cache-Control** or **Expires**, as applicable.
8. In the **Value** field, enter the applicable value:
 - For a Cache-Control field, enter:
max-age=number of seconds that you want objects to stay in a CloudFront edge cache
 - For an Expires field, enter a date and time in HTML format.
9. Click **Save**.
10. If you want to add a header field to additional objects, click the name of the next object, and repeat steps 5 through 9.

Invalidating Objects (Web Distributions Only)

If you need to remove an object from CloudFront edge caches before it expires, you can do one of the following:

- Invalidate the object from edge caches. The next time a viewer requests the object, CloudFront returns to the origin to fetch the latest version of the object.
- Use object versioning to serve a different version of the object that has a different name. For more information, see [Updating Existing Objects Using Versioned Object Names \(p. 115\)](#).

Important

You can invalidate most types of objects that are served by a web distribution, but you cannot invalidate media files in the Microsoft Smooth Streaming format when you have enabled Smooth Streaming for the corresponding cache behavior. In addition, you cannot invalidate objects that are served by an RTMP distribution.

To invalidate objects, you can specify either the path for individual objects or a path that ends with the * wildcard, which might apply to one object or to many, as shown in the following examples:

- /images/image1.jpg

- `/images/image*`
- `/images/*`

You can submit a specified number of invalidation paths each month for free. If you submit more than the allotted number of invalidation paths in a month, you pay a fee for each invalidation path that you submit. For more information about the charges for invalidation, see [Paying for Object Invalidation \(p. 127\)](#).

Topics

- [Choosing Between Invalidating Objects and Using Versioned Object Names \(p. 122\)](#)
- [Determining Which Objects to Invalidate \(p. 122\)](#)
- [Specifying the Objects to Invalidate \(p. 123\)](#)
- [Invalidating Objects and Displaying Information about Invalidations \(p. 124\)](#)
- [Third-Party Tools for Invalidating Objects \(p. 126\)](#)
- [Invalidation Limits \(p. 127\)](#)
- [Paying for Object Invalidation \(p. 127\)](#)

Choosing Between Invalidating Objects and Using Versioned Object Names

To control the versions of objects that are served from your distribution, you can either invalidate objects or give them versioned file names. If you'll want to update your objects frequently, we recommend that you primarily use object versioning for the following reasons:

- Versioning enables you to control which object a request returns even when the user has a version cached either locally or behind a corporate caching proxy. If you invalidate the object, the user might continue to see the old version until it expires from those caches.
- CloudFront access logs include the names of your objects, so versioning makes it easier to analyze the results of object changes.
- Versioning provides a way to serve different versions of objects to different users.
- Versioning simplifies rolling forward and back between object revisions.
- Versioning is less expensive. You still have to pay for CloudFront to transfer new versions of your objects to edge locations, but you don't have to pay for invalidating objects.

For more information about object versioning, see [Updating Existing Objects Using Versioned Object Names \(p. 115\)](#).

Determining Which Objects to Invalidate

If you want to invalidate multiple objects such as all of the objects in a directory or all of the objects whose names begin with the same characters, you can include the `*` wildcard at the end of the invalidation path. For more information about using the `*` wildcard, see [Invalidation paths](#).

If you want to invalidate selected objects but your users don't necessarily access every object on your origin, you can determine which objects viewers have requested from CloudFront and invalidate only those objects. To determine which objects viewers have requested, enable CloudFront access logging. For more information about access logs, see [Access Logs \(p. 256\)](#).

Specifying the Objects to Invalidate

Whether you invalidate objects by using the CloudFront console or the CloudFront API, the requirements and limitations for specifying objects are the same. Note the following about specifying the objects that you want to invalidate.

Case sensitivity

Invalidation paths are case sensitive, so `/images/image.jpg` and `/images/Image.jpg` specify two different objects.

Default root object

To invalidate the default root object, specify the path the same way that you specify the path for any other object.

Distribution types

You can invalidate only objects that are associated with a web distribution.

Forwarding cookies

If you configured CloudFront to forward cookies to your origin, CloudFront edge caches might contain several versions of the object. When you invalidate an object, CloudFront invalidates every cached version of the object regardless of its associated cookies. You can't selectively invalidate some versions and not others based on the associated cookies. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).

Forwarding headers

If you configured CloudFront to forward a whitelist of headers to your origin and to cache based on the values of the headers, CloudFront edge caches might contain several versions of the object.

When you invalidate an object, CloudFront invalidates every cached version of the object regardless of the header values. You can't selectively invalidate some versions and not others based on header values. (If you configure CloudFront to forward all headers to your origin, CloudFront doesn't cache your objects.) For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

Forwarding query strings

If you configured CloudFront to forward query strings to your origin, you must include the query strings when invalidating objects, as shown in the following examples:

- `images/image.jpg?parameter1=a`
- `images/image.jpg?parameter1=b`

If client requests include five different query strings for the same object, you can either invalidate the object five times, once for each query string, or you can use the `*` wildcard in the invalidation path, as shown in the following example:

`/images/image.jpg*`

For more information about using wildcards in the invalidation path, see [Invalidation paths](#). For more information about query strings, see [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#). To determine which query strings are in use, you can enable CloudFront logging. For more information, see [Access Logs \(p. 256\)](#).

Limits

For information about limits on invalidations, see [Invalidation Limits \(p. 127\)](#).

Microsoft Smooth Streaming files

You cannot invalidate media files in the Microsoft Smooth Streaming format when you have enabled Smooth Streaming for the corresponding cache behavior.

Non-ASCII or unsafe characters in the path

If the path includes non-ASCII characters or unsafe characters as defined in RFC 1783 (<http://www.ietf.org/rfc/rfc1738.txt>), URL-encode those characters. Do not URL-encode any other characters in the path, or CloudFront will not invalidate the old version of the updated object.

Invalidation paths

The path is relative to the distribution. A leading / is optional. For example, to invalidate the object at `http://d111111abcdef8.cloudfront.net/images/image2.jpg`, you would specify the following:

/images/image2.jpg

or

images/image2.jpg

You can also invalidate multiple objects simultaneously by using the * wildcard. The *, which replaces 0 or more characters, must be the last character in the invalidation path. For example:

- To invalidate all of the objects in a directory:

/directory-path/*

- To invalidate a directory, all of its subdirectories, and all of the objects in the directory and subdirectories:

/directory-path*

- To invalidate all files that have the same name but different file name extensions, such as logo.jpg, logo.png, and logo.gif:

/directory-path/file-name*

- To invalidate all of the files in a directory for which the file name starts with the same characters (such as all of the files for a video in HLS format), regardless of the file name extension:

/directory-path/initial-characters-in-file-name*

- When you configure CloudFront to cache based on query string parameters and you want to invalidate every version of an object:

/directory-path/file-name.file-name-extension*

- To invalidate all of the objects in a distribution:

/*

The maximum length of a path is 4,000 characters.

The charge to submit an invalidation path is the same regardless of the number of objects you're invalidating: a single object (/images/logo.jpg) or all of the objects that are associated with a distribution /*). For more information, see [Amazon CloudFront Pricing](#).

If the invalidation path is a directory and if you have not standardized on a method for specifying directories—with or without a trailing slash (/)—we recommend that you invalidate the directory both with and without a trailing slash, for example, /images and /images/. For more information, see [How Public URLs Affect the Invalidations of Directories \(p. 101\)](#).

Signed URLs

If you are using signed URLs, invalidate an object by including only the portion of the URL before the question mark (?).

Invalidate Objects and Display Information about Invalidations

You can use the CloudFront console or CloudFront API actions to create and run an invalidation, display a list of the invalidations that you submitted previously, and display detailed information about an individual

invalidation. You can also copy an existing invalidation, edit the list of object paths, and run the edited invalidation.

See the applicable topic:

- [Invalidating Objects Using the CloudFront Console \(p. 125\)](#)
- [Copying, Editing, and Rerunning an Existing Invalidiation Using the CloudFront Console \(p. 125\)](#)
- [Listing Invalidations Using the CloudFront Console \(p. 126\)](#)
- [Displaying Information about an Invalidiation Using the CloudFront Console \(p. 126\)](#)
- [Invalidating Objects and Displaying Information about Invalidations Using the CloudFront API \(p. 126\)](#)

Invalidating Objects Using the CloudFront Console

To invalidate objects using the CloudFront console, do the following procedure.

To invalidate objects using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the distribution for which you want to invalidate objects.
3. Choose **Distribution Settings**.
4. Choose the **Invalidations** tab.
5. Choose **Create Invalidations**.
6. For the objects that you want to invalidate, enter one invalidation path per line. For information about specifying invalidation paths, see [Specifying the Objects to Invalidate \(p. 123\)](#).

Important

Specify object paths carefully. You can't cancel an invalidation request after you start it.

7. Choose **Invalidate**.

Copying, Editing, and Rerunning an Existing Invalidiation Using the CloudFront Console

You can copy an invalidation that you created previously, update the list of invalidation paths, and run the updated invalidation. You cannot copy an existing invalidation, update the invalidation paths, and save the updated invalidation without running it.

Important

If you copy an invalidation that is still in progress, update the list of invalidation paths, and run the updated invalidation, CloudFront will not stop or delete the invalidation that you copied. If any invalidation paths appear in the original and in the copy, CloudFront will try to invalidate the objects twice, and both invalidations will count against your maximum number of free invalidations for the month. If you've already reached the maximum number of free invalidations, you'll be charged for both invalidations of each object. For more information, see [Invalidation Limits \(p. 127\)](#).

To copy, edit, and rerun an existing invalidation using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the distribution that contains the invalidation that you want to copy.
3. Choose **Distribution Settings**.
4. Choose the **Invalidations** tab.
5. Choose the invalidation that you want to copy.

If you aren't sure which invalidation you want to copy, you can choose an invalidation and choose **Details** to display detailed information about that invalidation.

6. Choose **Copy**.
7. Update the list of invalidation paths if applicable.
8. Choose **Invalidate**.

Listing Invalidations Using the CloudFront Console

Using the console, you can display a list of the last 100 invalidations that you've created and run for a distribution. If you want to get a list of more than 100 invalidations, use the GET [Invalidation List API](#) action. For more information, see [GET Invalidation List](#) in the *Amazon CloudFront API Reference*.

To list invalidations using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the distribution for which you want to display a list of invalidations.
3. Choose **Distribution Settings**.
4. Choose the **Invalidations** tab.

Displaying Information about an Invalidations Using the CloudFront Console

You can display detailed information about an invalidation, including distribution ID, invalidation ID, the status of the invalidation, the date and time that the invalidation was created, and a complete list of the invalidation paths.

To display information about an invalidation using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the distribution that contains the invalidation about which you want to display detailed information.
3. Choose **Distribution Settings**.
4. Choose the **Invalidations** tab.
5. Choose the invalidation about which you want to display detailed information.
6. Choose **Details**.

Invalidating Objects and Displaying Information about Invalidations Using the CloudFront API

For information about invalidating objects and about displaying information about invalidations using the CloudFront API, see the applicable topic in the *Amazon CloudFront API Reference*:

- Invalidating objects: [POST Invalidation](#)
- Getting a list of your invalidations: [GET Invalidation List](#)
- Getting information about a specific invalidation: [GET Invalidation](#)

Third-Party Tools for Invalidating Objects

In addition to the invalidation methods provided by CloudFront, several third-party tools provide ways to invalidate objects. For a list of tools, see [Invalidating Objects \(p. 357\)](#).

Invalidation Limits

If you're invalidating objects individually, you can have invalidation requests for up to 3,000 objects per distribution in progress at one time. This can be one invalidation request for up to 3,000 objects, up to 3,000 requests for one object each, or any other combination that doesn't exceed 3,000 objects. For example, you can submit 30 invalidation requests that invalidate 100 objects each. As long as all 30 invalidation requests are still in progress, you can't submit any more invalidation requests. If you exceed the limit, CloudFront returns an error message.

If you're using the * wildcard, you can have requests for up to 15 invalidation paths in progress at one time. You can also have invalidation requests for up to 3,000 individual objects per distribution in progress at the same time; the limit on wildcard invalidation requests is independent of the limit on invalidating objects individually.

Note

It usually takes 10 to 15 minutes for CloudFront to complete your invalidation request, depending on the number of invalidation paths that you included in the request.

Paying for Object Invalidation

The first 1,000 invalidation paths that you submit per month are free; you pay for each invalidation path over 1,000 in a month. An invalidation path can be for a single object (such as /images/logo.jpg) or for multiple objects (such as /images/*). A path that includes the * wildcard counts as one path even if it causes CloudFront to invalidate thousands of objects.

This limit of 1000 invalidation paths per month applies to the total number of invalidation paths across all of the distributions that you create with one AWS account. For example, if you use the AWS account john@example.com to create three distributions, and you submit 600 invalidation paths for each distribution in a given month (for a total of 1,800 invalidation paths), AWS will charge you for 800 invalidation paths in that month. For specific information about invalidation pricing, go to [Amazon CloudFront Pricing](#). For more information about invalidation paths, see [Invalidation paths](#).

Customizing Error Responses

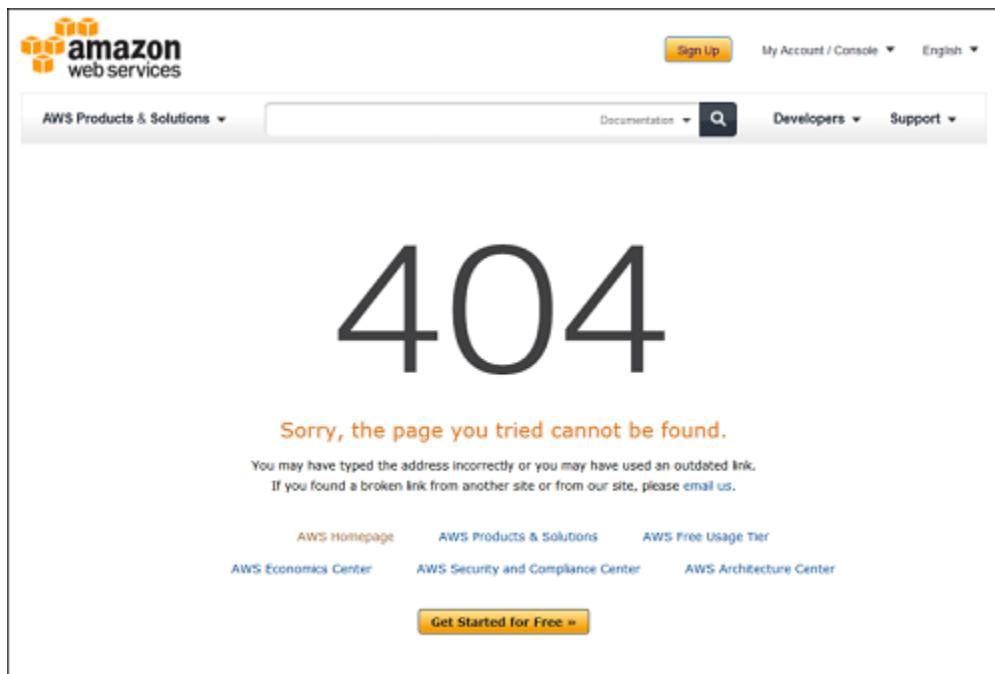
Topics

- [Creating or Updating a Cache Behavior for Custom Error Pages \(p. 129\)](#)
- [Changing Response Codes \(p. 129\)](#)
- [Controlling How Long CloudFront Caches Errors \(p. 129\)](#)
- [How CloudFront Responds When a Custom Error Page Is Unavailable \(p. 130\)](#)
- [Pricing for Custom Error Pages \(p. 130\)](#)
- [Configuring Error Response Behavior \(p. 131\)](#)

If the objects that you're serving through CloudFront are unavailable for some reason, your web server typically returns an HTTP status code to CloudFront. For example, if a viewer specifies an invalid URL, your web server returns a 404 status code to CloudFront, and CloudFront returns that status code to the viewer. The viewer displays a brief and sparsely formatted default message similar to this:

Not Found: The requested URL /myfilename.html was not found on this server.

If you'd rather display a custom error message, possibly using the same formatting as the rest of your website, you can have CloudFront return to the viewer an object (for example, an HTML file) that contains your custom error message.



You can specify a different object for each supported HTTP status code, or you can use the same object for all of the supported status codes. You can also choose to specify objects for some status codes and not for others.

The objects that you're serving through CloudFront can be unavailable for a variety of reasons. These fall into two broad categories:

- **Client errors** indicate a problem with the request. For example, an object with the specified name isn't available, or the user doesn't have the permissions required to get an object in your Amazon S3 bucket. When a client error occurs, the origin returns an HTTP status code in the 400 range to CloudFront.
- **Server errors** indicate a problem with the origin server. For example, the HTTP server is busy or unavailable. When a server error occurs, either your origin server returns an HTTP status code in the 500 range to CloudFront, or CloudFront doesn't get a response from your origin server for a certain period of time and assumes a 504 status code (gateway timeout).

The HTTP status codes for which CloudFront can return a custom error page include the following:

- 400, 403, 404, 405, 414, 416
- 500, 501, 502, 503, 504

Note

You can create a custom error page for HTTP status code 416 (Requested Range Not Satisfiable), and you can change the HTTP status code that CloudFront returns to viewers when your origin returns a status code 416 to CloudFront. (For more information, see [Changing Response Codes \(p. 129\)](#).) However, CloudFront doesn't cache status code 416 responses, so you can specify a value for **Error Caching Minimum TTL** for status code 416, but CloudFront doesn't use it.

For a detailed explanation of how CloudFront handles error responses from your origin, see [How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin \(p. 158\)](#).

Creating or Updating a Cache Behavior for Custom Error Pages

If you want to store your objects and your custom error pages in different locations, your distribution must include a cache behavior for which the following is true:

- The value of **Path Pattern** matches the path to your custom error messages. For example, suppose you saved custom error pages for 4xx errors in an Amazon S3 bucket in a directory named `/4xx-errors`. Your distribution must include a cache behavior for which the path pattern routes requests for your custom error pages to that location, for example, `/4xx-errors/*`.
- The value of **Origin** specifies the value of **Origin ID** for the origin that contains your custom error pages.

For more information, see [Cache Behavior Settings \(p. 68\)](#) in the topic [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

Changing Response Codes

You can choose the HTTP status code CloudFront returns along with a custom error page for a given HTTP status code. For example, if your origin returns a 500 status code to CloudFront, you might want CloudFront to return a custom error page and a 200 status code (OK) to the viewer. There are a variety of reasons that you might want CloudFront to return a status code to the viewer that is different from the one that your origin returned to CloudFront:

- Some Internet devices (some firewalls and corporate proxies, for example) intercept HTTP 4xx and 5xx and prevent the response from being returned to the viewer. If you substitute 200, the response typically won't be intercepted.
- If you don't care about distinguishing among different client errors or server errors, you can specify **400** or **500** as the value that CloudFront returns for all 4xx or 5xx status codes.
- You might want to return a 200 status code (OK) and static website so your customers don't know that your website is down.

If you enable CloudFront access logs and you configure CloudFront to change the HTTP status code in the response, the value of the `sc-status` column in access logs will contain the status code that you specify. However, the value of the `x-edge-result-type` column will not be affected; it will still contain the result type of the response from the origin. For example, suppose you configure CloudFront to return a status code of 200 to the viewer when the origin returns 404 (Not Found) to CloudFront. When the origin responds to a request with a 404 status code, the value in the `sc-status` column in the access log will be 200, but the value in the `x-edge-result-type` column will be `Error`.

You can configure CloudFront to return any of the following HTTP status codes along with a custom error page:

- 200
- 400, 403, 404, 405, 414, 416
- 500, 501, 502, 503, 504

Controlling How Long CloudFront Caches Errors

By default, when your origin returns an HTTP 4xx or 5xx status code, CloudFront caches these error responses for five minutes and then submits the next request for the object to your origin to see whether the problem that caused the error has been resolved and the requested object is now available.

Note

You can create a custom error page for HTTP status code 416 (Requested Range Not Satisfiable), and you can change the HTTP status code that CloudFront returns to viewers when your origin returns a status code 416 to CloudFront. (For more information, see [Changing Response Codes \(p. 129\)](#).) However, CloudFront doesn't cache status code 416 responses, so you can specify a value for **Error Caching Minimum TTL** for status code 416, but CloudFront doesn't use it.

You can specify the error-caching duration—the **Error Caching Minimum TTL**—for each 4xx and 5xx status code that CloudFront caches. For a procedure, see [Configuring Error Response Behavior \(p. 131\)](#). When you specify a duration, note the following:

- If you specify a short error-caching duration, CloudFront forwards more requests to your origin than if you specify a longer duration. For 5xx errors, this may aggravate the problem that originally caused your origin to return an error.
- When your origin returns an error for an object, CloudFront responds to requests for the object either with the error response or with your custom error page until the error-caching duration elapses. If you specify a long error-caching duration, CloudFront might continue to respond to requests with an error response or your custom error page for a long time after the object becomes available again.

If you want to control how long CloudFront caches errors for individual objects, you can configure your origin server to add the applicable header to the error response for that object:

- **If the origin adds a Cache-Control max-age or Cache-Control s-maxage directive, or an Expires header:** CloudFront caches error responses for the greater of the value in the header or the value of **Error Caching Minimum TTL**.
- **If the origin adds other Cache-Control directives or adds no headers:** CloudFront caches error responses for the value of **Error Caching Minimum TTL**.

If the expiration time for a 4xx or 5xx status code for an object is longer than you want to wait, you can invalidate the status code by using the URL of the requested object. If your origin is returning an error response for multiple objects, you need to invalidate each object separately. For more information about invalidating objects, see [Invalidate Objects \(Web Distributions Only\) \(p. 121\)](#).

How CloudFront Responds When a Custom Error Page Is Unavailable

If you configure CloudFront to return a custom error page for an HTTP status code but the custom error page isn't available, CloudFront returns to the viewer the status code that CloudFront received from the origin that contains the custom error pages. For example, suppose your custom origin returns a 500 status code and you have configured CloudFront to get a custom error page for a 500 status code from an Amazon S3 bucket. However, someone accidentally deleted the custom error page from your bucket. CloudFront will return an HTTP 404 status code (not found) to the viewer that requested the object.

Pricing for Custom Error Pages

When CloudFront returns a custom error page to a viewer, you pay the standard CloudFront charges for the custom error page, not the charges for the requested object. For more information about CloudFront charges, see [Amazon CloudFront Pricing](#).

Configuring Error Response Behavior

You can use either the CloudFront API or console to configure CloudFront error responses. For information about using the CloudFront API to configure error responses, go to [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*, and see the `CustomErrorResponse` element.

To configure CloudFront error responses using the console

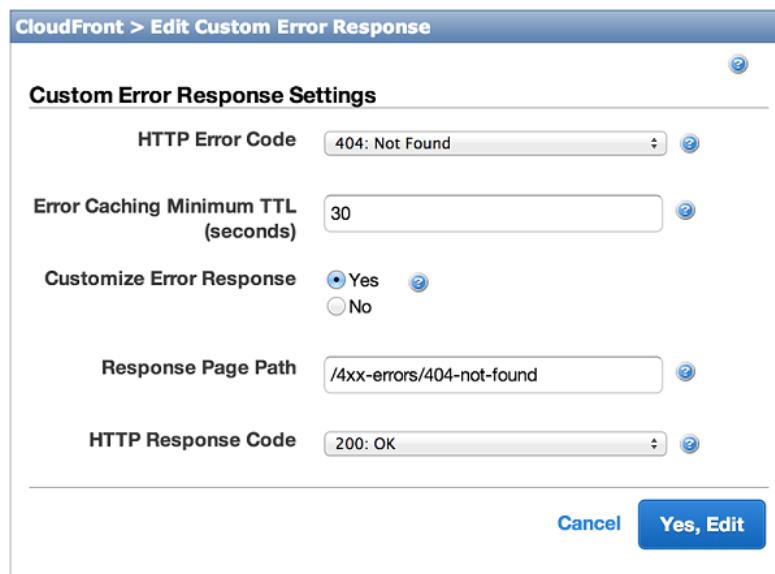
1. Create the custom error pages that you want CloudFront to return to viewers when your origin returns HTTP 4xx or 5xx errors. Save the pages in a location that is accessible to CloudFront.

We recommend that you store custom error pages in an Amazon S3 bucket even if you're using a custom origin. If you store custom error pages on an HTTP server and the server starts to return 5xx errors, CloudFront can't get the files that you want to return to viewers because the origin server is unavailable.

2. Confirm that you have granted CloudFront at least `read` permission to your custom error page objects.

For more information about Amazon S3 permissions, see [Access Control](#) in the *Amazon Simple Storage Service Developer Guide*. For information on using the Amazon S3 console to update permissions, go to the [Amazon Simple Storage Service Console User Guide](#).

3. (Optional) Configure your origin server to add `Cache-Control` directives or an `Expires` header along with the error response for specific objects, if applicable. For more information, see [Controlling How Long CloudFront Caches Errors \(p. 129\)](#).
4. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
5. In the list of distributions, select the distribution to update and choose **Distribution Settings**.
6. Choose the **Error Pages** tab. Then either choose **Create Custom Error Response**, or choose an existing error code and choose **Edit**.



7. Enter the applicable values. For more information, see [Custom Error Pages and Error Caching \(p. 79\)](#).
8. If you configured CloudFront to return custom error pages, add or update the applicable cache behaviors. For more information, see [Creating or Updating a Cache Behavior for Custom Error Pages \(p. 129\)](#).
9. To save your changes, choose **Yes, Edit**.

How CloudFront Processes Partial Requests for an Object (Range GETs)

For a large object, an end user's browser or client might make multiple GET requests and use the Range request header to download the object in smaller units. These requests for ranges of bytes, sometimes known as Range GET requests, improve the efficiency of partial downloads and the recovery from partially failed transfers.

When CloudFront receives a Range GET request, it checks the cache in the edge location that received the request. If the cache in that edge location already contains the entire object or the requested portion of the object, CloudFront immediately serves the requested range from the cache.

If the cache doesn't contain the requested range, CloudFront forwards the request to the origin. (To optimize performance, CloudFront may request a larger range than the client requested in the Range GET.) What happens next depends on whether the origin supports Range GET requests:

- **If the origin supports Range GET requests:** It returns the requested range. CloudFront serves the requested range and also caches it for future requests. (Amazon S3 supports Range GET requests, as do some HTTP servers, for example, Apache and IIS. For information about whether your HTTP server does, see the documentation for your HTTP server.)
- **If the origin doesn't support Range GET requests:** It returns the entire object. CloudFront serves the entire object and also caches the entire object for future requests. After CloudFront caches the entire object in an edge cache, it responds to Range GET requests by serving the requested range.

In either case, CloudFront begins to serve the requested range or object to the end user as soon as the first byte arrives from the origin.

Note

If the viewer makes a Range GET request and the origin returns Transfer-Encoding: chunked, CloudFront returns the entire object to the viewer instead of the requested range.

CloudFront generally follows the RFC specification for the Range header. However, if your Range headers don't adhere to the following requirements, CloudFront will return HTTP status code 200 with the full object instead of status code 206 with the specified ranges:

- The ranges must be listed in ascending order. For example, 100–200, 300–400 is valid, 300–400, 100–200 is not valid.
- The ranges must not overlap. For example, 100–200, 150–250 is not valid.
- All of the ranges specifications must be valid. For example, you can't specify a negative value as part of a range.

For more information about the Range request header, see "Section 14.35 Range" in *Hypertext Transfer Protocol -- HTTP/1.1* at <http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.35>.

Specifying a Default Root Object (Web Distributions Only)

You can configure CloudFront to return a specific object (the default root object) when an end user requests the root URL for your distribution instead of an object in your distribution. Specifying a default root object avoids exposing the contents of your distribution.

For example, the following request points to the object `image.jpg`:

```
http://d111111abcdef8.cloudfront.net/image.jpg
```

The following request points to the root URL of the same distribution instead of to a specific object:

```
http://d111111abcdef8.cloudfront.net/
```

When you define a default root object, an end-user request that calls the root of your distribution returns the default root object. For example, if you designate the file `index.html` as your default root object, a request for:

```
http://d111111abcdef8.cloudfront.net/
```

returns:

```
http://d111111abcdef8.cloudfront.net/index.html
```

However, if you define a default root object, an end-user request for a subdirectory of your distribution does not return the default root object. For example, suppose `index.html` is your default root object and that CloudFront receives an end-user request for the `install` directory under your CloudFront distribution:

```
http://d111111abcdef8.cloudfront.net/install/
```

CloudFront will not return the default root object even if a copy of `index.html` appears in the `install` directory.

If you configure your distribution to allow all of the HTTP methods that CloudFront supports, the default root object applies to all methods. For example, if your default root object is `index.php` and you write your application to submit a `POST` request to the root of your domain (`http://example.com`), CloudFront will send the request to `http://example.com/index.php`.

The behavior of CloudFront default root objects is different from the behavior of Amazon S3 index documents. When you configure an Amazon S3 bucket as a website and specify the index document, Amazon S3 returns the index document even if a user requests a subdirectory in the bucket. (A copy of the index document must appear in every subdirectory.) For more information about configuring Amazon S3 buckets as websites and about index documents, see the [Hosting Websites on Amazon S3](#) chapter in the *Amazon Simple Storage Service Developer Guide*.

Important

Remember that a default root object applies only to your CloudFront distribution. You still need to manage security for your origin. For example, if you are using an Amazon S3 origin, you still need to set your Amazon S3 bucket ACLs appropriately to ensure the level of access you want on your bucket.

If you don't define a default root object, requests for the root of your distribution pass to your origin server. If you are using an Amazon S3 origin, any of the following might be returned:

- **A list of the contents of your Amazon S3 bucket**—Under any of the following conditions, the contents of your origin are visible to anyone who uses CloudFront to access your distribution:
 - Your bucket is not properly configured.
 - The Amazon S3 permissions on the bucket associated with your distribution and on the objects in the bucket grant access to `everyone`.
 - An end user accesses your origin using your origin root URL.
- **A list of the private contents of your origin**—If you configure your origin as a private distribution (only you and CloudFront have access), the contents of the Amazon S3 bucket associated with your distribution are visible to anyone who has the credentials to access your distribution through CloudFront.

In this case, users are not able to access your content through your origin root URL. For more information about distributing private content, see [Serving Private Content through CloudFront \(p. 162\)](#).

- **Error 403 Forbidden**—CloudFront returns this error if the permissions on the Amazon S3 bucket associated with your distribution or the permissions on the objects in that bucket deny access to CloudFront and to everyone.

To avoid exposing the contents of your web distribution or returning an error, perform the following procedure to specify a default root object for your distribution.

To specify a default root object for your distribution

1. Upload the default root object to the origin that your distribution points to.

The file can be any type supported by CloudFront. For a list of constraints on the file name, see the description of the `DefaultRootObject` element in [DistributionConfig Complex Type](#).

Note

If the file name of the default root object is too long or contains an invalid character, CloudFront returns the error `HTTP 400 Bad Request - InvalidDefaultRootObject`. In addition, CloudFront caches the code for five minutes and writes the results to the access logs.

2. Confirm that the permissions for the object grant CloudFront at least `read` access.

For more information about Amazon S3 permissions, see [Access Control](#) in the *Amazon Simple Storage Service Developer Guide*. For information on using the Amazon S3 console to update permissions, go to the [Amazon Simple Storage Service Console User Guide](#).

3. Update your distribution to refer to the default root object using the CloudFront console or the CloudFront API.

To specify a default root object using the CloudFront console:

- a. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
- b. In the list of distributions in the top pane, select the distribution to update.
- c. In the **Distribution Details** pane, on the **General** tab, click **Edit**.
- d. In the **Edit Distribution** dialog box, in the **Default Root Object** field, enter the file name of the default root object.

Enter only the object name, for example, `index.html`. Do not add a `/` before the object name.

- e. To save your changes, click **Yes, Edit**.

To update your configuration using the CloudFront API, you specify a value for the `DefaultRootObject` element in your distribution. For information about using the CloudFront API to specify a default root object, see [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*.

4. Confirm that you have enabled the default root object by requesting your root URL. If your browser doesn't display the default root object, perform the following steps:
 - a. Confirm that your distribution is fully deployed by viewing the status of your distribution in the CloudFront console.
 - b. Repeat Steps 2 and 3 to verify that you granted the correct permissions and that you correctly updated the configuration of your distribution to specify the default root object.

Serving Compressed Files

You can configure CloudFront to automatically compress files of certain types and serve the compressed files when viewer requests include `Accept-Encoding: gzip` in the request header. When content is compressed, downloads are faster because the files are smaller—in some cases, less than a quarter the size of the original. Especially for JavaScript and CSS files, faster downloads translates into faster rendering of web pages for your users. In addition, because the cost of CloudFront data transfer is based on the total amount of data served, serving compressed files is less expensive than serving uncompressed files.

Important

A viewer request must include `Accept-Encoding: gzip` in the request header, or CloudFront won't compress the requested file.

If you're using a custom origin, you can configure your origin to compress files with or without CloudFront compression. Your origin can compress file types that CloudFront doesn't compress. (See [File Types that CloudFront Compresses \(p. 137\)](#).) If your origin returns a compressed file to CloudFront, CloudFront detects that the file is compressed based on the value of the `Content-Encoding` header and doesn't compress the file again.

Topics

- [Using CloudFront to Compress Your Content \(p. 135\)](#)
- [Using a Custom Origin to Compress Your Content \(p. 137\)](#)

Using CloudFront to Compress Your Content

CloudFront can compress files both for Amazon S3 origins and for custom origins. When you configure CloudFront to compress your content, you specify the setting in your cache behaviors.

When you configure CloudFront to compress your content, here's how CloudFront serves your content:

1. You create or update a CloudFront distribution and configure CloudFront to compress content.
2. A viewer requests a file. The viewer adds the `Accept-Encoding: gzip` header to the request. This indicates that the viewer supports compressed content.
3. At the edge location, CloudFront checks the cache for a compressed version of the file that is referenced in the request.
4. If the compressed file is already in the cache, CloudFront returns the file to the viewer and skips the remaining steps.
5. If the compressed file is not in the cache, CloudFront forwards the request to the origin server, which can be either an Amazon S3 bucket or a custom origin.

Note

If CloudFront has an uncompressed version of the file in the cache, it still forwards a request to the origin.

6. The origin server returns an uncompressed version of the requested file to CloudFront.
7. CloudFront determines whether the file is compressible:
 - The file must be of a type that CloudFront compresses.
 - The file size must be between 1,000 and 10,000,000 bytes.
 - The response must include a `Content-Length` header so CloudFront can determine whether the size of the file is in the range that CloudFront compresses. If the `Content-Length` header is missing, CloudFront won't compress the file.
 - The response must not include a `Content-Encoding` header.
8. If the file is compressible, CloudFront compresses it, returns the compressed file to the viewer, and adds it to the cache.

9. The viewer uncompresses the file.

Note the following:

File types that CloudFront compresses

CloudFront compresses files in a large number of file types. For a complete list, see [File Types that CloudFront Compresses \(p. 137\)](#).

Size of files that CloudFront compresses

CloudFront compresses files that are between 1,000 bytes and 10,000,000 bytes in size.

Content-Length header

The origin must include a `Content-Length` header in the response so CloudFront can determine whether the size of the file is in the range that CloudFront compresses. If the `Content-Length` header is missing, CloudFront won't compress the file.

Etag header

If you configure CloudFront to compress content, CloudFront removes the `ETag` response header from the files that it compresses. When the `ETag` header is present, CloudFront and your origin can use it to determine whether the version of a file in a CloudFront edge cache is identical to the version on the origin server. However, after compression the two versions are no longer identical. As a result, when a compressed file expires and CloudFront forwards another request to your origin, your origin always returns the file to CloudFront instead of an HTTP status code 304 (Not Modified).

Content already in edge locations when you configure CloudFront to compress files

CloudFront compresses files in each edge location when it gets the files from your origin. When you configure CloudFront to compress your content, it doesn't compress files that are already in edge locations. In addition, when a file expires in an edge location and CloudFront forwards another request for the file to your origin, CloudFront doesn't compress the file if your origin returns an HTTP status code 304, which means that the edge location already has the latest version of the file. If you want CloudFront to compress the files that are already in edge locations, you'll need to invalidate those files. For more information, see [Invalidate Objects \(Web Distributions Only\) \(p. 121\)](#).

Custom origin is already configured to compress files

If you configure CloudFront to compress files and CloudFront is forwarding requests to a custom origin that is also configured to compress files, the custom origin will include a `Content-Encoding: gzip` header, which indicates that the file that the origin returned to CloudFront has already been compressed. CloudFront returns the cached file to the viewer and caches it in the edge location.

Note

CloudFront does not compress a file if the response includes a `Content-Encoding` header, regardless of the value.

Request doesn't include Accept-Encoding: gzip

If the `Accept-Encoding` header is missing from the request, CloudFront serves uncompressed content. If the `Accept-Encoding` header includes additional values such as `deflate` or `sdch`, CloudFront removes them before forwarding the request to the origin server.

CloudFront is busy

In rare cases, when a CloudFront edge location is unusually busy, some files might not be compressed.

Configuring a CloudFront Distribution to Compress Content

To configure a web distribution to compress your content, you update the applicable cache behaviors by using one of the following methods:

- **CloudFront console** – Update the `Compress objects automatically` setting. For more information, see [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#).
- **CloudFront API** – Change the value of the `Compress` element to `true`. For more information, see [POST Distribution](#) (to create a new distribution) or [PUT Distribution Config](#) (to update an existing distribution).

- **One of the AWS SDKs** – See the applicable SDK documentation on the [AWS Documentation](#) page.
- **The AWS CLI** – For more information, see [create-distribution](#) or [update-distribution](#) in the *AWS Command Line Interface Reference*.

File Types that CloudFront Compresses

If you configure CloudFront to compress your content, CloudFront compresses files that have the following values in the Content-Type header:

| | |
|-------------------------------|---------------------------|
| application/eot | application/x-otf |
| application/font | application/x-perl |
| application/font-sfnt | application/x-ttf |
| application/javascript | font/eot |
| application/json | font/ttf |
| application/opentype | font/otf |
| application/otf | font/opentype |
| application/pkcs7-mime | image/svg+xml |
| application/truetype | text/css |
| application/ttf | text/csv |
| application/vnd.ms-fontobject | text/html |
| application/xhtml+xml | text/javascript |
| application/xml | text/js |
| application/xml+rss | text/plain |
| application/x-font-opentype | text/richtext |
| application/x-font-truetype | text/tab-separated-values |
| application/x-font-ttf | text/xml |
| application/x-httdp-cgi | text/x-script |
| application/x-javascript | text/x-component |
| application/x-mpegurl | text/x-java-source |
| application/x-opentype | |

Using a Custom Origin to Compress Your Content

If you want to compress file types that CloudFront doesn't compress, you can configure your custom origin to compress files of those types using gzip. CloudFront doesn't support other compression algorithms. When your origin returns the compressed file to CloudFront, it will include a Content-Encoding: gzip header, which indicates to CloudFront that the file is already compressed.

Note

CloudFront does not compress a file if the response includes a `Content-Encoding` header, regardless of the value.

Serving Compressed Files When Your Origin Server Is Running IIS

By default, IIS does not serve compressed content for requests that come through proxy servers such as CloudFront. If you're using IIS and if you configured IIS to compress content by using the `httpCompression` element, change the value of the `noCompressionForProxies` attribute to `false` so IIS will return compressed content to CloudFront.

In addition, if you have compressed objects that are requested less frequently than every few seconds, you might have to change the values of `frequentHitThreshold` and `frequentHitTimePeriod`.

For more information, refer to the IIS documentation on the Microsoft website.

Serving Compressed Files When Your Origin Server Is Running NGINX

When CloudFront forwards a request to the origin server, it includes a `Via` header. This causes NGINX to interpret the request as proxied and, by default, NGINX disables compression for proxied requests. If your version of NGINX includes the `gzip_proxied` setting, change the value to `any` so that NGINX will return compressed content to CloudFront. For more information, see the NGINX documentation for the module `ngx_http_gzip_module`.

Request and Response Behavior

The following sections explain how CloudFront processes viewer requests and forwards the requests to your Amazon S3 or custom origin, and how CloudFront processes responses from your origin, including how CloudFront processes and caches 4xx and 5xx HTTP status codes.

Topics

- [Request and Response Behavior for Amazon S3 Origins \(p. 139\)](#)
- [Request and Response Behavior for Custom Origins \(p. 145\)](#)
- [How CloudFront Processes HTTP 3xx Status Codes from Your Origin \(p. 158\)](#)
- [How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin \(p. 158\)](#)

Request and Response Behavior for Amazon S3 Origins

Topics

- [How CloudFront Processes and Forwards Requests to Your Amazon S3 Origin Server \(p. 139\)](#)
- [How CloudFront Processes Responses from Your Amazon S3 Origin Server \(p. 144\)](#)

How CloudFront Processes and Forwards Requests to Your Amazon S3 Origin Server

For information about how CloudFront processes viewer requests and forwards the requests to your Amazon S3 origin, see the applicable topic:

Topics

- [Caching Duration and Minimum TTL \(p. 140\)](#)
- [Client IP Addresses \(p. 140\)](#)
- [Conditional GETs \(p. 140\)](#)
- [Cookies \(p. 141\)](#)
- [Cross-Origin Resource Sharing \(CORS\) \(p. 141\)](#)
- [GET Requests that Include a Body \(p. 141\)](#)

- [HTTP Methods \(p. 141\)](#)
- [HTTP Request Headers that CloudFront Removes or Updates \(p. 142\)](#)
- [Maximum Length of a Request and Maximum Length of a URL \(p. 142\)](#)
- [OCSP Stapling \(p. 142\)](#)
- [Protocols \(p. 143\)](#)
- [Query Strings \(p. 143\)](#)
- [Request Timeout \(p. 143\)](#)
- [Simultaneous Requests for the Same Object \(Traffic Spikes\) \(p. 143\)](#)

Caching Duration and Minimum TTL

For web distributions, to control how long your objects stay in a CloudFront cache before CloudFront forwards another request to your origin, you can:

- Configure your origin to add a `Cache-Control` or an `Expires` header field to each object.
- Specify a value for Minimum TTL in CloudFront cache behaviors.
- Use the default value of 24 hours.

For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Client IP Addresses

If a viewer sends a request to CloudFront and does not include an `X-Forwarded-For` request header, CloudFront gets the IP address of the viewer from the TCP connection, adds an `X-Forwarded-For` header that includes the IP address, and forwards the request to the origin. For example, if CloudFront gets the IP address 192.0.2.2 from the TCP connection, it forwards the following header to the origin:

`X-Forwarded-For: 192.0.2.2`

If a viewer sends a request to CloudFront and includes an `X-Forwarded-For` request header, CloudFront gets the IP address of the viewer from the TCP connection, appends it to the end of the `X-Forwarded-For` header, and forwards the request to the origin. For example, if the viewer request includes `X-Forwarded-For: 192.0.2.4,192.0.2.3` and CloudFront gets the IP address 192.0.2.2 from the TCP connection, it forwards the following header to the origin:

`X-Forwarded-For: 192.0.2.4,192.0.2.3,192.0.2.2`

Conditional GETs

When CloudFront receives a request for an object that has expired from an edge cache, it forwards the request to the Amazon S3 origin either to get the latest version of the object or to get confirmation from Amazon S3 that the CloudFront edge cache already has the latest version. When Amazon S3 originally sent the object to CloudFront, it included an `ETag` value and a `LastModified` value in the response. In the new request that CloudFront forwards to Amazon S3, CloudFront adds one or both of the following:

- An `If-Match` or `If-None-Match` header that contains the `ETag` value for the expired version of the object.
- An `If-Modified-Since` header that contains the `LastModified` value for the expired version of the object.

Amazon S3 uses this information to determine whether the object has been updated and, therefore, whether to return the entire object to CloudFront or to return only an HTTP 304 status code (not modified).

Cookies

Amazon S3 doesn't process cookies. If you configure a cache behavior to forward cookies to an Amazon S3 origin, CloudFront forwards the cookies, but Amazon S3 ignores them.

Cross-Origin Resource Sharing (CORS)

If you want CloudFront to respect Amazon S3 cross-origin resource sharing settings, configure CloudFront to forward selected headers to Amazon S3. For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

GET Requests that Include a Body

If a viewer GET request includes a body, CloudFront returns an HTTP status code 403 (Forbidden) to the viewer.

HTTP Methods

If you configure CloudFront to process all of the HTTP methods that it supports, CloudFront accepts the following requests from viewers and forwards them to your Amazon S3 origin:

- DELETE
- GET
- HEAD
- OPTIONS
- PATCH
- POST
- PUT

CloudFront always caches responses to GET and HEAD requests. You can also configure CloudFront to cache responses to OPTIONS requests. CloudFront does not cache responses to requests that use the other methods.

If you use an Amazon S3 bucket as the origin for your distribution and if you use CloudFront origin access identities, POST requests aren't supported in some Amazon S3 regions and PUT requests in those regions require an additional header. For more information, see [Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication \(p. 170\)](#).

If you want to use multi-part uploads to add objects to an Amazon S3 bucket, you must add a CloudFront origin access identity to your distribution and grant the origin access identity the applicable permissions. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Caution

If you configure CloudFront to accept and forward to Amazon S3 all of the HTTP methods that CloudFront supports, you must create a CloudFront origin access identity to restrict access to your Amazon S3 content and grant the origin access identity the applicable permissions. For example, if you configure CloudFront to accept and forward these methods because you want to use PUT, you must configure Amazon S3 bucket policies or ACLs to handle DELETE requests appropriately so viewers can't delete resources that you don't want them to. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

For information about the operations supported by Amazon S3, see the [Amazon S3 documentation](#).

HTTP Request Headers that CloudFront Removes or Updates

CloudFront removes or updates the following header fields before forwarding requests to your Amazon S3 origin:

- Accept
- Accept-Charset
- Accept-Encoding – If the value contains `gzip`, CloudFront forwards `Accept-Encoding: gzip` to your Amazon S3 origin. If the value does not contain `gzip`, CloudFront removes the `Accept-Encoding` header field before forwarding the request to your origin.
- Accept-Language
- Authorization:
 - GET and HEAD requests: CloudFront removes the `Authorization` header field before forwarding the request to your origin.
 - OPTIONS requests: CloudFront removes the `Authorization` header field before forwarding the request to your origin if you configure CloudFront to cache responses to OPTIONS requests.

CloudFront forwards the `Authorization` header field to your origin if you do not configure CloudFront to cache responses to OPTIONS requests.

- DELETE, PATCH, POST, and PUT requests: CloudFront does not remove the header field before forwarding the request to your origin.
- Connection – CloudFront replaces this header with `Connection: Keep-Alive` before forwarding the request to your Amazon S3 origin.
- Cookie – If you configure CloudFront to forward cookies, it will forward the `Cookie` header field to your Amazon S3 origin. If you don't, CloudFront removes the `Cookie` header field. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).
- Expect
- Host – CloudFront sets the value to the name of the Amazon S3 bucket that is associated with the requested object.
- Proxy-Authorization
- Referer
- TE
- Upgrade
- User-Agent – CloudFront replaces the value of this header field with `Amazon CloudFront`.

Maximum Length of a Request and Maximum Length of a URL

The maximum length of a request, including the path, the query string (if any), and headers, is 20480 bytes.

CloudFront constructs a URL from the request. The maximum length of this URL is 8192 bytes.

If a request or a URL exceeds these limits, CloudFront returns HTTP status code 413, Request Header Fields Too Large, to the viewer, and then terminates the TCP connection to the viewer.

OCSP Stapling

When a viewer submits an HTTPS request for an object, either CloudFront or the viewer needs to confirm with the certificate authority (CA) that the SSL certificate for the domain has not been revoked. OCSP

stapling speeds up certificate validation by allowing CloudFront to validate the certificate and to cache the response from the CA, so the client doesn't need to validate the certificate directly with the CA.

The performance improvement of OCSP stapling is more pronounced when CloudFront receives a lot of HTTPS requests for objects in the same domain. Each server in a CloudFront edge location must submit a separate validation request. When CloudFront receives a lot of HTTPS requests for the same domain, every server in the edge location soon has a response from the CA that it can "staple" to a packet in the SSL handshake; when the viewer is satisfied that the certificate is valid, CloudFront can serve the requested object. If your distribution doesn't get much traffic in a CloudFront edge location, new requests are more likely to be directed to a server that hasn't validated the certificate with the CA yet. In that case, the viewer separately performs the validation step and the CloudFront server serves the object. That CloudFront server also submits a validation request to the CA, so the next time it receives a request that includes the same domain name, it has a validation response from the CA.

Protocols

CloudFront forwards HTTP or HTTPS requests to the origin server based on the protocol of the viewer request, either HTTP or HTTPS.

Important

If your Amazon S3 bucket is configured as a website endpoint, you cannot configure CloudFront to use HTTPS to communicate with your origin because Amazon S3 doesn't support HTTPS connections in that configuration.

Query Strings

For web distributions, you can configure whether CloudFront forwards query string parameters to your Amazon S3 origin. For RTMP distributions, CloudFront does not forward query string parameters. For more information, see [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#).

Request Timeout

The request timeout for CloudFront depends on the HTTP method:

- GET and HEAD requests – If Amazon S3 doesn't respond within 30 seconds or stops responding for 30 seconds, CloudFront drops the connection and makes two additional attempts to contact the origin. If the origin doesn't reply during the third attempt, CloudFront doesn't try again until it receives another request for content on the same origin.
- DELETE, OPTIONS, PATCH, POST, and PUT requests – If Amazon S3 doesn't respond within 30 seconds, CloudFront drops the connection and doesn't try again to contact the origin. The client can resubmit the request if necessary.

The request timeout cannot be changed.

Simultaneous Requests for the Same Object (Traffic Spikes)

When a CloudFront edge location receives a request for an object and either the object isn't currently in the cache or the object has expired, CloudFront immediately sends the request to your Amazon S3 origin. If there's a traffic spike—if additional requests for the same object arrive at the edge location before Amazon S3 responds to the first request—CloudFront pauses briefly before forwarding additional requests for the object to your origin. Typically, the response to the first request will arrive at the CloudFront edge location before the response to subsequent requests. This brief pause helps to reduce unnecessary load on Amazon S3. If additional requests are not identical because, for example, you configured CloudFront to cache based on request headers or query strings, CloudFront forwards all of the unique requests to your origin.

When the response from the origin includes a `Cache-Control: no-cache` header, CloudFront typically forwards the next request for the same object to the origin to determine whether the object has been updated. However, when there's a traffic spike and CloudFront pauses after forwarding the first request to your origin, multiple viewer requests might arrive before CloudFront receives a response from the origin. When CloudFront receives a response that contains a `Cache-Control: no-cache` header, it sends the object in the response to the viewer that made the original request and to all of the viewers that requested the object during the pause. After the response arrives from the origin, CloudFront forwards the next viewer request for the same object to the origin. In CloudFront access logs, the first request is identified as a `Miss` in the `x-edge-result-type` column, and all subsequent requests that CloudFront received during the pause are identified as a `Hit`. For more information about access log file format, see [Web Distribution Log File Format \(p. 261\)](#).

How CloudFront Processes Responses from Your Amazon S3 Origin Server

Topics

- [Canceled Requests \(p. 144\)](#)
- [HTTP Response Headers that CloudFront Removes or Updates \(p. 144\)](#)
- [Maximum File Size \(p. 145\)](#)
- [Redirects \(p. 145\)](#)

Canceled Requests

If an object is not in the edge cache, and if a viewer terminates a session (for example, closes a browser) after CloudFront gets the object from your origin but before it can deliver the requested object, CloudFront does not cache the object in the edge location.

HTTP Response Headers that CloudFront Removes or Updates

CloudFront removes or updates the following header fields before forwarding the response from your Amazon S3 origin to the viewer:

- `Set-Cookie` – If you configure CloudFront to forward cookies, it will forward the `Set-Cookie` header field to clients. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).
- `Trailer`
- `Transfer-Encoding` – If your Amazon S3 origin returns this header field, CloudFront sets the value to `chunked` before returning the response to the viewer.
- `Upgrade`
- `Via` – CloudFront sets the value to:

`Via: 1.1 alphanumeric-string.cloudfront.net (CloudFront)`

before returning the response to the viewer. For example:

`Via: 1.1 1026589cc7887e7a0dc7827b4example.cloudfront.net (CloudFront)`

Maximum File Size

The maximum size of a response body that CloudFront will return to the viewer is 20 GB. This includes chunked transfer responses that don't specify the `Content-Length` header value.

Redirects

You can configure an Amazon S3 bucket to redirect all requests to another host name; this can be another Amazon S3 bucket or an HTTP server. If you configure a bucket to redirect all requests and if the bucket is the origin for a CloudFront distribution, we recommend that you configure the bucket to redirect all requests to a CloudFront distribution using either the domain name for the distribution (for example, d111111abcdef8.cloudfront.net) or an alternate domain name (a CNAME) that is associated with a distribution (for example, example.com). Otherwise, viewer requests bypass CloudFront, and the objects are served directly from the new origin.

Note

If you redirect requests to an alternate domain name, you must also update the DNS service for your domain by adding a CNAME record. For more information, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Here's what happens when you configure a bucket to redirect all requests:

1. A viewer (for example, a browser) requests an object from CloudFront.
2. CloudFront forwards the request to the Amazon S3 bucket that is the origin for your distribution.
3. Amazon S3 returns an HTTP status code 301 (Moved Permanently) as well as the new location.
4. CloudFront caches the redirect status code and the new location, and returns the values to the viewer. CloudFront does not follow the redirect to get the object from the new location.
5. The viewer sends another request for the object, but this time the viewer specifies the new location that it got from CloudFront:
 - If the Amazon S3 bucket is redirecting all requests to a CloudFront distribution, using either the domain name for the distribution or an alternate domain name, CloudFront requests the object from the Amazon S3 bucket or the HTTP server in the new location. When the new location returns the object, CloudFront returns it to the viewer and caches it in an edge location.
 - If the Amazon S3 bucket is redirecting requests to another location, the second request bypasses CloudFront. The Amazon S3 bucket or the HTTP server in the new location returns the object directly to the viewer, so the object is never cached in a CloudFront edge cache.

Request and Response Behavior for Custom Origins

Topics

- [How CloudFront Processes and Forwards Requests to Your Custom Origin Server \(p. 146\)](#)
- [How CloudFront Processes Responses from Your Custom Origin Server \(p. 155\)](#)

How CloudFront Processes and Forwards Requests to Your Custom Origin Server

For information about how CloudFront processes viewer requests and forwards the requests to your custom origin, see the applicable topic:

Topics

- [Authentication \(p. 146\)](#)
- [Caching Duration and Minimum TTL \(p. 146\)](#)
- [Client IP Addresses \(p. 147\)](#)
- [Client-Side SSL Authentication \(p. 147\)](#)
- [Compression \(p. 147\)](#)
- [Conditional Requests \(p. 147\)](#)
- [Cookies \(p. 148\)](#)
- [Cross-Origin Resource Sharing \(CORS\) \(p. 148\)](#)
- [Encryption \(p. 148\)](#)
- [GET Requests that Include a Body \(p. 149\)](#)
- [HTTP Methods \(p. 149\)](#)
- [HTTP Request Headers and CloudFront Behavior \(p. 149\)](#)
- [HTTP Version \(p. 152\)](#)
- [Maximum Length of a Request and Maximum Length of a URL \(p. 152\)](#)
- [OCSP Stapling \(p. 153\)](#)
- [Persistent Connections \(p. 153\)](#)
- [Protocols \(p. 153\)](#)
- [Query Strings \(p. 153\)](#)
- [Request Timeout \(p. 154\)](#)
- [Simultaneous Requests for the Same Object \(Traffic Spikes\) \(p. 154\)](#)
- [User-Agent Header \(p. 154\)](#)

Authentication

For `DELETE`, `GET`, `HEAD`, `PATCH`, `POST`, and `PUT` requests, if you configure CloudFront to forward the `Authorization` header to your origin, you can configure your origin server to request client authentication.

For `OPTIONS` requests, you can configure your origin server to request client authentication only if you use the following CloudFront settings:

- Configure CloudFront to forward the `Authorization` header to your origin
- Configure CloudFront to *not* cache the response to `OPTIONS` requests

You can configure CloudFront to forward requests to your origin using either HTTP or HTTPS; for more information, see [How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin \(p. 230\)](#).

Caching Duration and Minimum TTL

For web distributions, to control how long your objects stay in a CloudFront cache before CloudFront forwards another request to your origin, you can:

- Configure your origin to add a Cache-Control or an Expires header field to each object.
- Specify a value for Minimum TTL in CloudFront cache behaviors.
- Use the default value of 24 hours.

For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

Client IP Addresses

If a viewer sends a request to CloudFront and does not include an X-Forwarded-For request header, CloudFront gets the IP address of the viewer from the TCP connection, adds an X-Forwarded-For header that includes the IP address, and forwards the request to the origin. For example, if CloudFront gets the IP address 192.0.2.2 from the TCP connection, it forwards the following header to the origin:

X-Forwarded-For: 192.0.2.2

If a viewer sends a request to CloudFront and includes an X-Forwarded-For request header, CloudFront gets the IP address of the viewer from the TCP connection, appends it to the end of the X-Forwarded-For header, and forwards the request to the origin. For example, if the viewer request includes

X-Forwarded-For: 192.0.2.4,192.0.2.3 and CloudFront gets the IP address 192.0.2.2 from the TCP connection, it forwards the following header to the origin:

X-Forwarded-For: 192.0.2.4,192.0.2.3,192.0.2.2

Some applications, such as load balancers (including Elastic Load Balancing), web application firewalls, reverse proxies, intrusion prevention systems, and API Gateway, append the IP address of the CloudFront edge server that forwarded the request onto the end of the X-Forwarded-For header. For example, if CloudFront includes X-Forwarded-For: 192.0.2.2 in a request that it forwards to ELB and if the IP address of the CloudFront edge server is 192.0.2.199, the request that your EC2 instance receives contains the following header:

X-Forwarded-For: 192.0.2.2,192.0.2.199

Client-Side SSL Authentication

CloudFront does not support client authentication with client-side SSL certificates. If an origin requests a client-side certificate, CloudFront drops the request.

Compression

CloudFront forwards requests that have the Accept-Encoding field values "identity" and "gzip". For more information, see [Serving Compressed Files \(p. 135\)](#).

Conditional Requests

When CloudFront receives a request for an object that has expired from an edge cache, it forwards the request to the origin either to get the latest version of the object or to get confirmation from the origin that the CloudFront edge cache already has the latest version. Typically, when the origin last sent the object to CloudFront, it included an ETag value, a LastModified value, or both values in the response. In the new request that CloudFront forwards to the origin, CloudFront adds one or both of the following:

- An If-Match or If-None-Match header that contains the ETag value for the expired version of the object.
- An If-Modified-Since header that contains the LastModified value for the expired version of the object.

The origin uses this information to determine whether the object has been updated and, therefore, whether to return the entire object to CloudFront or to return only an HTTP 304 status code (not modified).

Cookies

You can configure CloudFront to forward cookies to your origin. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).

Cross-Origin Resource Sharing (CORS)

If you want CloudFront to respect cross-origin resource sharing settings, configure CloudFront to forward the `Origin` header to your origin. For more information, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

Encryption

You can require viewers to use HTTPS to send requests to CloudFront and require CloudFront to forward requests to your custom origin by using the protocol that is used by the viewer. For more information, see the following distribution settings:

- [Viewer Protocol Policy \(p. 70\)](#)
- [Origin Protocol Policy \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#)

CloudFront forwards HTTPS requests to the origin server using the SSLv3, TLSv1.0, TLSv1.1, and TLSv1.2 protocols. For custom origins, you can choose the SSL protocols that you want CloudFront to use when communicating with your origin:

- If you're using the CloudFront console, choose protocols by using the **Origin SSL Protocols** check boxes. For more information, see [Creating or Updating a Web Distribution Using the CloudFront Console \(p. 59\)](#).
- If you're using the CloudFront API, specify protocols by using the `OriginSslProtocols` element. For more information, see [DistributionConfig Complex Type](#) in the *Amazon CloudFront API Reference*.

If the origin is an Amazon S3 bucket, CloudFront always uses TLSv1.2.

Important

Other versions of SSL and TLS are not supported.

CloudFront forwards HTTPS requests to the origin server by using the following ciphers:

- ECDHE-RSA-AES128-SHA
- ECDHE-RSA-AES256-SHA
- AES256-SHA
- AES128-SHA
- DES-CBC3-SHA
- RC4-MD5

Your origin server must support at least one of these ciphers for CloudFront to establish an SSL connection to your origin.

When establishing an HTTPS connection to the origin, CloudFront adds a Server Name Indication (SNI) extension and includes the value of **Origin Domain Name** for the applicable origin in your distribution. For more information about SNI, see Section 3.1 of [RFC 4366, Transport Layer Security \(TLS\) Extensions](#).

GET Requests that Include a Body

If a viewer GET request includes a body, CloudFront returns an HTTP status code 403 (Forbidden) to the viewer.

HTTP Methods

If you configure CloudFront to process all of the HTTP methods that it supports, CloudFront accepts the following requests from viewers and forwards them to your custom origin:

- DELETE
- GET
- HEAD
- OPTIONS
- PATCH
- POST
- PUT

CloudFront always caches responses to GET and HEAD requests. You can also configure CloudFront to cache responses to OPTIONS requests. CloudFront does not cache responses to requests that use the other methods.

For information about configuring whether your custom origin processes these methods, see the documentation for your origin.

Caution

If you configure CloudFront to accept and forward to your origin all of the HTTP methods that CloudFront supports, configure your origin server to handle all methods. For example, if you configure CloudFront to accept and forward these methods because you want to use POST, you must configure your origin server to handle DELETE requests appropriately so viewers can't delete resources that you don't want them to. For more information, see the documentation for your HTTP server.

HTTP Request Headers and CloudFront Behavior

The following table lists HTTP request headers and, for each header, explains the following:

- CloudFront behavior if you don't configure CloudFront to forward the header to your origin, which causes CloudFront to cache your objects based on header values.
- Whether you can configure CloudFront to cache objects based on header values for that header.

You can configure CloudFront to cache objects based on values in the Date and User-Agent headers, but we don't recommend it. These headers have a lot of possible values, and caching based on their values would cause CloudFront to forward significantly more requests to your origin.

For more information about caching based on header values, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

Amazon CloudFront Developer Guide
How CloudFront Processes and Forwards Requests to
Your Custom Origin Server

| Header | Behavior If You Don't Configure CloudFront to Cache Based on Header Values | Caching Based on Header Values Is Supported |
|------------------------------|--|---|
| Customer-defined headers | CloudFront forwards the headers to your origin. | Yes |
| Accept | CloudFront removes the header. | Yes |
| Accept-Charset | CloudFront removes the header. | Yes |
| Accept-Encoding | <p>If the value contains <code>gzip</code>, CloudFront forwards <code>Accept-Encoding: gzip</code> to your origin.</p> <p>If the value does not contain <code>gzip</code>, CloudFront removes the <code>Accept-Encoding</code> header field before forwarding the request to your origin.</p> | No |
| Accept-Language | CloudFront removes the header. | Yes |
| Authorization | <ul style="list-style-type: none"> GET and HEAD requests – CloudFront removes the <code>Authorization</code> header field before forwarding the request to your origin. OPTIONS requests – CloudFront removes the <code>Authorization</code> header field before forwarding the request to your origin if you configure CloudFront to cache responses to OPTIONS requests. CloudFront forwards the <code>Authorization</code> header field to your origin if you do not configure CloudFront to cache responses to OPTIONS requests. DELETE, PATCH, POST, and PUT requests – CloudFront does not remove the header field before forwarding the request to your origin. | Yes |
| Cache-Control | CloudFront forwards the header to your origin. | No |
| CloudFront-Forwarded-Proto | <p>CloudFront does not add the header before forwarding the request to your origin.</p> <p>For more information, see Configuring CloudFront to Cache Objects Based on the Protocol of the Request (p. 111).</p> | Yes |
| CloudFront-Is-Desktop-Viewer | <p>CloudFront does not add the header before forwarding the request to your origin.</p> <p>For more information, see Configuring CloudFront to Cache Objects Based on the Device Type (p. 110).</p> | Yes |
| CloudFront-Is-Mobile-Viewer | <p>CloudFront does not add the header before forwarding the request to your origin.</p> <p>For more information, see Configuring CloudFront to Cache Objects Based on the Device Type (p. 110).</p> | Yes |

Amazon CloudFront Developer Guide
How CloudFront Processes and Forwards Requests to
Your Custom Origin Server

| Header | Behavior If You Don't Configure CloudFront to Cache Based on Header Values | Caching Based on Header Values Is Supported |
|-----------------------------|---|---|
| CloudFront-Is-Tablet-Viewer | CloudFront does not add the header before forwarding the request to your origin. For more information, see Configuring CloudFront to Cache Objects Based on the Device Type (p. 110) . | Yes |
| CloudFront-Viewer-Country | CloudFront does not add the header before forwarding the request to your origin. | Yes |
| Connection | CloudFront replaces this header with Connection: Keep-Alive before forwarding the request to your origin. | No |
| Content-Length | CloudFront forwards the header to your origin. | No |
| Content-MD5 | CloudFront forwards the header to your origin. | Yes |
| Content-Type | CloudFront forwards the header to your origin. | Yes |
| Cookie | If you configure CloudFront to forward cookies, it will forward the Cookie header field to your origin. If you don't, CloudFront removes the Cookie header field. For more information, see Configuring CloudFront to Cache Objects Based on Cookies (p. 106) . | No |
| Date | CloudFront forwards the header to your origin. | Yes, but not recommended |
| Expect | CloudFront removes the header. | Yes |
| From | CloudFront forwards the header to your origin. | Yes |
| Host | CloudFront sets the value to the domain name of the origin that is associated with the requested object. | Yes |
| If-Match | CloudFront forwards the header to your origin. | Yes |
| If-Modified-Since | CloudFront forwards the header to your origin. | Yes |
| If-None-Match | CloudFront forwards the header to your origin. | Yes |
| If-Range | CloudFront forwards the header to your origin. | Yes |
| If-Unmodified-Since | CloudFront forwards the header to your origin. | Yes |
| Max-Forwards | CloudFront forwards the header to your origin. | No |
| Origin | CloudFront forwards the header to your origin. | Yes |
| Pragma | CloudFront forwards the header to your origin. | No |
| Proxy-Authenticate | CloudFront removes the header. | No |
| Proxy-Authorization | CloudFront removes the header. | No |
| Proxy-Connection | CloudFront removes the header. | No |

| Header | Behavior If You Don't Configure CloudFront to Cache Based on Header Values | Caching Based on Header Values Is Supported |
|-------------------|--|---|
| Range | CloudFront forwards the header to your origin. For more information, see How CloudFront Processes Partial Requests for an Object (Range GETs) (p. 132) . | Yes, by default |
| Referer | CloudFront removes the header. | Yes |
| Request-Range | CloudFront forwards the header to your origin. | No |
| TE | CloudFront removes the header. | No |
| Trailer | CloudFront removes the header. | No |
| Transfer-Encoding | CloudFront forwards the header to your origin. | No |
| Upgrade | CloudFront removes the header. | No |
| User-Agent | CloudFront replaces the value of this header field with Amazon CloudFront. If you want CloudFront to cache your content based on the device the user is using, see Configuring CloudFront to Cache Objects Based on the Device Type (p. 110) . | Yes, but not recommended |
| Via | CloudFront forwards the header to your origin. | Yes |
| Warning | CloudFront forwards the header to your origin. | Yes |
| X-Amz-Cf-Id | CloudFront adds the header to the viewer request before forwarding the request to your origin. The header value contains an encrypted string that uniquely identifies the request. | No |
| X-Edge-* | CloudFront removes all X-Edge-* headers. | No |
| X-Forwarded-For | CloudFront forwards the header to your origin. For more information, see Client IP Addresses (p. 147) . | Yes |
| X-Forwarded-Proto | CloudFront removes the header. | Yes |
| X-Real-IP | CloudFront removes the header. | No |

HTTP Version

CloudFront forwards requests to your custom origin using HTTP/1.1.

Maximum Length of a Request and Maximum Length of a URL

The maximum length of a request, including the path, the query string (if any), and headers, is 20480 bytes.

CloudFront constructs a URL from the request. The maximum length of this URL is 8192 bytes.

If a request or a URL exceeds these limits, CloudFront returns HTTP status code 413, Request Header Fields Too Large, to the viewer, and then terminates the TCP connection to the viewer.

OCSP Stapling

When a viewer submits an HTTPS request for an object, either CloudFront or the viewer needs to confirm with the certificate authority (CA) that the SSL certificate for the domain has not been revoked. OCSP stapling speeds up certificate validation by allowing CloudFront to validate the certificate and to cache the response from the CA, so the client doesn't need to validate the certificate directly with the CA.

The performance improvement of OCSP stapling is more pronounced when CloudFront receives a lot of HTTPS requests for objects in the same domain. Each server in a CloudFront edge location must submit a separate validation request. When CloudFront receives a lot of HTTPS requests for the same domain, every server in the edge location soon has a response from the CA that it can "staple" to a packet in the SSL handshake; when the viewer is satisfied that the certificate is valid, CloudFront can serve the requested object. If your distribution doesn't get much traffic in a CloudFront edge location, new requests are more likely to be directed to a server that hasn't validated the certificate with the CA yet. In that case, the viewer separately performs the validation step and the CloudFront server serves the object. That CloudFront server also submits a validation request to the CA, so the next time it receives a request that includes the same domain name, it has a validation response from the CA.

Persistent Connections

When CloudFront gets a response from your origin, it tries to maintain the connection for several seconds in case another request arrives during that period. Maintaining a persistent connection saves the time that is required to re-establish the TCP connection and perform another TLS handshake for subsequent requests. To improve performance, we recommend that you configure your origin server to allow persistent connections.

Protocols

CloudFront forwards HTTP or HTTPS requests to the origin server based on the following:

- The protocol of the request that the viewer sends to CloudFront, either HTTP or HTTPS.
- The value of the **Origin Protocol Policy** field in the CloudFront console or, if you're using the CloudFront API, the `OriginProtocolPolicy` element in the `DistributionConfig` complex type. In the CloudFront console, the options are **HTTP Only**, **HTTPS Only**, and **Match Viewer**.

If you specify **HTTP Only** or **HTTPS Only**, CloudFront forwards requests to the origin server using the specified protocol, regardless of the protocol in the viewer request.

If you specify **Match Viewer**, CloudFront forwards requests to the origin server using the protocol in the viewer request. Note that CloudFront caches the object only once even if viewers make requests using both HTTP and HTTPS protocols.

Caution

If CloudFront forwards a request to the origin using the HTTPS protocol, and if the origin server returns an invalid certificate or a self-signed certificate, CloudFront drops the TCP connection.

For information about how to update a distribution using the CloudFront console, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#). For information about how to update a distribution using the CloudFront API, go to [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*.

Query Strings

You can configure whether CloudFront forwards query string parameters to your origin. For more information, see [Configuring CloudFront to Cache Based on Query String Parameters \(p. 105\)](#).

Request Timeout

The request timeout for CloudFront depends on the HTTP method:

- GET and HEAD requests – If the origin doesn't respond within 30 seconds or stops responding for 30 seconds, CloudFront drops the connection and makes two additional attempts to contact the origin. If the origin doesn't reply during the third attempt, CloudFront doesn't try again until it receives another request for content on the same origin.
- DELETE, OPTIONS, PATCH, POST, and PUT requests – If the origin doesn't respond within 30 seconds, CloudFront drops the connection and doesn't try again to contact the origin. The client can resubmit the request if necessary.

The request timeout cannot be changed.

Simultaneous Requests for the Same Object (Traffic Spikes)

When a CloudFront edge location receives a request for an object and either the object isn't currently in the cache or the object has expired, CloudFront immediately sends the request to your origin. If there's a traffic spike—if additional requests for the same object arrive at the edge location before your origin responds to the first request—CloudFront pauses briefly before forwarding additional requests for the object to your origin. Typically, the response to the first request will arrive at the CloudFront edge location before the response to subsequent requests. This brief pause helps to reduce unnecessary load on your origin server. If additional requests are not identical because, for example, you configured CloudFront to cache based on request headers or cookies, CloudFront forwards all of the unique requests to your origin.

User-Agent Header

If you want CloudFront to cache different versions of your objects based on the device a user is using to view your content, we recommend that you configure CloudFront to forward the applicable headers to your custom origin:

- CloudFront-Is-Desktop-Viewer
- CloudFront-Is-Mobile-Viewer
- CloudFront-Is-SmartTV-Viewer
- CloudFront-Is-Tablet-Viewer

Based on the value of the User-Agent header, CloudFront sets the value of these headers to `true` or `false` before forwarding the request to your origin. If a device falls into more than one category, more than one value might be `true`. For example, for some tablet devices, CloudFront might set both `CloudFront-Is-Mobile-Viewer` and `CloudFront-Is-Tablet-Viewer` to `true`. For more information about configuring CloudFront to cache based on request headers, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

You can configure CloudFront to cache objects based on values in the User-Agent header, but we don't recommend it. The User-Agent header has a lot of possible values, and caching based on those values would cause CloudFront to forward significantly more requests to your origin.

If you do not configure CloudFront to cache objects based on values in the User-Agent header, CloudFront adds a User-Agent header with the following value before it forwards a request to your origin:

```
User-Agent = Amazon CloudFront
```

CloudFront adds this header regardless of whether the request from the viewer includes a User-Agent header. If the request from the viewer includes a User-Agent header, CloudFront removes it.

How CloudFront Processes Responses from Your Custom Origin Server

For information about how CloudFront processes responses from custom origin servers, see the applicable topic:

Topics

- [Caching \(p. 155\)](#)
- [Canceled Requests \(p. 155\)](#)
- [Content Negotiation \(p. 155\)](#)
- [Cookies \(p. 155\)](#)
- [Dropped TCP Connections \(p. 156\)](#)
- [HTTP Response Headers that CloudFront Removes or Updates \(p. 156\)](#)
- [Maximum File Size \(p. 157\)](#)
- [Origin Unavailable \(p. 157\)](#)
- [Redirects \(p. 157\)](#)
- [Transfer Encoding \(p. 157\)](#)

Caching

- Ensure that the origin server sets valid and accurate values for the `Date` and `Last-Modified` header fields.
- If requests from viewers include the `If-Match` or `If-None-Match` request header fields, set the `ETag` response header field. If you do not specify an `ETag` value, CloudFront ignores subsequent `If-Match` or `If-None-Match` headers.
- CloudFront normally respects a `Cache-Control: no-cache` header in the response from the origin. For an exception, see [Simultaneous Requests for the Same Object \(Traffic Spikes\) \(p. 154\)](#).

Canceled Requests

If an object is not in the edge cache, and if a viewer terminates a session (for example, closes a browser) after CloudFront gets the object from your origin but before it can deliver the requested object, CloudFront does not cache the object in the edge location.

Content Negotiation

If your origin returns `Vary: *` in the response, and if the value of **Minimum TTL** for the corresponding cache behavior is **0**, CloudFront caches the object but still forwards every subsequent request for the object to the origin to confirm that the cache contains the latest version of the object.

If your origin returns `Vary: *` in the response, and if the value of **Minimum TTL** for the corresponding cache behavior is any other value, CloudFront processes the `Vary` header as described in [HTTP Response Headers that CloudFront Removes or Updates \(p. 156\)](#).

Cookies

If you enable cookies for a cache behavior, and if the origin returns cookies with an object, CloudFront caches both the object and the cookies. Note that this reduces cacheability for an object. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).

Dropped TCP Connections

If the TCP connection between CloudFront and your origin drops while your origin is returning an object to CloudFront, CloudFront behavior depends on whether your origin included a Content-Length header in the response:

- **Content-Length header** – CloudFront returns the object to the viewer as it gets the object from your origin. However, if the value of the Content-Length header doesn't match the size of the object, CloudFront doesn't cache the object.
- **Transfer-Encoding: Chunked** – CloudFront returns the object to the viewer as it gets the object from your origin. However, if the chunked response is not complete, CloudFront does not cache the object.
- **No Content-Length header** – CloudFront returns the object to the viewer and caches it, but the object may not be complete. Without a Content-Length header, CloudFront cannot determine whether the TCP connection was dropped accidentally or on purpose.

We recommend that you configure your HTTP server to add a Content-Length header to prevent CloudFront from caching partial objects.

HTTP Response Headers that CloudFront Removes or Updates

CloudFront removes or updates the following header fields before forwarding the response from your origin to the viewer:

- Set-Cookie – If you configure CloudFront to forward cookies, it will forward the Set-Cookie header field to clients. For more information, see [Configuring CloudFront to Cache Objects Based on Cookies \(p. 106\)](#).
- Trailer
- Transfer-Encoding – If your origin returns this header field, CloudFront sets the value to chunked before returning the response to the viewer.
- Upgrade
- Vary – Note the following:
 - If you configure CloudFront to forward any of the device-specific headers to your origin (CloudFront-Is-Desktop-Viewer, CloudFront-Is-Mobile-Viewer, CloudFront-Is-SmartTV-Viewer, CloudFront-Is-Tablet-Viewer) and you configure your origin to return Vary:User-Agent to CloudFront, CloudFront returns Vary:User-Agent to the viewer. For more information, see [Configuring CloudFront to Cache Objects Based on the Device Type \(p. 110\)](#).
 - If you configure your origin to include either Accept-Encoding or Cookie in the Vary header, CloudFront includes the values in the response to the viewer.
 - If you configure CloudFront to forward a whitelist of headers to your origin, and if you configure your origin to return the header names to CloudFront in the Vary header (for example, Vary:Accept-Charset, Accept-Language), CloudFront returns the Vary header with those values to the viewer.
 - For information about how CloudFront processes a value of * in the Vary header, see [Content Negotiation \(p. 155\)](#).
 - If you configure your origin to include any other values in the Vary header, CloudFront removes the values before returning the response to the viewer.
- Via – Regardless of whether your origin returns this header field to CloudFront, CloudFront sets the value to:

Via: 1.1 *alphanumeric-string*.cloudfront.net (CloudFront)

before returning the response to the viewer. For example:

Via: 1.1 1026589cc7887e7a0dc7827b4example.cloudfront.net (CloudFront)

Maximum File Size

The maximum size of a response body that CloudFront will return to the viewer is 20 GB. This includes chunked transfer responses that don't specify the `Content-Length` header value.

Origin Unavailable

If your origin server is unavailable and CloudFront gets a request for an object that is in the edge cache but that has expired (for example, because the period of time specified in the `Cache-Control max-age` directive has passed), CloudFront either serves the expired version of the object or serves a custom error page. For more information, see [How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin \(p. 158\)](#).

In some cases, an object that is seldom requested is evicted and is no longer available in the edge cache. CloudFront can't serve an object that has been evicted.

Redirects

If you change the location of an object on the origin server, you can configure your web server to redirect requests to the new location. After you configure the redirect, the first time a viewer submits a request for the object, CloudFront sends the request to the origin, and the origin responds with a redirect (for example, 302 Moved Temporarily). CloudFront caches the redirect and returns it to the viewer. CloudFront does not follow the redirect.

You can configure your web server to redirect requests to one of the following locations:

- The new URL of the object on the origin server. When the viewer follows the redirect to the new URL, the viewer bypasses CloudFront and goes straight to the origin. As a result, we recommend that you not redirect requests to the new URL of the object on the origin.
- The new CloudFront URL for the object. When the viewer submits the request that contains the new CloudFront URL, CloudFront gets the object from the new location on your origin, caches it at the edge location, and returns the object to the viewer. Subsequent requests for the object will be served by the edge location. This avoids the latency and load associated with viewers requesting the object from the origin. However, every new request for the object will incur charges for two requests to CloudFront.

Transfer Encoding

CloudFront supports only the `chunked` value of the `Transfer-Encoding` header. If your origin returns `Transfer-Encoding: chunked`, CloudFront returns the object to the client as the object is received at the edge location, and caches the object in chunked format for subsequent requests.

If the viewer makes a `Range GET` request and the origin returns `Transfer-Encoding: chunked`, CloudFront returns the entire object to the viewer instead of the requested range.

We recommend that you use chunked encoding if the content length of your response cannot be predetermined. For more information, see [Dropped TCP Connections \(p. 156\)](#).

How CloudFront Processes HTTP 3xx Status Codes from Your Origin

When CloudFront requests an object from your Amazon S3 bucket or custom origin server, your origin sometimes returns an HTTP 3xx status code, which typically indicates either that the URL has changed (301, Moved Permanently, or 307, Temporary Redirect) or that the object hasn't changed since the last time CloudFront requested it (304, Not Modified). CloudFront caches 3xx responses for the duration specified by the settings in your CloudFront distribution and by the header fields that your origin returns along with an object. For more information, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

If your origin returns a 301 or 307 status code, CloudFront doesn't follow the redirect to the new location.

How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin

Topics

- [How CloudFront Processes Errors When You Have Configured Custom Error Pages \(p. 158\)](#)
- [How CloudFront Processes Errors When You Have Not Configured Custom Error Pages \(p. 160\)](#)
- [HTTP 4xx and 5xx Status Codes that CloudFront Caches \(p. 161\)](#)

When CloudFront requests an object from your Amazon S3 bucket or custom origin server, your origin sometimes returns an HTTP 4xx or 5xx status code, which indicates an error has occurred. CloudFront behavior depends on:

- Whether you have configured custom error pages.
- Whether you have configured how long you want CloudFront to cache error responses from your origin (error caching minimum TTL).
- The status code.
- For 5xx status codes, whether the requested object is currently in the CloudFront edge cache.

For information about settings for custom error pages in the CloudFront console, see [Custom Error Pages and Error Caching \(p. 79\)](#). For information about the error caching minimum TTL in the CloudFront console, see [Error Caching Minimum TTL \(p. 79\)](#).

For a list of the HTTP status codes that CloudFront caches, see [HTTP 4xx and 5xx Status Codes that CloudFront Caches \(p. 161\)](#).

If you have enabled logging, CloudFront writes the results to the logs regardless of the HTTP status code.

How CloudFront Processes Errors When You Have Configured Custom Error Pages

If you have configured custom error pages, CloudFront behavior depends on whether the requested object is in the edge cache.

The Requested Object Is Not in the Edge Cache

CloudFront continues to try to get the requested object from your origin when all of the following are true:

- A viewer requests an object
- The object isn't in the edge cache
- Your origin returns an HTTP 4xx or 5xx status code instead of returning a 304 status code (Not Modified) or an updated version of the object

CloudFront does the following:

1. In the CloudFront edge cache that received the viewer request, CloudFront checks your distribution configuration and gets the path of the custom error page that corresponds with the status code that your origin returned.
2. CloudFront finds the first cache behavior in your distribution that has a path pattern that matches the path of the custom error page.
3. The CloudFront edge location sends a request for the custom error page to the origin that is specified in the cache behavior.
4. The origin returns the custom error page to the edge location.
5. CloudFront returns the custom error page to the viewer that made the request, and also caches the custom error page for the amount of time specified by the error caching minimum TTL (five minutes by default).
6. After the error caching minimum TTL has elapsed, CloudFront tries again to get the requested object by forwarding another request to your origin. CloudFront continues to retry at intervals specified by the error caching minimum TTL.

The Requested Object Is in the Edge Cache

CloudFront continues to serve the object that is currently in the edge cache when all of the following are true:

- A viewer requests an object
- The object is in the edge cache but it has expired
- Your origin returns an HTTP 4xx or 5xx status code instead of returning a 304 status code (Not Modified) or an updated version of the object

CloudFront does the following:

1. If your origin returns a 5xx status code, CloudFront serves the object even though it has expired. For the duration of the error caching minimum TTL, CloudFront continues to respond to viewer requests by serving the object from the edge cache.

If your origin returns a 4xx status code, CloudFront returns the status code, not the requested object, to the viewer.

2. After the error caching minimum TTL has elapsed, CloudFront tries again to get the requested object by forwarding another request to your origin. Note that if the object is not requested frequently, CloudFront might evict it from the edge cache while your origin server is still returning 5xx responses. For information about how long objects stay in CloudFront edge caches, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\) \(p. 116\)](#).

How CloudFront Processes Errors When You Have Not Configured Custom Error Pages

If you have not configured custom error pages, CloudFront behavior depends on whether the requested object is in the edge cache.

The Requested Object Is Not in the Edge Cache

CloudFront continues to try to get the requested object from your origin when all of the following are true:

- A viewer requests an object
- The object isn't in the edge cache
- Your origin returns an HTTP 4xx or 5xx status code instead of returning a 304 status code (Not Modified) or an updated version of the object

CloudFront does the following:

1. CloudFront returns the 4xx or 5xx status code to the viewer.
2. CloudFront also caches the status code in the edge cache that received the request.
3. For the duration of the error caching minimum TTL (five minutes by default), CloudFront responds to subsequent viewer requests for the same object with the cached 4xx or 5xx status code.
4. After the error caching minimum TTL has elapsed, CloudFront tries again to get the requested object by forwarding another request to your origin.

The Requested Object Is in the Edge Cache

CloudFront continues to serve the object that is currently in the edge cache when all of the following are true:

- A viewer requests an object
- The object is in the edge cache but it has expired
- Your origin returns an HTTP 4xx or 5xx status code instead of returning a 304 status code (Not Modified) or an updated version of the object

CloudFront does the following:

1. If your origin returns a 5xx error code, CloudFront serves the object even though it has expired. For the duration of the error caching minimum TTL (five minutes by default), CloudFront continues to respond to viewer requests by serving the object from the edge cache.

If your origin returns a 4xx status code, CloudFront returns the status code, not the requested object, to the viewer.

2. After the error caching minimum TTL has elapsed, CloudFront tries again to get the requested object by forwarding another request to your origin. Note that if the object is not requested frequently, CloudFront might evict it from the edge cache while your origin server is still returning 5xx responses. For information about how long objects stay in CloudFront edge caches, see [Specifying How Long Objects Stay in a CloudFront Edge Cache \(Expiration\)](#) (p. 116).

HTTP 4xx and 5xx Status Codes that CloudFront Caches

CloudFront caches the following HTTP 4xx and 5xx status codes returned by Amazon S3 or your custom origin server. If you have configured a custom error page for an HTTP status code, CloudFront caches the custom error page.

| | |
|-----|------------------------|
| 400 | Bad Request |
| 403 | Forbidden |
| 404 | Not Found |
| 405 | Method Not Allowed |
| 414 | Request-URI Too Large |
| 500 | Internal Service Error |
| 501 | Not Implemented |
| 502 | Bad Gateway |
| 503 | Service Unavailable |
| 504 | Gateway Time-out |

Serving Private Content through CloudFront

Many companies that distribute content via the Internet want to restrict access to documents, business data, media streams, or content that is intended for selected users, for example, users who have paid a fee. To securely serve this private content using CloudFront, you can do the following:

- Require that your users access your private content by using special CloudFront signed URLs or signed cookies.
- Require that your users access your Amazon S3 content using CloudFront URLs, not Amazon S3 URLs. Requiring CloudFront URLs isn't required, but we recommend it to prevent users from bypassing the restrictions that you specify in signed URLs or signed cookies.

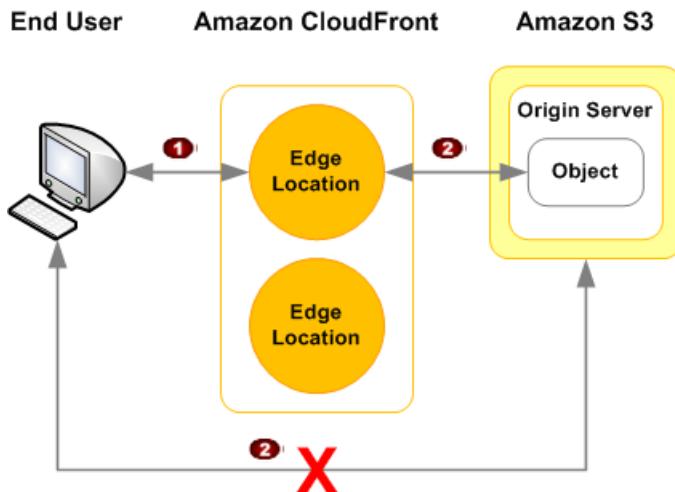
Topics

- [Overview of Private Content \(p. 162\)](#)
- [Using an HTTP Server for Private Content \(p. 164\)](#)
- [Task List: Serving Private Content \(p. 165\)](#)
- [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#)
- [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#)
- [Choosing Between Signed URLs and Signed Cookies \(p. 178\)](#)
- [Using Signed URLs \(p. 179\)](#)
- [Using Signed Cookies \(p. 198\)](#)
- [Using a Linux Command and OpenSSL for Base64-Encoding and Encryption \(p. 213\)](#)
- [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#)

Overview of Private Content

You can control user access to your private content in two ways, as shown in the following illustration:

1. Restrict access to objects in CloudFront edge caches
2. Restrict access to objects in your Amazon S3 bucket



Restricting Access to Objects in CloudFront Edge Caches

You can configure CloudFront to require that users access your objects using either **signed URLs** or **signed cookies**. You then develop your application either to create and distribute signed URLs to authenticated users or to send `Set-Cookie` headers that set signed cookies on the viewers for authenticated users. (To give a few users long-term access to a limited number of objects, you can also create signed URLs manually.)

When you create signed URLs or signed cookies to control access to your objects, you can specify the following restrictions:

- An ending date and time, after which the URL is no longer valid.
- (Optional) The date and time that the URL becomes valid.
- (Optional) The IP address or range of addresses of the computers that can be used to access your content.

One part of a signed URL or a signed cookie is hashed and signed using the private key from a public/private key pair. When someone uses a signed URL or signed cookie to access an object, CloudFront compares the signed and unsigned portions of the URL or cookie. If they don't match, CloudFront doesn't serve the object.

Restricting Access to Objects in Amazon S3 Buckets

You can optionally secure the content in your Amazon S3 bucket so users can access it through CloudFront but cannot access it directly by using Amazon S3 URLs. This prevents anyone from bypassing CloudFront and using the Amazon S3 URL to get content that you want to restrict access to. This step isn't required to use signed URLs, but we recommend it.

To require that users access your content through CloudFront URLs, you perform the following tasks:

- Create a special CloudFront user called an **origin access identity**.
- Give the origin access identity permission to read the objects in your bucket.
- Remove permission for anyone else to use Amazon S3 URLs to read the objects.

Using an HTTP Server for Private Content

You can use signed URLs or signed cookies for any CloudFront distribution, regardless of whether the origin is an Amazon S3 bucket or an HTTP server. However, for CloudFront to get your objects from an HTTP server, the objects must remain publicly accessible. When the objects are publicly accessible, anyone who has the URL for an object on your HTTP server can access the object without logging in or paying for your content. If you use signed URLs or signed cookies and your origin is an HTTP server, do not give the URLs for the objects on your HTTP server to your customers or to others outside your organization.

Task List: Serving Private Content

To configure CloudFront to serve private content, perform the following tasks:

1. (Optional but recommended) Require your users to access your content only through CloudFront. The method that you use depends on whether you're using Amazon S3 or custom origins:
 - **Amazon S3** – See [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).
 - **Custom origin** – See [Using Custom Headers to Restrict Access to Your Content on a Custom Origin \(p. 113\)](#).
2. Specify the AWS accounts that you want to use to create signed URLs or signed cookies. For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).
3. Write your application to respond to requests from authorized users either with signed URLs or with Set-Cookie headers that set signed cookies. For more information, see [Choosing Between Signed URLs and Signed Cookies \(p. 178\)](#).

Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content

Topics

- [Creating a CloudFront Origin Access Identity and Adding it to Your Distribution \(p. 166\)](#)
- [Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket \(p. 168\)](#)
- [Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication \(p. 170\)](#)

Typically, if you're using an Amazon S3 bucket as the origin for a CloudFront distribution, you grant everyone permission to read the objects in your bucket. This allows anyone to access your objects either through CloudFront or using the Amazon S3 URL. CloudFront doesn't expose Amazon S3 URLs, but your users might have those URLs if your application serves any objects directly from Amazon S3 or if anyone gives out direct links to specific objects in Amazon S3.

Note

You can also restrict access to content on a custom origin by using custom headers. For more information, see [Using Custom Headers to Restrict Access to Your Content on a Custom Origin \(p. 113\)](#).

If you want to use CloudFront signed URLs or signed cookies to provide access to objects in your Amazon S3 bucket, you probably also want to prevent users from accessing your Amazon S3 objects using Amazon S3 URLs. If users access your objects directly in Amazon S3, they bypass the controls provided by CloudFront signed URLs or signed cookies, for example, control over the date and time that a user can no longer access your content and control over which IP addresses can be used to access content. In addition, if users access objects both through CloudFront and directly by using Amazon S3 URLs, CloudFront access logs are less useful because they're incomplete.

Note

To create origin access identities, you must use the CloudFront console or CloudFront API version 2009-09-09 or later.

To ensure that your users access your objects using only CloudFront URLs, regardless of whether the URLs are signed, perform the following tasks:

1. Create an origin access identity, which is a special CloudFront user, and associate the origin access identity with your distribution. (For web distributions, you associate the origin access identity with origins, so you can secure all or just some of your Amazon S3 content.) You can also create an origin access identity and add it to your distribution when you create the distribution. For more information, see [Creating a CloudFront Origin Access Identity and Adding it to Your Distribution \(p. 166\)](#).
2. Change the permissions either on your Amazon S3 bucket or on the objects in your bucket so only the origin access identity has read permission (or read and download permission). When your users access your Amazon S3 objects through CloudFront, the CloudFront origin access identity gets the objects on your users' behalf. If your users request objects directly by using Amazon S3 URLs, they're denied access. The origin access identity has permission to access objects in your Amazon S3 bucket, but users don't. For more information, see [Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket \(p. 168\)](#).

Creating a CloudFront Origin Access Identity and Adding it to Your Distribution

An AWS account can have up to 100 CloudFront origin access identities. However, you can add an origin access identity to as many distributions as you want, so one origin access identity is usually sufficient.

If you didn't create an origin access identity and add it to your distribution when you created the distribution, you can create and add one now using either the CloudFront console or the CloudFront API:

- **If you're using the CloudFront console** – You can create an origin access identity and add it to your distribution at the same time. For more information, see [Creating an Origin Access Identity and Adding it to Your Distribution Using the CloudFront Console \(p. 167\)](#).
- **If you're using the CloudFront API** – You create an origin access identity and then you add it to your distribution. Perform the procedure in each of the following topics:
 - [Creating an Origin Access Identity Using the CloudFront API \(p. 168\)](#)
 - [Adding an Origin Access Identity to Your Distribution Using the CloudFront API \(p. 168\)](#)

Creating an Origin Access Identity and Adding it to Your Distribution Using the CloudFront Console

If you didn't create an origin access identity when you created your distribution, perform the following procedure.

To create a CloudFront origin access identity using the CloudFront console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Click the ID of the distribution that you want to add an origin access identity to.
3. Change to edit mode:
 - **Web distributions** – Click the **Origins** tab, select the origin that you want to edit, and click **Edit**. You can only create an origin access identity for origins for which **Origin Type** is **S3 Origin**.
 - **RTMP distributions** – Click **Edit**.
4. For **Restrict Bucket Access**, click **Yes**.
5. If you already have an origin access identity that you want to use, click **Use an Existing Identity**. Then select the identity in the **Your Identities** list.

Note

If you already have an origin access identity, we recommend that you reuse it to simplify maintenance.

If you want to create an identity, click **Create a New Identity**. Then enter a description for the identity in the **Comment** field.

6. If you want CloudFront to automatically give the origin access identity permission to read the objects in the Amazon S3 bucket specified in **Origin Domain Name**, click **Yes, Update Bucket Policy**.

Important

If you click **Yes, Update Bucket Policy**, CloudFront updates bucket permissions to grant the specified origin access identity the permission to read objects in your bucket. However, CloudFront does not remove existing permissions. If users currently have permission to access the objects in your bucket using Amazon S3 URLs, they will still have that permission after CloudFront updates your bucket permissions. To view or remove existing bucket permissions, use a method provided by Amazon S3. For more information, see [Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket \(p. 168\)](#).

If you want to manually update permissions on your Amazon S3 bucket, click **No, I Will Update Permissions**.

7. Click **Yes, Edit**.

8. If you're adding an origin access identity to a web distribution and you have more than one origin, repeat Step 3 through Step 7 as applicable.

Creating an Origin Access Identity Using the CloudFront API

If you already have an origin access identity and you want to reuse it instead of creating another one, skip to [Adding an Origin Access Identity to Your Distribution Using the CloudFront API \(p. 168\)](#).

To create a CloudFront origin access identity using the CloudFront API, use the `POST Origin Access Identity` API action. The response includes an `Id` and an `S3CanonicalUserId` for the new origin access identity. Make note of these values because you will use them later in the process:

- **Id element** – You use the value of the `Id` element to associate an origin access ID with your distribution.
- **S3CanonicalUserId element** – You use the value of the `S3CanonicalUserId` element when you give CloudFront access to your Amazon S3 bucket or objects.

For more information about the `POST Origin Access Identity` API action, go to [POST Origin Access Identity](#) in the *Amazon CloudFront API Reference*. For a list of other actions that you can perform on origin access identities, go to [Actions on Origin Access Identities](#), also in the *Amazon CloudFront API Reference*.

Adding an Origin Access Identity to Your Distribution Using the CloudFront API

You can use the CloudFront API to add a CloudFront origin access identity to an existing distribution or to create a new distribution that includes an origin access identity. In either case, include an `OriginAccessIdentity` element. This element contains the value of the `Id` element that the `POST Origin Access Identity` API action returned when you created the origin access identity. For web distributions, add the `OriginAccessIdentity` element to one or more origins. For RTMP distributions, add the `OriginAccessIdentity` element to the distribution.

See the applicable topic in the *Amazon CloudFront API Reference*:

- **Create a new web distribution** – [POST Distribution](#)
- **Update an existing web distribution** – [PUT Distribution Config](#)
- **Create a new RTMP distribution** – [POST Streaming Distribution](#)
- **Update an existing RTMP distribution** – [PUT Streaming Distribution Config](#)

Granting the Origin Access Identity Permission to Read Objects in Your Amazon S3 Bucket

When you create or update a distribution, you can add an origin access identity and automatically update the bucket policy to give the origin access identity permission to access your bucket. Alternatively, you can choose to manually change the bucket policy or change ACLs, which control permissions on individual objects in your bucket.

Whichever method you use, you should still review the bucket policy for your bucket and review the permissions on your objects to ensure that:

- CloudFront can access objects in the bucket on behalf of users who are requesting your objects through CloudFront.
- Users can't use Amazon S3 URLs to access your objects.

Caution

If you configure CloudFront to accept and forward to Amazon S3 all of the HTTP methods that CloudFront supports, create a CloudFront origin access identity to restrict access to your Amazon S3 content, and grant the origin access identity the applicable permissions. For example, if you configure CloudFront to accept and forward these methods because you want to use the `PUT` method, you must configure Amazon S3 bucket policies or ACLs to handle `DELETE` requests appropriately so users can't delete resources that you don't want them to.

Note the following:

- You might find it easier to update Amazon S3 bucket policies than ACLs because you can add objects to the bucket without updating permissions. However, ACLs give you more fine-grained control because you're granting permissions on each object.
- By default, your Amazon S3 bucket and all of the objects in it are private—only the AWS account that created the bucket has permission to read or write the objects in it.
- If you're adding an origin access identity to an existing distribution, modify the bucket policy or any object ACLs as appropriate to ensure that the objects are not publicly available.
- Grant additional permissions to one or more secure administrator accounts so you can continue to update the contents of the Amazon S3 bucket.

Important

There might be a brief delay between when you save your changes to Amazon S3 permissions and when the changes take effect. Until the changes take effect, you can get permission-denied errors when you try to access objects in your bucket.

Updating Amazon S3 Bucket Policies

You can update the Amazon S3 bucket policy using either the AWS Management Console or the Amazon S3 API:

- Grant the CloudFront origin access identity the applicable permissions on the bucket.

To specify an origin access identity, use the value of **Amazon S3 Canonical User ID** on the **Origin Access Identity** page in the CloudFront console. If you're using the CloudFront API, use the value of the `S3CanonicalUserId` element that was returned when you created the origin access identity.

- Deny access to anyone that you don't want to have access using Amazon S3 URLs.

For more information, go to [Using Bucket Policies and User Policies](#) in the *Amazon Simple Storage Service Developer Guide*.

For an example, see "Granting Permission to an Amazon CloudFront Origin Identity" in the topic [Bucket Policy Examples](#), also in the *Amazon Simple Storage Service Developer Guide*.

Updating Amazon S3 ACLs

Using either the AWS Management Console or the Amazon S3 API, change the Amazon S3 ACL:

- Grant the CloudFront origin access identity the applicable permissions on each object that the CloudFront distribution serves.

To specify an origin access identity, use the value of **Amazon S3 Canonical User ID** on the **Origin Access Identity** page in the CloudFront console. If you're using the CloudFront API, use the value of the `S3CanonicalUserId` element that was returned when you created the origin access identity.

- Deny access to anyone that you don't want to have access using Amazon S3 URLs.

If another AWS account uploads objects to your bucket, that account is the owner of the objects. By default, the account that owns objects in a bucket is the only account that can grant permissions to those objects. However, the AWS account that owns the objects can make you an owner, too, which allows you to change permissions on the objects.

For more information, go to [Managing Access with ACLs](#) in the *Amazon Simple Storage Service Developer Guide*.

You can also change the ACLs using code and one of the AWS SDKs. For an example, see the downloadable sample code in [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#).

Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication

Newer Amazon S3 regions require that you use signature version 4 for authenticated requests. (For the versions of signature supported in each Amazon S3 region, see [Amazon Simple Storage Service \(S3\)](#) in the topic [Regions and Endpoints](#) in the *Amazon Web Services General Reference*.) However, when you create an origin access identity and add it to a CloudFront distribution, CloudFront typically uses signature version 2 for authentication when it requests objects in your Amazon S3 bucket. If you're using an origin access identity and if your bucket is in one of the regions that requires signature version 4 for authentication, note the following:

- `DELETE`, `GET`, `HEAD`, `OPTIONS`, and `PATCH` requests are supported without qualifications.
- If you want to submit `PUT` requests to CloudFront to upload objects to your Amazon S3 bucket, you must add an `x-amz-content-sha256` header to the request, and the header value must contain a SHA256 hash of the body of the request. For more information, see the documentation about the `x-amz-content-sha256` header on the [Common Request Headers](#) page in the *Amazon Simple Storage Service API Reference*.
- `POST` requests are not supported.

Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies (Trusted Signers)

Topics

- [Creating CloudFront Key Pairs for Your Trusted Signers \(p. 172\)](#)
- [Reformatting the CloudFront Private Key \(.NET and Java Only\) \(p. 173\)](#)
- [Adding Trusted Signers to Your Distribution \(p. 174\)](#)
- [Verifying that Trusted Signers Are Active \(Optional\) \(p. 176\)](#)
- [Rotating CloudFront Key Pairs \(p. 176\)](#)

To create signed URLs or signed cookies, you need at least one AWS account that has an active CloudFront key pair. This account is known as a trusted signer. The trusted signer has two purposes:

- As soon as you add the AWS account ID for your trusted signer to your distribution, CloudFront starts to require that users use signed URLs or signed cookies to access your objects.
- When you create signed URLs or signed cookies, you use the private key from the trusted signer's key pair to sign a portion of the URL or the cookie. When someone requests a restricted object, CloudFront compares the signed portion of the URL or cookie with the unsigned portion to verify that the URL or cookie hasn't been tampered with. CloudFront also verifies that the URL or cookie is valid, meaning, for example, that the expiration date and time hasn't passed.

When you specify trusted signers, you also indirectly specify the objects that require signed URLs or signed cookies:

- **Web distributions** – You add trusted signers to cache behaviors. If your distribution has only one cache behavior, users must use signed URLs or signed cookies to access any object associated with the distribution. If you create multiple cache behaviors and add trusted signers to some cache behaviors and not to others, you can require that users use signed URLs or signed cookies to access some objects and not others.
- **RTMP distributions (signed URLs only)** – You add trusted signers to a distribution. After you add trusted signers to an RTMP distribution, users must use signed URLs to access any object associated with the distribution.

Note

To specify trusted signers for a distribution, you must use the CloudFront console or CloudFront API version 2009-09-09 or later.

To specify the accounts that are allowed to create signed URLs or signed cookies and to add the accounts to your CloudFront distribution, perform the following tasks:

1. Decide which AWS accounts you want to use as trusted signers. Most CloudFront customers use the account that they used to create the distribution.
2. For each of the accounts that you selected in Step 1, create a CloudFront key pair. For more information, see [Creating CloudFront Key Pairs for Your Trusted Signers \(p. 172\)](#).
3. If you're using to .NET or Java to create signed URLs or signed cookies, reformat the CloudFront private key. For more information, see [Reformatting the CloudFront Private Key \(.NET and Java Only\) \(p. 173\)](#).

4. In the distribution for which you're creating signed URLs or signed cookies, specify the AWS account IDs of your trusted signers. For more information, see [Adding Trusted Signers to Your Distribution \(p. 174\)](#).
5. (Optional) Verify that CloudFront recognizes that your trusted signers have active CloudFront key pairs. For more information, see [Verifying that Trusted Signers Are Active \(Optional\) \(p. 176\)](#).

Creating CloudFront Key Pairs for Your Trusted Signers

Each of the AWS accounts that you use to create CloudFront signed URLs or signed cookies—your trusted signers—must have its own CloudFront key pair, and the key pair must be active. Note that you can't substitute an Amazon EC2 key pair for a CloudFront key pair. When you create a CloudFront signed URL or signed cookie, you include the key pair ID for the trusted signer's key pair in the URL. Amazon EC2 does not make key pair IDs available.

To help secure your applications, we recommend that you change CloudFront key pairs every 90 days or more often. For more information, see [Rotating CloudFront Key Pairs \(p. 176\)](#).

You can create a key pair in the following ways:

- Create a key pair in the AWS Management Console and download the private key. See the procedure [To create CloudFront key pairs in the AWS Management Console \(p. 172\)](#).
- Create an RSA key pair by using an application such as OpenSSL, and upload the public key to the AWS Management Console. See the procedure [To create an RSA key pair and upload the public key in the AWS Management Console \(p. 173\)](#).

To create CloudFront key pairs in the AWS Management Console

1. Sign in to the AWS Management Console using the root credentials for an AWS account.

Important

IAM users can't create CloudFront key pairs. You must log in using root credentials to create key pairs.

2. On the *account-name* menu, click **Security Credentials**.
3. Expand **CloudFront Key Pairs**.
4. Confirm that you have no more than one active key pair. You can't create a key pair if you already have two active key pairs.
5. Click **Create New Key Pair**.
6. In the **Create Key Pair** dialog box, click **Download Private Key File**.
7. In the **Opening <filename>** dialog box, accept the default value of **Save File**, and click **OK** to download and save the private key for your CloudFront key pair.

Important

Save the private key for your CloudFront key pair in a secure location, and set permissions on the file so that only the desired administrator users can read it. If someone gets your private key, they can generate valid signed URLs and signed cookies and download your content. You cannot get the private key again, so if you lose or delete it, you must create a new CloudFront key pair.

8. Record the key pair ID for your key pair. (In the AWS Management Console, this is called the access key ID.) You'll use it when you create signed URLs or signed cookies.

To create an RSA key pair and upload the public key in the AWS Management Console

1. Use OpenSSL or another tool to create a key pair.

For example, if you're using OpenSSL, you can use the following command to generate a key pair with a length of 4096 bits and save it in the file `private_key.pem`:

```
$ openssl genrsa -out private_key.pem 4096
```

The resulting file contains both the public and the private key. To extract the public key from that file, run the following command:

```
$ openssl rsa -pubout -in private_key.pem -out public_key.pem
```

The public key is the file that you upload later in this procedure

Note the following requirements for the key:

- The key pair must be an SSH-2 RSA key pair.
- The key pair must be in base64 encoded PEM format.
- The supported key lengths are 1024, 2048, and 4096 bits.

2. Sign in to the AWS Management Console using the root credentials for an AWS account.

Important

IAM users can't create CloudFront key pairs. You must log in using root credentials to create key pairs.

3. On the `account-name` menu, click **Security Credentials**.
4. Expand **CloudFront Key Pairs**.
5. Confirm that you have no more than one active key pair. You can't upload your own key pair if you already have two active key pairs.
6. Click **Upload Your Own Key Pair**.
7. In the **Upload Your Own Key Pair** dialog box, click **Choose File** and choose the public key file that you created in step 1.
8. Click **Upload**.

The **Upload Key Pair** dialog box clears, and the new key pair appears at the top of the list of CloudFront key pairs.

9. Record the key pair ID for your key pair. (In the AWS Management Console, this is called the access key ID.) You'll use it when you create signed URLs or signed cookies.

Reformatting the CloudFront Private Key (.NET and Java Only)

If you're using .NET or Java to create signed URLs or signed cookies, you cannot use the private key from your key pair in the default .pem format to create the signature:

- **.NET framework** – Convert the private key to the XML format that the .NET framework uses. Several tools are available.
- **Java** – Convert the private key to DER format. To do this, you can use OpenSSL:

```
$ openssl pkcs8 -topk8 -nocrypt -in origin.pem -inform PEM -out new.der  
-outform DER
```

To ensure that the encoder works correctly, add the jar for the Bouncy Castle Java cryptography APIs to your project and then add the Bouncy Castle provider.

Adding Trusted Signers to Your Distribution

Trusted signers are the AWS accounts that can create signed URLs and signed cookies for a distribution. By default, no account, not even the account that created the distribution, is allowed to create signed URLs or signed cookies. To specify the AWS accounts that you want to use as trusted signers, add the accounts to your distribution:

- **Web distributions** – Trusted signers are associated with cache behaviors. This allows you to require signed URLs or signed cookies for some objects and not for others in the same distribution. Trusted signers can only create signed URLs or cookies for objects that are associated with the corresponding cache behaviors. For example, if you have one trusted signer for one cache behavior and a different trusted signer for a different cache behavior, neither trusted signer can create signed URLs or cookies for objects that are associated with the other cache behavior.
- **RTMP distributions (signed URLs only)** – Trusted signers are associated with the distribution. After you add trusted signers to an RTMP distribution, users must use signed URLs or signed cookies to access any of the objects associated with the distribution.

Caution

Define path patterns and their sequence carefully so you don't either give users unintended access to your content or prevent them from accessing content that you want to be available to everyone. For example, suppose a request matches the path pattern for two cache behaviors. The first cache behavior does not require signed URLs or signed cookies and the second cache behavior does. Users will be able to access the objects without using signed URLs or signed cookies because CloudFront processes the cache behavior that is associated with the first match.

For more information about path patterns, see [Path Pattern \(p. 69\)](#).

Caution

If you're updating a distribution that you're already using to distribute content, add trusted signers only when you're ready to start generating signed URLs or signed cookies for your objects, or CloudFront will reject the requests:

- **Web distributions** – After you add trusted signers to a cache behavior for a web distribution, users must use signed URLs or signed cookies to access the objects that are associated with the cache behavior.
- **RTMP distributions (signed URLs only)** – After you add trusted signers to an RTMP distribution, users must use signed URLs to access any of the objects associated with the distribution.

The maximum number of trusted signers depends on the type of distribution:

- **Web distributions** – A maximum of five for each cache behavior
- **RTMP distributions** – A maximum of five for the distribution

You can add trusted signers to your distribution using either the CloudFront console or the CloudFront API. See the applicable topic:

- [Adding Trusted Signers to Your Distribution Using the CloudFront Console \(p. 175\)](#)
- [Adding Trusted Signers to Your Distribution Using the CloudFront API \(p. 175\)](#)

Adding Trusted Signers to Your Distribution Using the CloudFront Console

To add trusted signers to your distribution using the CloudFront console

1. If you want to use only the AWS account that created the distribution as a trusted signer, skip to Step 2.
- If you want to use other AWS accounts, get the AWS account ID for each account:
 - a. Sign in to the AWS Management Console at <https://console.aws.amazon.com/console/home> using an account that you want to use as a trusted signer.
 - b. In the upper-right corner of the console, click the name associated with the account, and click **My Account**.
 - c. Under **Account Settings**, make note of the account ID.
 - d. Sign out of the AWS Management Console.
 - e. Repeat steps a through d for the other accounts that you want to use as trusted signers.
2. Open the Amazon CloudFront console at <https://console.aws.amazon.com/cloudfront/>, and sign in using the account that you used to create the distribution that you want to add trusted signers to.
3. Click the distribution ID.
4. Change to edit mode:
 - **Web distributions** – Click the **Behaviors** tab, click the behavior that you want to edit, and click **Edit**.
 - **RTMP distributions** – Click **Edit**.
5. For **Restrict Viewer Access (Use Signed URLs or Signed Cookies)**, click **Yes**.
6. For **Trusted Signers**, check the applicable check boxes:
 - **Self** – Check this check box if you want to use the current account (the account that you used to create the distribution).
 - **Specify Accounts** – Check this check box if you want to use other AWS accounts.
7. If you checked the **Specify Accounts** check box, enter AWS account IDs in the **AWS Account Number** field. These are the account IDs that you got in the first step of this procedure. Enter one account ID per line.
8. Click **Yes, Edit**.
9. If you're adding trusted signers to a web distribution and you have more than one cache behavior, repeat steps 4 through 8 as applicable.

Adding Trusted Signers to Your Distribution Using the CloudFront API

You can use the CloudFront API to add the AWS account IDs for trusted signers to an existing distribution or to create a new distribution that includes trusted signers. In either case, specify the applicable values in the `TrustedSigners` element. For web distributions, add the `TrustedSigners` element to one or more cache behaviors. For RTMP distributions, add the `TrustedSigners` element to the distribution.

See the applicable topic in the *Amazon CloudFront API Reference*:

- **Create a new web distribution** – [POST Distribution](#)
- **Update an existing web distribution** – [PUT Distribution Config](#)
- **Create a new RTMP distribution** – [POST Streaming Distribution](#)
- **Update an existing RTMP distribution** – [PUT Streaming Distribution Config](#)

Verifying that Trusted Signers Are Active (Optional)

After you add trusted signers to your distribution, you might want to verify that the signers are active. For a trusted signer to be active, the following must be true:

- The AWS account must have at least one active key pair. If you're rotating key pairs, the account will temporarily have two active key pairs, the old key pair and the new one.
- CloudFront must be aware of the active key pair. After you create a key pair, there can be a short period of time before CloudFront is aware that the key pair exists.

Note

To display a list of active trusted signers for a distribution, you currently must use the CloudFront API. A list of active trusted signers is not available in the CloudFront console.

Verifying that Trusted Signers Are Active Using the CloudFront API

To determine which trusted signers have active key pairs (are active trusted signers), you get the distribution and review the values in the `ActiveTrustedSigners` element. This element lists the AWS account ID of each account that the distribution identifies as a trusted signer. If the trusted signer has one or more active CloudFront key pairs, the `ActiveTrustedSigners` element also lists the key pair IDs. For more information, see the applicable topic in the *Amazon CloudFront API Reference*:

- **Web distributions** – [GET Distribution](#)
- **RTMP distributions** – [GET Streaming Distribution](#)

Rotating CloudFront Key Pairs

AWS recommends that you rotate (change) your active CloudFront key pairs every 90 days. To rotate CloudFront key pairs that you're using to create signed URLs or signed cookies without invalidating URLs or cookies that haven't expired yet, perform the following tasks:

1. Create a new key pair for each of the accounts that you're using to create signed URLs. For more information, see [Creating CloudFront Key Pairs for Your Trusted Signers \(p. 172\)](#).
2. Verify that CloudFront is aware of the new key pairs. For more information, see [Verifying that Trusted Signers Are Active \(Optional\) \(p. 176\)](#).
3. Update your application to create signatures using the private keys from the new key pairs.
4. Confirm that URLs or cookies that you're signing using the new private keys are working.
5. Wait until the expiration date has passed in URLs or cookies that were signed using the old CloudFront key pairs.
6. Change the old CloudFront key pairs to **Inactive**:
 - a. Sign in to the AWS Management Console using the root credentials for an AWS account for which you want to make key pairs inactive.

- b. On the *account-name* menu, click **Security Credentials**.
 - c. Expand **CloudFront Key Pairs**.
 - d. For the applicable key pairs, click **Make Inactive**.
 - e. Repeat steps a through d for each of the AWS accounts for which you want to make key pairs inactive.
7. Reconfirm that URLs or cookies that you're signing using the new private keys are working.
 8. Delete the old CloudFront key pairs:
 - a. Go to the [Your Security Credentials](#) page.
 - b. Expand **CloudFront Key Pairs**.
 - c. For the applicable key pairs, click **Delete**.
 9. Delete the old private keys from the location where you stored them.

Choosing Between Signed URLs and Signed Cookies

CloudFront signed URLs and signed cookies provide the same basic functionality: they allow you to control who can access your content. If you want to serve private content through CloudFront and you're trying to decide whether to use signed URLs or signed cookies, consider the following.

Use signed URLs in the following cases:

- You want to use an RTMP distribution. Signed cookies aren't supported for RTMP distributions.
- You want to restrict access to individual files, for example, an installation download for your application.
- Your users are using a client (for example, a custom HTTP client) that doesn't support cookies.

Use signed cookies in the following cases:

- You want to provide access to multiple restricted files, for example, all of the files for a video in HLS format or all of the files in the subscribers' area of a website.
- You don't want to change your current URLs.

If you are not currently using signed URLs and if your URLs contain any of the following query string parameters, you cannot use either signed URLs or signed cookies:

- Expires
- Policy
- Signature
- Key-Pair-Id

CloudFront assumes that URLs that contain any of those query string parameters are signed URLs and therefore won't look at signed cookies.

Using Both Signed URLs and Signed Cookies

If you use both signed URLs and signed cookies to control access to the same objects and a viewer uses a signed URL to request an object, CloudFront determines whether to return the object to the viewer based only on the signed URL.

Using Signed URLs

Topics

- Choosing Between Canned and Custom Policies for Signed URLs (p. 179)
- How Signed URLs Work (p. 180)
- Choosing How Long Signed URLs Are Valid (p. 180)
- When Does CloudFront Check the Expiration Date and Time in a Signed URL? (p. 181)
- Sample Code and Third-Party Tools (p. 181)
- Creating a Signed URL Using a Canned Policy (p. 182)
- Creating a Signed URL Using a Custom Policy (p. 189)

A signed URL includes additional information, for example, an expiration date and time, that gives you more control over access to your content. This additional information appears in a policy statement, which is based on either a canned policy or a custom policy. The differences between canned and custom policies are explained in the next two sections.

Note

You can create some signed URLs using canned policies and create some signed URLs using custom policies for the same distribution.

Choosing Between Canned and Custom Policies for Signed URLs

When you create a signed URL, you write a policy statement in JSON format that specifies the restrictions on the signed URL, for example, how long the URL is valid. You can use either a canned policy or a custom policy. Here's how canned and custom policies compare:

| Description | Canned Policy | Custom Policy |
|--|---------------|----------------|
| You can reuse the policy statement for multiple objects. To reuse the policy statement, you must use wildcard characters in the <code>Resource</code> object. For more information, see Values that You Specify in the Policy Statement for a Signed URL That Uses a Custom Policy (p. 192) .) | No | Yes |
| You can specify the date and time that users can begin to access your content. | No | Yes (optional) |
| You can specify the date and time that users can no longer access your content. | Yes | Yes |
| You can specify the IP address or range of IP addresses of the users who can access your content. | No | Yes (optional) |
| The signed URL includes a base64-encoded version of the policy, which results in a longer URL. | No | Yes |

For information about creating signed URLs using a canned policy, see [Creating a Signed URL Using a Canned Policy \(p. 182\)](#).

For information about creating signed URLs using a custom policy, see [Creating a Signed URL Using a Custom Policy \(p. 189\)](#).

How Signed URLs Work

Here's an overview of how you configure CloudFront and Amazon S3 for signed URLs and how CloudFront responds when a user uses a signed URL to request an object.

1. In your CloudFront distribution, specify one or more trusted signers, which are the AWS accounts that you want to have permission to create signed URLs.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).
2. You develop your application to determine whether a user should have access to your content and to create signed URLs for the objects or parts of your application that you want to restrict access to. For more information, see the applicable topic:
 - [Creating a Signed URL Using a Canned Policy \(p. 182\)](#)
 - [Creating a Signed URL Using a Custom Policy \(p. 189\)](#)
3. A user requests an object for which you want to require signed URLs.
4. Your application verifies that the user is entitled to access the object: they've signed in, they've paid for access to the content, or they've met some other requirement for access.
5. Your application creates and returns a signed URL to the user.
6. The signed URL allows the user to download or stream the content.

This step is automatic; the user usually doesn't have to do anything additional to access the content. For example, if a user is accessing your content in a web browser, your application returns the signed URL to the browser. The browser immediately uses the signed URL to access the object in the CloudFront edge cache without any intervention from the user.

7. CloudFront uses the public key to validate the signature and confirm that the URL hasn't been tampered with. If the signature is invalid, the request is rejected.

If the signature is valid, CloudFront looks at the policy statement in the URL (or constructs one if you're using a canned policy) to confirm that the request is still valid. For example, if you specified a beginning and ending date and time for the URL, CloudFront confirms that the user is trying to access your content during the time period that you want to allow access.

If the request meets the requirements in the policy statement, CloudFront performs the standard operations: determines whether the object is already in the edge cache, forwards the request to the origin if necessary, and returns the object to the user.

Choosing How Long Signed URLs Are Valid

You can distribute private content using a signed URL that is valid for only a short time—possibly for as little as a few minutes. Signed URLs that are valid for such a short period are good for distributing content on-the-fly to a user for a limited purpose, such as distributing movie rentals or music downloads to customers on demand. If your signed URLs will be valid for just a short period, you'll probably want to generate them automatically using an application that you develop. When the user starts to download an object or starts to play a media file, CloudFront compares the expiration time in the URL with the current time to determine whether the URL is still valid.

You can also distribute private content using a signed URL that is valid for a longer time, possibly for years. Signed URLs that are valid for a longer period are useful for distributing private content to known users, such as distributing a business plan to investors or distributing training materials to employees. You can develop an application to generate these longer-term signed URLs for you, or you can use one of the third-party GUI tools listed in [Tools and Code Examples for Configuring Private Content \(p. 357\)](#).

When Does CloudFront Check the Expiration Date and Time in a Signed URL?

When CloudFront checks the expiration date and time in a signed URL to determine whether the URL is still valid depends on whether the URL is for a web distribution or an RTMP distribution:

- **Web distributions** – CloudFront checks the expiration date and time in a signed URL at the time of the HTTP request. If a client begins to download a large object immediately before the expiration time, the download should complete even if the expiration time passes during the download. If the TCP connection drops and the client tries to restart the download after the expiration time passes, the download will fail.

If a client uses Range GETs to get an object in smaller pieces, any GET request that occurs after the expiration time passes will fail. For more information about Range GETs, see [How CloudFront Processes Partial Requests for an Object \(Range GETs\) \(p. 132\)](#).

- **RTMP distributions** – CloudFront checks the expiration time in a signed URL at the start of a play event. If a client starts to play a media file before the expiration time passes, CloudFront allows the entire media file to play. However, depending on the media player, pausing and restarting might trigger another play event. Skipping to another position in the media file will trigger another play event. If the subsequent play event occurs after the expiration time passes, CloudFront won't serve the media file.

Sample Code and Third-Party Tools

For sample code that creates the hashed and signed part of signed URLs, see the following topics:

- [Create a URL Signature Using Perl \(p. 214\)](#)
- [Create a URL Signature Using PHP \(p. 216\)](#)
- [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#)
- [Create a URL Signature Using Java \(p. 226\)](#)

Additional sample code for creating signed URLs is available on the [Amazon CloudFront Sample Code & Libraries](#) page.

For information about third-party tools that support private content, including creating signed URLs, see [Tools and Code Examples for Configuring Private Content \(p. 357\)](#).

Creating a Signed URL Using a Canned Policy

To create a signed URL using a canned policy, perform the following procedure.

To create a signed URL using a canned policy

1. If you're using .NET or Java to create signed URLs, and if you haven't reformatted the private key for your key pair from the default .pem format to a format compatible with .NET or with Java, do so now. For more information, see [Reformatting the CloudFront Private Key \(.NET and Java Only\) \(p. 173\)](#).
2. Concatenate the following values in the specified order, and remove the whitespace (including tabs and newline characters) between the parts. You might have to include escape characters in the string in application code. All values have a type of String. Each part is keyed by number (1) to the two examples that follow.

1 Base URL for the object

The base URL is the CloudFront URL that you would use to access the object if you were not using signed URLs, including your own query string parameters, if any. For more information about the format of URLs for web distributions, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

The following examples show values that you specify for web distributions.

- The following CloudFront URL is for an object in a web distribution (using the CloudFront domain name). Note that `image.jpg` is in an `images` directory. The path to the object in the URL must match the path to the object on your HTTP server or in your Amazon S3 bucket.

`http://d111111abcdef8.cloudfront.net/images/image.jpg`

- The following CloudFront URL includes a query string:

`http://d111111abcdef8.cloudfront.net/images/image.jpg?size=large`

- The following CloudFront URLs are for objects in a web distribution. Both use an alternate domain name; the second one includes a query string:

`http://www.example.com/images/image.jpg`

`http://www.example.com/images/image.jpg?color=red`

- The following CloudFront URL is for an objects in a web distribution that uses an alternate domain name and the HTTPS protocol:

`https://www.example.com/images/image.jpg`

For RTMP distributions, the following examples are for objects in two different video formats, MP4 and FLV:

- **MP4** – `mp4:sydney-vacation.mp4`
- **FLV** – `sydney-vacation`
- **FLV** – `sydney-vacation.flv`

Note

For .flv files, whether you include the `.flv` filename extension depends on your player. To serve MP3 audio files or H.264/MPEG-4 video files, you might need to prefix the file name with `mp3:` or `mp4:`. Some media players can be configured to add the prefix automatically. The media player might also require you to specify the file name without the file extension (for example, `sydney-vacation` instead of `sydney-vacation.mp4`).

2 ?

The `?` indicates that query string parameters follow the base URL. Include the `?` even if you don't have any query string parameters of your own.

3 Your query string parameters, if any&

This value is optional. If you want to add your own query string parameters, for example:

```
color=red&size=medium
```

then add the parameters after the ? (see **2**) and before the Expires parameter. In certain rare circumstances, you might need to put your query string parameters after Key-Pair-Id.

Important

Your parameters cannot be named Expires, Signature, or Key-Pair-Id.

If you add your own parameters, append an & after each one, including the last one.

4 Expires=date and time in Unix time format (in seconds) and Coordinated Universal Time (UTC)

Specify the expiration date and time in Unix time format and Coordinated Universal Time (UTC). For example, January 1, 2013 10:00 am UTC converts to 1357034400 in Unix time format. For information about UTC, see *RFC 3339, Date and Time on the Internet: Timestamps*, <http://tools.ietf.org/html/rfc3339>.

Specify the date and time, in Unix time format (in seconds) and Coordinated Universal Time (UTC), that you want the URL to stop allowing access to the object. For example, January 1, 2013 10:00 am UTC converts to 1357034400 in Unix time format.

5 &Signature=hashed and signed version of the policy statement

A hashed, signed, and base64-encoded version of the JSON policy statement. For more information, see [Creating a Signature for a Signed URL That Uses a Canned Policy \(p. 184\)](#).

6 &Key-Pair-Id=active CloudFront key pair Id for the key pair that you're using to generate the signature

The ID for an active CloudFront key pair, for example, APKA9ONS7QCOWEXAMPLE. The CloudFront key pair ID tells CloudFront which public key to use to validate the signed URL. CloudFront compares the information in the signature with the information in the policy statement to verify that the URL has not been tampered with.

The key pair ID that you include in CloudFront signed URLs must be the ID of an active key pair for one of your trusted signers:

- **Web distributions** – The key pair must be associated with an AWS account that is one of the trusted signers for the applicable cache behavior.
- **RTMP distributions** – The key pair must be associated with an AWS account that is one of the trusted signers for the distribution.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

If you make a key pair inactive while rotating CloudFront key pairs, and if you're generating signed URLs programmatically, you must update your application to use a new active key pair for one of your trusted signers. If you're generating signed URLs manually, you must create new signed URLs. For more information about rotating key pairs, see [Rotating CloudFront Key Pairs \(p. 176\)](#).

Example signed URL for a web distribution:

1 <http://d111111abcdef8.cloudfront.net/image.jpg> **2** ? **3** color=red&size=medium&
4 Expires=1357034400 **5** &Signature=nitfHRCrtziwO2HwPfWw~yYDhUF5EwRunQA-j19DzZr

vDh6hQ73IDx~~ar3UocvvRQVw6EkC~GdpGQyyOSKQim-TxAnW7d8F5Kkai9HVx0Flu-5jcQb0UEmatEXAMPLE3ReXySpLSMj0yCd3ZAB4UcBCAqEijkytL6f3fVYNGQI6

⑥ &Key-Pair-Id=APKA9ONS7QCOWEXAMPLE

Example signed URL for an RTMP distribution:

① videos/mediafile.flv ② ? ③ color=red&size=medium& ④ Expires=1357034400
⑤ &Signature=nitfHRCrtziwO2HwPfWw~yYDhUF5EwRunQA-j19DzZr
vDh6hQ73IDx~~ar3UocvvRQVw6EkC~GdpGQyyOSKQim-TxAnW7d8F5Kkai9HVx0Flu-5jcQb0UEmatEXAMPLE3ReXySpLSMj0yCd3ZAB4UcBCAqEijkytL6f3fVYNGQI6
⑥ &Key-Pair-Id=APKA9ONS7QCOWEXAMPLE

Creating a Signature for a Signed URL That Uses a Canned Policy

To create the signature for a signed URL that uses a canned policy, you perform the following procedures:

1. Create a policy statement. See [Creating a Policy Statement for a Signed URL That Uses a Canned Policy \(p. 184\)](#).
2. Sign the policy statement to create a signature. See [Creating a Signature for a Signed URL That Uses a Canned Policy \(p. 186\)](#).

Creating a Policy Statement for a Signed URL That Uses a Canned Policy

When you create a signed URL using a canned policy, the `Signature` parameter is a hashed and signed version of a policy statement. For signed URLs that use a canned policy, you don't include the policy statement in the URL, as you do for signed URLs that use a custom policy. To create the policy statement, perform the following procedure.

To create the policy statement for a signed URL that uses a canned policy

1. Construct the policy statement using the following JSON format and using UTF-8 character encoding. Include all punctuation and other literal values exactly as specified. For information about the `Resource` and `DateLessThan` parameters, see [Values that You Specify in the Policy Statement for a Signed URL That Uses a Canned Policy \(p. 185\)](#).

```
{  
    "Statement": [  
        {  
            "Resource": "base URL or stream name",  
            "Condition": {  
                "DateLessThan": {  
                    "AWS:EpochTime": ending date and time in Unix time format and  
                    UTC  
                }  
            }  
        }  
    ]  
}
```

2. Remove all whitespace (including tabs and newline characters) from the policy statement. You might have to include escape characters in the string in application code.

Values that You Specify in the Policy Statement for a Signed URL That Uses a Canned Policy

When you create a policy statement for a canned policy, you specify the following values.

Resource

The value that you specify depends on whether you're creating the signed URL for a web distribution or an RTMP distribution.

Note

You can specify only one value for Resource.

Web distributions

The base URL including your query strings, if any, but excluding the CloudFront `Expires`, `Signature`, and `Key-Pair-Id` parameters, for example:

```
http://d111111abcdef8.cloudfront.net/images/horizon.jpg?size=large&license=yes
```

Note the following:

- **Protocol** – The value must begin with `http://`, `https://`, or `http*://`.
- **Query string parameters** – If you have no query string parameters, omit the question mark.
- **Alternate domain names** – If you specify an alternate domain name (CNAME) in the URL, you must specify the alternate domain name when referencing the object in your web page or application. Do not specify the Amazon S3 URL for the object.

RTMP distributions

Include only the stream name. For example, if the full URL for a streaming video is:

```
rtmp://s5c39gqb8ow64r.cloudfront.net/videos/cfx/st/mp3_name.mp3
```

then use the following value for Resource:

```
videos/mp3_name
```

Do not include a prefix such as `mp3:` or `mp4:`. Also, depending on the player you're using, you might have to omit the file extension from the value of Resource. For example, you might need to use `sydney-vacation` instead of `sydney-vacation.flv`.

DateLessThan

The expiration date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). For example, January 1, 2013 10:00 am UTC converts to 1357034400 in Unix time format.

This value must match the value of the `Expires` query string parameter in the signed URL. Do not enclose the value in quotation marks.

For more information, see [When Does CloudFront Check the Expiration Date and Time in a Signed URL? \(p. 181\)](#).

Example Policy Statement for a Signed URL That Uses a Canned Policy

When you use the following example policy statement in a signed URL, a user can access the object `http://d111111abcdef8.cloudfront.net/horizon.jpg` until January 1, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/horizon.jpg?size=large&license=yes",  
            "Condition": {  
                "DateLessThan": 1357034400  
            }  
        }  
    ]  
}
```

```

        "Condition": {
            "DateLessThan": {
                "AWS:EpochTime": 1357034400
            }
        }
    ]
}

```

Creating a Signature for a Signed URL That Uses a Canned Policy

To create the value for the `Signature` parameter in a signed URL, you hash and sign the policy statement that you created in [Creating a Policy Statement for a Signed URL That Uses a Canned Policy \(p. 184\)](#). There are two versions of this procedure. Perform the applicable procedure:

- Option 1: To create a signature for a web distribution or for an RTMP distribution (without Adobe Flash Player) by using a canned policy (p. 186)
- Option 2: To create a signature for an RTMP distribution by using a canned policy (Adobe Flash Player) (p. 187)

For additional information and examples of how to hash, sign, and encode the policy statement, see:

- [Using a Linux Command and OpenSSL for Base64-Encoding and Encryption \(p. 213\)](#)
- [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Option 1: To create a signature for a web distribution or for an RTMP distribution (without Adobe Flash Player) by using a canned policy

1. Use the SHA-1 hash function and RSA to hash and sign the policy statement that you created in the procedure [To create the policy statement for a signed URL that uses a canned policy \(p. 184\)](#). Use the version of the policy statement that no longer includes whitespace.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.
3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Append the resulting value to your signed URL after **&Signature=**, and return to [To create a signed URL using a canned policy \(p. 182\)](#) to finish concatenating the parts of your signed URL.

Option 2: To create a signature for an RTMP distribution by using a canned policy (Adobe Flash Player)

1. Use the SHA-1 hash function and RSA to hash and sign the policy statement that you created in the [To create the policy statement for a signed URL that uses a canned policy \(p. 184\)](#) procedure. Use the version of the policy statement that no longer includes whitespace.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.

Continue on to Step 3 if you're using Adobe Flash Player and the stream name is passed in from a web page.

If you're using Adobe Flash Player and if the stream name is not passed in from a web page, skip the rest of this procedure. For example, if you wrote your own player that fetches stream names from within the Adobe Flash .swf file, skip the rest of this procedure.

3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Some versions of Adobe Flash Player require that you URL-encode the characters ?, =, and &. For information about whether your version of Adobe Flash Player requires this character substitution, refer to the Adobe website.

If your version of Flash does not require URL-encoding those character, skip to Step 6.

If your version of Flash requires URL-encoding those characters, replace them as indicated in the following table. (You already replaced = in the previous step.)

| Replace these invalid characters | With this URL encoding |
|----------------------------------|------------------------|
| ? | %3F |
| & | %26 |

6. Append the resulting value to your signed URL after **&Signature=**, and return to [To create a signed URL using a canned policy \(p. 182\)](#) to finish concatenating the parts of your signed URL.

Creating a Signed URL Using a Custom Policy

Topics

- [Creating a Policy Statement for a Signed URL That Uses a Custom Policy \(p. 191\)](#)
- [Example Policy Statements for a Signed URL That Uses a Custom Policy \(p. 194\)](#)
- [Creating a Signature for a Signed URL That Uses a Custom Policy \(p. 195\)](#)

To create a signed URL using a custom policy, perform the following procedure.

To create a signed URL using a custom policy

1. If you're using .NET or Java to create signed URLs, and if you haven't reformatted the private key for your key pair from the default .pem format to a format compatible with .NET or with Java, do so now. For more information, see [Reformatting the CloudFront Private Key \(.NET and Java Only\) \(p. 173\)](#).
2. Concatenate the following values in the specified order, and remove the whitespace (including tabs and newline characters) between the parts. You might have to include escape characters in the string in application code. All values have a type of String. Each part is keyed by number (1) to the two examples that follow.

1 *Base URL for the object*

The base URL is the CloudFront URL that you would use to access the object if you were not using signed URLs, including your own query string parameters, if any. For more information about the format of URLs for web distributions, see [Format of URLs for CloudFront Objects \(p. 99\)](#).

The following examples show values that you specify for web distributions.

- The following CloudFront URL is for an object in a web distribution (using the CloudFront domain name). Note that `image.jpg` is in an `images` directory. The path to the object in the URL must match the path to the object on your HTTP server or in your Amazon S3 bucket.

`http://d111111abcdef8.cloudfront.net/images/image.jpg`

- The following CloudFront URL includes a query string:

`http://d111111abcdef8.cloudfront.net/images/image.jpg?size=large`

- The following CloudFront URLs are for objects in a web distribution. Both use an alternate domain name; the second one includes a query string:

`http://www.example.com/images/image.jpg`

`http://www.example.com/images/image.jpg?color=red`

- The following CloudFront URL is for an objects in a web distribution that uses an alternate domain name and the HTTPS protocol:

`https://www.example.com/images/image.jpg`

For RTMP distributions, the following examples are for objects in two different video formats, MP4 and FLV:

- **MP4** – `mp4:sydney-vacation.mp4`
- **FLV** – `sydney-vacation`
- **FLV** – `sydney-vacation.flv`

Note

For `.flv` files, whether you include the `.flv` filename extension depends on your player.

To serve MP3 audio files or H.264/MPEG-4 video files, you might need to prefix the file name with `mp3:` or `mp4:`. Some media players can be configured to add the prefix

automatically. The media player might also require you to specify the file name without the file extension (for example, sydney-vacation instead of sydney-vacation.mp4).

2 ?

The **?** indicates that query string parameters follow the base URL. Include the **?** even if you don't have any query string parameters of your own.

3 Your query string parameters, if any&

This value is optional. If you want to add your own query string parameters, for example:

```
color=red&size=medium
```

then add them after the **?** (see **2**) and before the **Policy** parameter. In certain rare circumstances, you might need to put your query string parameters after **Key-Pair-Id**.

Important

Your parameters cannot be named **Policy**, **Signature**, or **Key-Pair-Id**.

If you add your own parameters, append an **&** after each one, including the last one.

4 Policy=base64 encoded version of policy statement

Your policy statement in JSON format, with white space removed, then base64 encoded. For more information, see [Creating a Policy Statement for a Signed URL That Uses a Custom Policy \(p. 191\)](#).

The policy statement controls the access that a signed URL grants to a user: the URL of the object (for web distributions) or the stream name (for RTMP distributions), an expiration date and time, an optional date and time that the URL becomes valid, and an optional IP address or range of IP addresses that are allowed to access the object.

5 &Signature=hashed and signed version of the policy statement

A hashed, signed, and base64-encoded version of the JSON policy statement. For more information, see [Creating a Signature for a Signed URL That Uses a Custom Policy \(p. 195\)](#).

6 &Key-Pair-Id=active CloudFront key pair Id for the key pair that you're using to sign the policy statement

The ID for an active CloudFront key pair, for example, APKA9ONS7QCOWEXAMPLE. The CloudFront key pair ID tells CloudFront which public key to use to validate the signed URL. CloudFront compares the information in the signature with the information in the policy statement to verify that the URL has not been tampered with.

The key pair ID that you include in CloudFront signed URLs must be the ID of an active key pair for one of your trusted signers:

- **Web distributions** – The key pair must be associated with an AWS account that is one of the trusted signers for the applicable cache behavior.
- **RTMP distributions** – The key pair must be associated with an AWS account that is one of the trusted signers for the distribution.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

If you make a key pair inactive while rotating CloudFront key pairs, and if you're generating signed URLs programmatically, you must update your application to use a new active key pair for one of your trusted signers. If you're generating signed URLs manually, you must create new signed URLs. For more information about rotating key pairs, see [Rotating CloudFront Key Pairs \(p. 176\)](#).

Example signed URL for a web distribution:

```

1 http://d111111abcdef8.cloudfront.net/image.jpg 2 ? 3 color=red&size=medium&
4 Policy=eyANCiAgICAgIEXAMPLEW1lbnQiOiBbeyANCiAgICAgICJSZXNvdXJjZSI6Imh0dHA
6Ly9kemJlc3FtN3VuMW0wLmNs3VkZnJvbnQubmV0L2RlbW8ucGhwliwgDQogICAgICAIQ
29uZGI0aW9uljp7IA0KICAgICAgICAgIklwQWRkcmVzcyI6eyJBV1M6U291cmNISXAiOil
yMDcuMTcxLjE4MC4xMDEvMzlifSwNCiAgICAgICAgICJEYXRIR3JIYXRicRoYW4iOnsiQ
VdTOKVwb2NoVGltZSI6MTI5Njg2MDE3Nn0sDQogICAgICAgICAiRGF0ZUxlC3NUaGFuljp
7IkFXUzpFcG9jaFRpbWUiOjEyOTY4NjAyMjZ9DQogICAgICB9IA0KICAgfV0gDQp9DQo
5 &Signature=nitfHRCrtziwO2HwPfWw~yYDhUF5EwRunQA-j19DzZrvDh6hQ73IDx~
-ar3UocvvRQVw6EkC~GdpGQyyOSKQim-TxAnW7d8F5Kkai9HVx0Flu-5jcQb0UEmat
EXAMPLE3ReXySpLSMj0yCd3ZAB4UcBCAqEijktL6f3fVYNGQI6
6 &Key-Pair-Id=APKA9ONS7QCOWEXAMPLE

```

Example signed URL for an RTMP distribution:

```

1 videos/mediafile.flv 2 ? 3 color=red&size=medium&
4 Policy=eyANCiAgICAgIEXAMPLEW1lbnQiOiBbeyANCiAgICAgICJSZXNvdXJjZSI6Imh0dHA
6Ly9kemJlc3FtN3VuMW0wLmNs3VkZnJvbnQubmV0L2RlbW8ucGhwliwgDQogICAgICAIQ
29uZGI0aW9uljp7IA0KICAgICAgICAgIklwQWRkcmVzcyI6eyJBV1M6U291cmNISXAiOil
yMDcuMTcxLjE4MC4xMDEvMzlifSwNCiAgICAgICAgICJEYXRIR3JIYXRicRoYW4iOnsiQ
VdTOKVwb2NoVGltZSI6MTI5Njg2MDE3Nn0sDQogICAgICAgICAiRGF0ZUxlC3NUaGFuljp
7IkFXUzpFcG9jaFRpbWUiOjEyOTY4NjAyMjZ9DQogICAgICB9IA0KICAgfV0gDQp9DQo
5 &Signature=nitfHRCrtziwO2HwPfWw~yYDhUF5EwRunQA-j19DzZrvDh6hQ73IDx~
-ar3UocvvRQVw6EkC~GdpGQyyOSKQim-TxAnW7d8F5Kkai9HVx0Flu-5jcQb0UEmat
EXAMPLE3ReXySpLSMj0yCd3ZAB4UcBCAqEijktL6f3fVYNGQI6
6 &Key-Pair-Id=APKA9ONS7QCOWEXAMPLE

```

Creating a Policy Statement for a Signed URL That Uses a Custom Policy

To create a policy statement for a custom policy, perform the following procedure. For several example policy statements that control access to objects in a variety of ways, see [Example Policy Statements for a Signed URL That Uses a Custom Policy \(p. 194\)](#).

To create the policy statement for a signed URL that uses a custom policy

1. Construct the policy statement using the following JSON format. For more information, see [Values that You Specify in the Policy Statement for a Signed URL That Uses a Custom Policy \(p. 192\)](#).

```
{
  "Statement": [
    {
      "Resource": "URL or stream name of the object",
      "Condition": {
        "DateLessThan": { "AWS:EpochTime": required ending date and time in Unix time format and UTC },
        "DateGreaterThanOrEqual": { "AWS:EpochTime": optional beginning date and time in Unix time format and UTC },
        "IpAddress": { "AWS:SourceIp": "optional IP address" }
      }
    }
  ]
}
```

```
    ]  
}
```

Note the following:

- Use UTF-8 character encoding.
 - Include all punctuation and parameter names exactly as specified. Abbreviations for parameter names are not accepted.
 - The order of the parameters in the Condition section doesn't matter.
 - For information about the values for Resource, DateLessThan, DateGreaterThan, and IpAddress, see [Values that You Specify in the Policy Statement for a Signed URL That Uses a Custom Policy \(p. 192\)](#).
2. Remove all whitespace (including tabs and newline characters) from the policy statement. You might have to include escape characters in the string in application code.
3. Base64-encode the policy statement using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Append the resulting value to your signed URL after Policy=.
6. Create a signature for the signed URL by hashing, signing, and base64-encoding the policy statement. For more information, see [Creating a Signature for a Signed URL That Uses a Custom Policy \(p. 195\)](#).

Values that You Specify in the Policy Statement for a Signed URL That Uses a Custom Policy

When you create a policy statement for a custom policy, you specify the following values.

Resource

The value that you specifies depends on whether you're creating signed URLs for web or RTMP distributions.

Note

You can specify only one value for Resource.

Web distributions (optional but recommended)

The base URL including your query strings, if any, but excluding the CloudFront Policy, Signature, and Key-Pair-Id parameters, for example:

```
http://d111111abcdef8.cloudfront.net/images/horizon.jpg?size=large&license=yes
```

Caution

If you omit the Resource parameter for a web distribution, users can access all of the objects associated with any distribution that is associated with the key pair that you use to create the signed URL.

Note the following:

- **Protocol** – The value must begin with `http://`, `https://`, or `*`.
- **Query string parameters** – If you have no query string parameters, omit the question mark.
- **Wildcard characters** – You can use the wildcard character that matches zero or more characters (*) or the wild-card character that matches exactly one character (?) anywhere in the string. For example, the value:

```
http*://d111111abcdef8.cloudfront.net/*game_download.zip*
```

would include (for example) all of the following objects:

- `http://d111111abcdef8.cloudfront.net/example_game_download.zip?license=yes`
- `https://d111111abcdef8.cloudfront.net/example_game_download.zip?license=yes`
- `http://d111111abcdef8.cloudfront.net/test_game_download.zip?license=temp`
- `https://d111111abcdef8.cloudfront.net/test_game_download.zip?license=temp`
- **Alternate domain names** – If you specify an alternate domain name (CNAME) in the URL, you must specify the alternate domain name when referencing the object in your web page or application. Do not specify the Amazon S3 URL for the object.

RTMP distributions

Include only the stream name. For example, if the full URL for a streaming video is:

```
rtmp://s5c39gqb8ow64r.cloudfront.net/videos/cfx/st/mp3_name.mp3
```

then use the following value for Resource:

```
videos/mp3_name
```

Do not include a prefix such as `mp3:` or `mp4:`. Also, depending on the player you're using, you might have to omit the file extension from the value of Resource. For example, you might need to use `sydney-vacation` instead of `sydney-vacation.flv`.

DateLessThan

The expiration date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). Do not enclose the value in quotation marks. For information about UTC, see *RFC 3339, Date and Time on the Internet: Timestamps*, <http://tools.ietf.org/html/rfc3339>.

For example, January 1, 2013 10:00 am UTC converts to 1357034400 in Unix time format.

This is the only required parameter in the Condition section. CloudFront requires this value to prevent users from having permanent access to your private content.

For more information, see [When Does CloudFront Check the Expiration Date and Time in a Signed URL? \(p. 181\)](#)

DateGreaterThanOrEqual (Optional)

An optional start date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). Users are not allowed to access the object before the specified date and time. Do not enclose the value in quotation marks.

IpAddress (Optional)

The IP address of the client making the GET request. Note the following:

- To allow any IP address to access the object, omit the `IpAddress` parameter.
- You can specify either one IP address or one IP address range. For example, you can't set the policy to allow access if the client's IP address is in one of two separate ranges.

- To allow access from a single IP address, you specify:

"*IPv4 IP address*/32"

- You must specify IP address ranges in standard IPv4 CIDR format (for example, 10.52.176.0/24). For more information, go to *RFC 4632, Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan*, <http://tools.ietf.org/html/rfc4632>.

Example Policy Statements for a Signed URL That Uses a Custom Policy

The following example policy statements show how to control access to a specific object, all of the objects in a directory, or all of the objects associated with a key pair ID. The examples also show how to control access from an individual IP address or a range of IP addresses, and how to prevent users from using the signed URL after a specified date and time.

If you copy and paste any of these examples, remove any whitespace (including tabs and newline characters), replace the applicable values with your own values, and include a newline character after the closing brace (}).

For more information, see [Values that You Specify in the Policy Statement for a Signed URL That Uses a Custom Policy \(p. 192\)](#).

Topics

- [Example Policy Statement: Accessing One Object from a Range of IP Addresses \(p. 194\)](#)
- [Example Policy Statement: Accessing All Objects in a Directory from a Range of IP Addresses \(p. 194\)](#)
- [Example Policy Statement: Accessing All Objects Associated with a Key Pair ID from One IP Address \(p. 195\)](#)

Example Policy Statement: Accessing One Object from a Range of IP Addresses

The following example custom policy in a signed URL specifies that a user can access the object `http://d111111abcdef8.cloudfront.net/game_download.zip` from IP addresses in the range 192.0.2.0/24 until January 1, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/game_download.zip",  
            "Condition": {  
                "IpAddress": { "AWS:SourceIp": "192.0.2.0/24" },  
                "DateLessThan": { "AWS:EpochTime": 1357034400 }  
            }  
        }  
    ]  
}
```

Example Policy Statement: Accessing All Objects in a Directory from a Range of IP Addresses

The following example custom policy allows you to create signed URLs for any object in the `training` directory, as indicated by the `*` wildcard character in the `Resource` parameter. Users can access the object from an IP address in the range 192.0.2.0/24 until January 1, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/training/*",  
            "Condition": {  
                "IpAddress": {"AWS:SourceIp": "192.0.2.0/24"},  
                "DateLessThan": {"AWS:EpochTime": 1357034400}  
            }  
        }  
    ]  
}
```

Each signed URL in which you use this policy includes a base URL that identifies a specific object, for example:

<http://d111111abcdef8.cloudfront.net/training/orientation.pdf>

Example Policy Statement: Accessing All Objects Associated with a Key Pair ID from One IP Address

The following sample custom policy allows you to create signed URLs for any object associated with any distribution, as indicated by the * wildcard character in the `Resource` parameter. The user must use the IP address 192.0.2.10/32. (The value 192.0.2.10/32 in CIDR notation refers to a single IP address, 192.0.2.10.) The objects are available only from January 1, 2013 10:00 am UTC until January 2, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http:///*",  
            "Condition": {  
                "IpAddress": {"AWS:SourceIp": "192.0.2.10/32"},  
                "DateGreaterThanOrEqual": {"AWS:EpochTime": 1357034400},  
                "DateLessThan": {"AWS:EpochTime": 1357120800}  
            }  
        }  
    ]  
}
```

Each signed URL in which you use this policy includes a base URL that identifies a specific object in a specific CloudFront distribution, for example:

<http://d111111abcdef8.cloudfront.net/training/orientation.pdf>

The signed URL also includes a key pair ID, which must be associated with a trusted signer in the distribution (d111111abcdef8.cloudfront.net) that you specify in the base URL.

Creating a Signature for a Signed URL That Uses a Custom Policy

The signature for a signed URL that uses a custom policy is a hashed, signed, and base64-encoded version of the policy statement. To create a signature for a custom policy, perform the applicable procedure. The version that you choose depends on your distribution type (web or RTMP) and, for RTMP distributions, the media player that you're using (Adobe Flash Player or another media player):

- Option 1: To create a signature for a web distribution or for an RTMP distribution (without Adobe Flash Player) by using a custom policy (p. 196)
- Option 2: To create a signature for an RTMP distribution by using a custom policy (Adobe Flash Player) (p. 196)

For additional information and examples of how to hash, sign, and encode the policy statement, see:

- [Using a Linux Command and OpenSSL for Base64-Encoding and Encryption \(p. 213\)](#)
- [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Option 1: To create a signature for a web distribution or for an RTMP distribution (without Adobe Flash Player) by using a custom policy

1. Use the SHA-1 hash function and RSA to hash and sign the JSON policy statement that you created in the procedure [To create the policy statement for a signed URL that uses a custom policy \(p. 191\)](#). Use the version of the policy statement that no longer includes whitespace but that has not yet been base64-encoded.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.
3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Append the resulting value to your signed URL after **&Signature=**, and return to [To create a signed URL using a custom policy \(p. 189\)](#) to finish concatenating the parts of your signed URL.

Option 2: To create a signature for an RTMP distribution by using a custom policy (Adobe Flash Player)

1. Use the SHA-1 hash function and RSA to hash and sign the JSON policy statement that you created in the [To create the policy statement for a signed URL that uses a custom policy \(p. 191\)](#) procedure. Use the version of the policy statement that no longer includes whitespace but that has not yet been base64-encoded.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.

Continue on to Step 3 if the stream name is passed in from a web page.

If the stream name is not passed in from a web page, skip the rest of this procedure. For example, if you wrote your own player that fetches stream names from within the Adobe Flash .swf file, skip the rest of this procedure.

3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Some versions of Adobe Flash Player require that you URL-encode the characters ?, =, and &. For information about whether your version of Adobe Flash Player requires this character substitution, refer to the Adobe website.

If your version of Adobe Flash Player does not require that you URL-encode the characters ?, =, and &, skip to Step 6.

If your version of Adobe Flash Player requires URL-encoding those characters, replace them as indicated in the following table. (You already replaced = in the previous step.)

| Replace these invalid characters | With this URL encoding |
|----------------------------------|------------------------|
| ? | %3F |
| & | %26 |

6. Append the resulting value to your signed URL after **&Signature=**, and return to [To create a signed URL using a custom policy \(p. 189\)](#) to finish concatenating the parts of your signed URL.

Using Signed Cookies

CloudFront signed cookies allow you to control who can access your content when you don't want to change your current URLs or when you want to provide access to multiple restricted files, for example, all of the files in the subscribers' area of a website. This topic explains the considerations when using signed cookies and describes how to set signed cookies using canned and custom policies.

Topics

- [Choosing Between Canned and Custom Policies for Signed Cookies \(p. 198\)](#)
- [How Signed Cookies Work \(p. 198\)](#)
- [Preventing Misuse of Signed Cookies \(p. 199\)](#)
- [When Does CloudFront Check the Expiration Date and Time in a Signed Cookie? \(p. 200\)](#)
- [Sample Code and Third-Party Tools \(p. 200\)](#)
- [Setting Signed Cookies Using a Canned Policy \(p. 200\)](#)
- [Setting Signed Cookies Using a Custom Policy \(p. 205\)](#)

Choosing Between Canned and Custom Policies for Signed Cookies

When you create a signed cookie, you write a policy statement in JSON format that specifies the restrictions on the signed cookie, for example, how long the cookie is valid. You can use canned policies or custom policies. The following table compares canned and custom policies:

| Description | Canned Policy | Custom Policy |
|--|---------------|----------------|
| You can reuse the policy statement for multiple objects. To reuse the policy statement, you must use wildcard characters in the <code>Resource</code> object. For more information, see Values That You Specify in the Policy Statement for a Custom Policy for Signed Cookies (p. 208) .) | No | Yes |
| You can specify the date and time that users can begin to access your content | No | Yes (optional) |
| You can specify the date and time that users can no longer access your content | Yes | Yes |
| You can specify the IP address or range of IP addresses of the users who can access your content | No | Yes (optional) |

For information about creating signed cookies using a canned policy, see [Setting Signed Cookies Using a Canned Policy \(p. 200\)](#).

For information about creating signed cookies using a custom policy, see [Setting Signed Cookies Using a Custom Policy \(p. 205\)](#).

How Signed Cookies Work

Here's an overview of how you configure CloudFront for signed cookies and how CloudFront responds when a user submits a request that contains a signed cookie.

1. In your CloudFront distribution, you specify one or more trusted signers, which are the AWS accounts that you want to have permission to create signed URLs and signed cookies.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

2. You develop your application to determine whether a user should have access to your content and, if so, to send three Set-Cookie headers to the viewer. (Each Set-Cookie header can contain only one name-value pair, and a CloudFront signed cookie requires three name-value pairs.) You must send the Set-Cookie headers to the viewer before the viewer requests your private content. If you set a short expiration time on the cookie, you might also want to send three more Set-Cookie headers in response to subsequent requests, so that the user continues to have access.

Typically, your CloudFront distribution will have at least two cache behaviors, one that doesn't require authentication and one that does. The error page for the secure portion of the site includes a redirector or a link to a login page.

If you configure your distribution to cache objects based on cookies, CloudFront doesn't cache separate objects based on the attributes in signed cookies.

3. A user signs in to your website and either pays for content or meets some other requirement for access.
4. Your application returns the Set-Cookie headers in the response, and the viewer stores the name-value pairs.
5. The user requests an object.

The user's browser or other viewer gets the name-value pairs from step 4 and adds them to the request in a Cookie header. This is the signed cookie.

6. CloudFront uses the public key to validate the signature in the signed cookie and to confirm that the cookie hasn't been tampered with. If the signature is invalid, the request is rejected.

If the signature in the cookie is valid, CloudFront looks at the policy statement in the cookie (or constructs one if you're using a canned policy) to confirm that the request is still valid. For example, if you specified a beginning and ending date and time for the cookie, CloudFront confirms that the user is trying to access your content during the time period that you want to allow access.

If the request meets the requirements in the policy statement, CloudFront serves your content as it does for content that isn't restricted: it determines whether the object is already in the edge cache, forwards the request to the origin if necessary, and returns the object to the user.

Preventing Misuse of Signed Cookies

If you specify the Domain parameter in a Set-Cookie header, specify the most precise value possible to limit potential access by someone with the same root domain name. For example, apex.example.com is preferable to example.com, especially when you don't control example.com. This helps prevent someone from accessing your content from nadir.example.com.

To prevent this type of attack, do the following:

- Exclude the Expires and Max-Age cookie attributes, so that the Set-Cookie header creates a session cookie. Session cookies are automatically deleted when the user closes the browser, which reduces the possibility of someone getting unauthorized access to your content.
- Include the Secure attribute, so that the cookie is encrypted when a viewer includes it in a request.
- When possible, use a custom policy and include the IP address of the viewer.
- In the CloudFront-Expires attribute, specify the shortest reasonable expiration time based on how long you want users to have access to your content.

When Does CloudFront Check the Expiration Date and Time in a Signed Cookie?

To determine whether a signed cookie is still valid, CloudFront checks the expiration date and time in the cookie at the time of the HTTP request. If a client begins to download a large object immediately before the expiration time, the download should complete even if the expiration time passes during the download. If the TCP connection drops and the client tries to restart the download after the expiration time passes, the download will fail.

If a client uses Range GETs to get an object in smaller pieces, any GET request that occurs after the expiration time passes will fail. For more information about Range GETs, see [How CloudFront Processes Partial Requests for an Object \(Range GETs\)](#) (p. 132).

Sample Code and Third-Party Tools

The sample code for private content shows only how to create the signature for signed URLs. However, the process for creating a signature for a signed cookie is very similar, so much of the sample code is still relevant. For more information, see the following topics:

- [Create a URL Signature Using Perl](#) (p. 214)
- [Create a URL Signature Using PHP](#) (p. 216)
- [Create a URL Signature Using C# and the .NET Framework](#) (p. 218)
- [Create a URL Signature Using Java](#) (p. 226)

Additional sample code for creating signed URLs is available on the [Amazon CloudFront Sample Code & Libraries](#) page.

For information about third-party tools that support private content, including creating signed URLs, see [Tools and Code Examples for Configuring Private Content](#) (p. 357).

Setting Signed Cookies Using a Canned Policy

Topics

- [Creating a Signature for a Signed Cookie That Uses a Canned Policy](#) (p. 202)

To set a signed cookie using a canned policy, perform the following procedure.

To set a signed cookie using a canned policy

1. If you're using .NET or Java to create signed URLs, and if you haven't reformatted the private key for your key pair from the default .pem format to a format compatible with .NET or with Java, do so now. For more information, see [Reformatting the CloudFront Private Key \(.NET and Java Only\)](#) (p. 173).
2. Program your application to send three Set-Cookie headers to approved viewers. You need three Set-Cookie headers because each Set-Cookie header can contain only one name-value pair, and a CloudFront signed cookie requires three name-value pairs. The name-value pairs are: CloudFront-Expires, CloudFront-Signature, and CloudFront-Key-Pair-Id. The values must be present on the viewer before a user makes the first request for an object that you want to control access to.

Note

In general, we recommend that you exclude Expires and Max-Age attributes. Excluding the attributes causes the browser to delete the cookie when the user closes the browser,

which reduces the possibility of someone getting unauthorized access to your content. For more information, see [Preventing Misuse of Signed Cookies \(p. 199\)](#).

The names of cookie attributes are case sensitive.

Line breaks are included only to make the attributes more readable.

```
Set-Cookie:  
Domain=optional domain name;  
Path=/optional directory path;  
Secure;  
HttpOnly;  
CloudFront-Expires=date and time in Unix time format (in seconds) and Coordinated Universal Time (UTC)  
  
Set-Cookie:  
Domain=optional domain name;  
Path=/optional directory path;  
Secure;  
HttpOnly;  
CloudFront-Signature=hashed and signed version of the policy statement  
  
Set-Cookie:  
Domain=optional domain name;  
Path=/optional directory path;  
Secure;  
HttpOnly;  
CloudFront-Key-Pair-Id=active CloudFront key pair Id for the key pair that you are using to generate the signature
```

(Optional) Domain

The domain name for the requested object. If you don't specify a `Domain` attribute, the default value is the domain name in the URL, and it applies only to the specified domain name, not to subdomains. If you specify a `Domain` attribute, it also applies to subdomains. A leading dot in the domain name (for example, `Domain=.example.com`) is optional. In addition, if you specify a `Domain` attribute, the domain name in the URL and the value of the `Domain` attribute must match.

You can specify the domain name that CloudFront assigned to your distribution, for example, `d111111abcdef8.cloudfront.net`, but you can't specify `*.cloudfront.net` for the domain name.

If you want to use an alternate domain name such as `example.com` in URLs, you must add the alternate domain name to your distribution regardless of whether you specify the `Domain` attribute. For more information, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#) in the topic [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

(Optional) Path

The path for the requested object. If you don't specify a `Path` attribute, the default value is the path in the URL.

Secure

Requires that the viewer encrypt cookies before sending a request. We recommend that you send the `Set-Cookie` header over an HTTPS connection to ensure that the cookie attributes are protected from man-in-the-middle attacks.

HttpOnly

Requires that the viewer send the cookie only in HTTP or HTTPS requests.

CloudFront-Expires

Specify the expiration date and time in Unix time format and Coordinated Universal Time (UTC). For example, March 16, 2015 10:00 am UTC converts to 1426500000 in Unix time format. For

information about UTC, see *RFC 3339, Date and Time on the Internet: Timestamps*, <http://tools.ietf.org/html/rfc3339>.

CloudFront-Signature

A hashed, signed, and base64-encoded version of a JSON policy statement. For more information, see [Creating a Signature for a Signed Cookie That Uses a Canned Policy \(p. 202\)](#).

CloudFront-Key-Pair-Id

The ID for an active CloudFront key pair, for example, APKA9ONS7QCOWEXAMPLE. The CloudFront key pair ID tells CloudFront which public key to use to validate the signed cookie. CloudFront compares the information in the signature with the information in the policy statement to verify that the URL has not been tampered with.

The key pair ID that you include in CloudFront signed cookies must be associated with an AWS account that is one of the trusted signers for the applicable cache behavior.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

If you make a key pair inactive while rotating CloudFront key pairs, you must update your application to use a new active key pair for one of your trusted signers. For more information about rotating key pairs, see [Rotating CloudFront Key Pairs \(p. 176\)](#).

Example Set-Cookie headers for one signed cookie when you're using the domain name that is associated with your distribution in the URLs for your objects:

```
Set-Cookie: Domain=d11111abcdef8.cloudfront.net; Path=/images/*; Secure; HttpOnly; CloudFront-Expires=1426500000
Set-Cookie: Domain=d11111abcdef8.cloudfront.net; Path=/images/*; Secure; HttpOnly; CloudFront-Signature=yXrSIgyQoeE4FBI4eMKF6ho~CA8_
Set-Cookie: Domain=d11111abcdef8.cloudfront.net; Path=/images/*; Secure; HttpOnly; CloudFront-Key-Pair-Id=APKA9ONS7QCOWEXAMPLE
```

Example Set-Cookie headers for one signed cookie when you're using the alternate domain name example.org in the URLs for your objects:

```
Set-Cookie: Domain=example.org; Path=/images/*; Secure; HttpOnly; CloudFront-Expires=1426500000
Set-Cookie: Domain=example.org; Path=/images/*; Secure; HttpOnly; CloudFront-Signature=yXrSIgyQoeE4FBI4eMKF6ho~CA8_
Set-Cookie: Domain=example.org; Path=/images/*; Secure; HttpOnly; CloudFront-Key-Pair-Id=APKA9ONS7QCOWEXAMPLE
```

If you want to use an alternate domain name such as example.com in URLs, you must add the alternate domain name to your distribution regardless of whether you specify the `Domain` attribute. For more information, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#) in the topic [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

Creating a Signature for a Signed Cookie That Uses a Canned Policy

To create the signature for a signed cookie that uses a canned policy, you perform the following tasks:

1. Create a policy statement. See [Creating a Policy Statement for a Signed Cookie That Uses a Canned Policy \(p. 203\)](#).

2. Sign the policy statement to create a signature. See [Signing the Policy Statement to Create a Signature for a Signed Cookie That Uses a Canned Policy \(p. 204\)](#).

Creating a Policy Statement for a Signed Cookie That Uses a Canned Policy

When you set a signed cookie that uses a canned policy, the `CloudFront-Signature` attribute is a hashed and signed version of a policy statement. For signed cookies that use a canned policy, you don't include the policy statement in the `Set-Cookie` header, as you do for signed cookies that use a custom policy. To create the policy statement, perform the following procedure.

To create a policy statement for a signed cookie that uses a canned policy

1. Construct the policy statement using the following JSON format and using UTF-8 character encoding. Include all punctuation and other literal values exactly as specified. For information about the `Resource` and `DateLessThan` parameters, see [Values That You Specify in the Policy Statement for a Canned Policy for Signed Cookies \(p. 203\)](#).

```
{  
    "Statement": [  
        {  
            "Resource": "base URL or stream name",  
            "Condition": {  
                "DateLessThan": {  
                    "AWS:EpochTime": ending date and time in Unix time format and UTC  
                }  
            }  
        }  
    ]  
}
```

2. Remove all whitespace (including tabs and newline characters) from the policy statement. You might have to include escape characters in the string in application code.

Values That You Specify in the Policy Statement for a Canned Policy for Signed Cookies

When you create a policy statement for a canned policy, you specify the following values:

Resource

The base URL including your query strings, if any, for example:

`http://d111111abcdef8.cloudfront.net/images/horizon.jpg?size=large&license=yes`

You can specify only one value for `Resource`.

Note the following:

- **Protocol** – The value must begin with `http://`, `https://`, or `http*://`.
- **Query string parameters** – If you have no query string parameters, omit the question mark.
- **Alternate domain names** – If you specify an alternate domain name (CNAME) in the URL, you must specify the alternate domain name when referencing the object in your web page or application. Do not specify the Amazon S3 URL for the object.

DateLessThan

The expiration date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). Do not enclose the value in quotation marks.

For example, March 16, 2015 10:00 am UTC converts to 1426500000 in Unix time format.

This value must match the value of the `CloudFront-Expires` attribute in the `Set-Cookie` header. Do not enclose the value in quotation marks.

For more information, see [When Does CloudFront Check the Expiration Date and Time in a Signed Cookie? \(p. 200\)](#).

Example Policy Statement for a Canned Policy

When you use the following example policy statement in a signed cookie, a user can access the object `http://d111111abcdef8.cloudfront.net/horizon.jpg` until March 16, 2015 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/horizon.jpg?size=large&license=yes",  
            "Condition": {  
                "DateLessThan": {  
                    "AWS:EpochTime": 1426500000  
                }  
            }  
        }  
    ]  
}
```

Signing the Policy Statement to Create a Signature for a Signed Cookie That Uses a Canned Policy

To create the value for the `CloudFront-Signature` attribute in a `Set-Cookie` header, you hash and sign the policy statement that you created in [To create a policy statement for a signed cookie that uses a canned policy \(p. 203\)](#).

For additional information and examples of how to hash, sign, and encode the policy statement, see the following topics:

- [Using a Linux Command and OpenSSL for Base64-Encoding and Encryption \(p. 213\)](#)
- [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

To create a signature for a signed cookie using a canned policy

1. Use the SHA-1 hash function and RSA to hash and sign the policy statement that you created in the procedure [To create a policy statement for a signed cookie that uses a canned policy \(p. 203\)](#). Use the version of the policy statement that no longer includes whitespace.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.

3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding](#) in *RFC 2045, MIME (Multipurpose Internet Mail Extensions) Part One: Format of Internet Message Bodies*.
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Include the resulting value in the `Set-Cookie` header for the `CloudFront-Signature` name-value pair. Then return to [To set a signed cookie using a canned policy \(p. 200\)](#) add the `Set-Cookie` header for `CloudFront-Key-Pair-Id`.

Setting Signed Cookies Using a Custom Policy

Topics

- [Creating a Policy Statement for a Signed Cookie That Uses a Custom Policy \(p. 207\)](#)
- [Example Policy Statements for a Signed Cookie That Uses a Custom Policy \(p. 209\)](#)
- [Creating a Signature for a Signed Cookie That Uses a Custom Policy \(p. 211\)](#)

To set a signed cookie that uses a custom policy, perform the following procedure.

To set a signed cookie using a custom policy

1. If you're using .NET or Java to create signed URLs, and if you haven't reformatted the private key for your key pair from the default .pem format to a format compatible with .NET or with Java, do so now. For more information, see [Reformatting the CloudFront Private Key \(.NET and Java Only\) \(p. 173\)](#).
2. Program your application to send three `Set-Cookie` headers to approved viewers. You need three `Set-Cookie` headers because each `Set-Cookie` header can contain only one name-value pair, and a CloudFront signed cookie requires three name-value pairs. The name-value pairs are: `CloudFront-Policy`, `CloudFront-Signature`, and `CloudFront-Key-Pair-Id`. The values must be present on the viewer before a user makes the first request for an object that you want to control access to.

Note

In general, we recommend that you exclude `Expires` and `Max-Age` attributes. This causes the browser to delete the cookie when the user closes the browser, which reduces the possibility of someone getting unauthorized access to your content. For more information, see [Preventing Misuse of Signed Cookies \(p. 199\)](#).

The names of cookie attributes are case sensitive.

Line breaks are included only to make the attributes more readable.

```
Set-Cookie:  
Domain=optional domain name;  
Path=/optional directory path;  
Secure;
```

```
HttpOnly;
CloudFront-Policy=base64 encoded version of the policy statement

Set-Cookie:
Domain=optional domain name;
Path=/optional directory path;
Secure;
HttpOnly;
CloudFront-Signature=hashed and signed version of the policy statement

Set-Cookie:
Domain=optional domain name;
Path=/optional directory path;
Secure;
HttpOnly;
CloudFront-Key-Pair-Id=active CloudFront key pair Id for the key pair that
you are using to generate the signature
```

(Optional) Domain

The domain name for the requested object. If you don't specify a `Domain` attribute, the default value is the domain name in the URL, and it applies only to the specified domain name, not to subdomains. If you specify a `Domain` attribute, it also applies to subdomains. A leading dot in the domain name (for example, `Domain=.example.com`) is optional. In addition, if you specify a `Domain` attribute, the domain name in the URL and the value of the `Domain` attribute must match.

You can specify the domain name that CloudFront assigned to your distribution, for example, `d111111abcdef8.cloudfront.net`, but you can't specify `*.cloudfront.net` for the domain name.

If you want to use an alternate domain name such as `example.com` in URLs, you must add the alternate domain name to your distribution regardless of whether you specify the `Domain` attribute. For more information, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#) in the topic [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

(Optional) Path

The path for the requested object. If you don't specify a `Path` attribute, the default value is the path in the URL.

Secure

Requires that the viewer encrypt cookies before sending a request. We recommend that you send the `Set-Cookie` header over an HTTPS connection to ensure that the cookie attributes are protected from man-in-the-middle attacks.

HttpOnly

Requires that the viewer send the cookie only in HTTP or HTTPS requests.

CloudFront-Policy

Your policy statement in JSON format, with white space removed, then base64 encoded. For more information, see [Creating a Policy Statement for a Custom Policy](#).

The policy statement controls the access that a signed cookie grants to a user: the objects that the user can access, an expiration date and time, an optional date and time that the URL becomes valid, and an optional IP address or range of IP addresses that are allowed to access the object.

CloudFront-Signature

A hashed, signed, and base64-encoded version of the JSON policy statement. For more information, see [Creating a Signature for a Signed Cookie That Uses a Custom Policy \(p. 211\)](#).

CloudFront-Key-Pair-Id

The ID for an active CloudFront key pair, for example, `APKA9ONS7QCOWEXAMPLE`. The CloudFront key pair ID tells CloudFront which public key to use to validate the signed cookie.

CloudFront compares the information in the signature with the information in the policy statement to verify that the URL has not been tampered with.

The key pair ID that you include in CloudFront signed cookies must be associated with an AWS account that is one of the trusted signers for the applicable cache behavior.

For more information, see [Specifying the AWS Accounts That Can Create Signed URLs and Signed Cookies \(Trusted Signers\) \(p. 171\)](#).

If you make a key pair inactive while rotating CloudFront key pairs, you must update your application to use a new active key pair for one of your trusted signers. For more information about rotating key pairs, see [Rotating CloudFront Key Pairs \(p. 176\)](#).

Example Set-Cookie headers for one signed cookie when you're using the domain name that is associated with your distribution in the URLs for your objects:

```
Set-Cookie: Domain=d111111abcdef8.cloudfront.net; Path=/; Secure; HttpOnly;
CloudFront-Policy=eyJtDGF0ZW1lbnQiOlt7IlJlc291cmNlIjoiaHR0cDovL2QxMTEzMThYmNkZWY4LmNsb3VkJvbnQubmV0L2dhwWVfZG93bmXvYWQuemlwIiwiQ29uZG10aW9uIjp7Ik1wQWRkcmVzcyI6eyJBV1M6U291cmNlSXAxoiIxOTIuMC4yLjAvMjQifSwiRGF0ZUxlc3NUaGFuIjp7IkFXUzpFcG9jaFRpbWUiOjE0MjY1MDAwMDB9fx1dfQ_
Set-Cookie: Domain=d111111abcdef8.cloudfront.net; Path=/; Secure; HttpOnly;
CloudFront-Signature=dtKhpJ3aUYxqDIwepczPiDb9NXQ_
Set-Cookie: Domain=d111111abcdef8.cloudfront.net; Path=/; Secure; HttpOnly;
CloudFront-Key-Pair-Id=APKA9ONS7QCOWEXAMPLE
```

Example Set-Cookie headers for one signed cookie when you're using the alternate domain name example.org in the URLs for your objects:

```
Set-Cookie: Domain=example.org; Path=/; Secure; HttpOnly; CloudFront-
Policy=eyJtDGF0ZW1lbnQiOlt7IlJlc291cmNlIjoiaHR0cDovL2QxMTEzMThYmNkZWY4LmNsb3VkJvbnQubmV0L2dhwWVfZG93bmXvYWQuemlwIiwiQ29uZG10aW9uIjp7Ik1wQWRkcmVzcyI6eyJBV1M6U291cmNlSXAxoiIxOTIuMC4yLjAvMjQifSwiRGF0ZUxlc3NUaGFuIjp7IkFXUzpFcG9jaFRpbWUiOjE0MjY1MDAwMDB9fx1dfQ_
Set-Cookie: Domain=example.org; Path=/; Secure; HttpOnly; CloudFront-Signature=dtKhpJ3aUYxqDIwepczPiDb9NXQ_
Set-Cookie: Domain=example.org; Path=/; Secure; HttpOnly; CloudFront-Key-Pair-Id=APKA9ONS7QCOWEXAMPLE
```

If you want to use an alternate domain name such as example.com in URLs, you must add the alternate domain name to your distribution regardless of whether you specify the `Domain` attribute. For more information, see [Alternate Domain Names \(CNAMEs\) \(p. 76\)](#) in the topic [Values that You Specify When You Create or Update a Web Distribution \(p. 63\)](#).

Creating a Policy Statement for a Signed Cookie That Uses a Custom Policy

To create a policy statement for a custom policy, perform the following procedure. For several example policy statements that control access to objects in a variety of ways, see [Example Policy Statements for a Signed Cookie That Uses a Custom Policy \(p. 209\)](#).

To create the policy statement for a signed cookie that uses a custom policy

1. Construct the policy statement using the following JSON format.

```
{
    "Statement": [
        {
            "Resource": "URL of the object",
            "Condition": {
                "DateLessThan": { "AWS:EpochTime": required ending date and time
in Unix time format and UTC },
                "DateGreaterThanOrEqual": { "AWS:EpochTime": optional beginning date and
time in Unix time format and UTC },
                "IpAddress": { "AWS:SourceIp": optional IP address }
            }
        }
    ]
}
```

Note the following:

- Use UTF-8 character encoding.
 - Include all punctuation and parameter names exactly as specified. Abbreviations for parameter names are not accepted.
 - The order of the parameters in the Condition section doesn't matter.
 - For information about the values for Resource, DateLessThan, DateGreaterThanOrEqual, and IpAddress, see [Values That You Specify in the Policy Statement for a Custom Policy for Signed Cookies \(p. 208\)](#).
2. Remove all whitespace (including tabs and newline characters) from the policy statement. You might have to include escape characters in the string in application code.
 3. Base64-encode the policy statement using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
 4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.
- | Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |
5. Include the resulting value in your Set-Cookie header after CloudFront-Policy=.
 6. Create a signature for the Set-Cookie header for CloudFront-Signature by hashing, signing, and base64-encoding the policy statement. For more information, see [Creating a Signature for a Signed Cookie That Uses a Custom Policy \(p. 211\)](#).

Values That You Specify in the Policy Statement for a Custom Policy for Signed Cookies

When you create a policy statement for a custom policy, you specify the following values.

Resource

The base URL including your query strings, if any:

`http://d111111abcdef8.cloudfront.net/images/horizon.jpg?size=large&license=yes`

Caution

If you omit the `Resource` parameter, users can access all of the objects associated with any distribution that is associated with the key pair that you use to create the signed URL.

You can specify only one value for `Resource`.

Note the following:

- **Protocol** – The value must begin with `http://`, `https://`, or `http*://`.
- **Query string parameters** – If you have no query string parameters, omit the question mark.
- **Wildcards** – You can use the wildcard character that matches zero or more characters (*) or the wild-card character that matches exactly one character (?) anywhere in the string. For example, the value:

`http*://d111111abcdef8.cloudfront.net/*game_download.zip*`

would include (for example) all of the following objects:

- `http://d111111abcdef8.cloudfront.net/example_game_download.zip?license=yes`
- `https://d111111abcdef8.cloudfront.net/example_game_download.zip?license=yes`
- `http://d111111abcdef8.cloudfront.net/test_game_download.zip?license=temp`
- `https://d111111abcdef8.cloudfront.net/test_game_download.zip?license=temp`
- **Alternate domain names** – If you specify an alternate domain name (CNAME) in the URL, you must specify the alternate domain name when referencing the object in your web page or application. Do not specify the Amazon S3 URL for the object.

DateLessThan

The expiration date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). Do not enclose the value in quotation marks.

For example, March 16, 2015 10:00 am UTC converts to 1426500000 in Unix time format.

For more information, see [When Does CloudFront Check the Expiration Date and Time in a Signed Cookie? \(p. 200\)](#).

DateGreaterThanOrEqual (Optional)

An optional start date and time for the URL in Unix time format (in seconds) and Coordinated Universal Time (UTC). Users are not allowed to access the object before the specified date and time. Do not enclose the value in quotation marks.

IpAddress (Optional)

The IP address of the client making the GET request. Note the following:

- To allow any IP address to access the object, omit the `IpAddress` parameter.
- You can specify either one IP address or one IP address range. For example, you can't set the policy to allow access if the client's IP address is in one of two separate ranges.
- To allow access from a single IP address, you specify:

`"IPv4 IP address/32"`

- You must specify IP address ranges in standard IPv4 CIDR format (for example, `10.52.176.0/24`). For more information, go to *RFC 4632, Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan*, <http://tools.ietf.org/html/rfc4632>.

Example Policy Statements for a Signed Cookie That Uses a Custom Policy

The following example policy statements show how to control access to a specific object, all of the objects in a directory, or all of the objects associated with a key pair ID. The examples also show how to control

access from an individual IP address or a range of IP addresses, and how to prevent users from using the signed cookie after a specified date and time.

If you copy and paste any of these examples, remove any whitespace (including tabs and newline characters), replace the applicable values with your own values, and include a newline character after the closing brace (}).

For more information, see [Values That You Specify in the Policy Statement for a Custom Policy for Signed Cookies \(p. 208\)](#).

Topics

- [Example Policy Statement: Accessing One Object from a Range of IP Addresses \(p. 210\)](#)
- [Example Policy Statement: Accessing All Objects in a Directory from a Range of IP Addresses \(p. 210\)](#)
- [Example Policy Statement: Accessing All Objects Associated with a Key Pair ID from One IP Address \(p. 211\)](#)

Example Policy Statement: Accessing One Object from a Range of IP Addresses

The following example custom policy in a signed cookie specifies that a user can access the object `http://d111111abcdef8.cloudfront.net/game_download.zip` from IP addresses in the range `192.0.2.0/24` until January 1, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/game_download.zip",  
            "Condition": {  
                "IpAddress": {"AWS:SourceIp": "192.0.2.0/24"},  
                "DateLessThan": {"AWS:EpochTime": 1357034400}  
            }  
        }  
    ]  
}
```

Example Policy Statement: Accessing All Objects in a Directory from a Range of IP Addresses

The following example custom policy allows you to create signed cookies for any object in the `training` directory, as indicated by the `*` wildcard character in the `Resource` parameter. Users can access the object from an IP address in the range `192.0.2.0/24` until January 1, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http://d111111abcdef8.cloudfront.net/training/*",  
            "Condition": {  
                "IpAddress": {"AWS:SourceIp": "192.0.2.0/24"},  
                "DateLessThan": {"AWS:EpochTime": 1357034400}  
            }  
        }  
    ]  
}
```

Each signed cookie in which you use this policy includes a base URL that identifies a specific object, for example:

`http://d111111abcdef8.cloudfront.net/training/orientation.pdf`

Example Policy Statement: Accessing All Objects Associated with a Key Pair ID from One IP Address

The following sample custom policy allows you to set signed cookies for any object associated with any distribution, as indicated by the `*` wildcard character in the `Resource` parameter. The user must use the IP address `192.0.2.10/32`. (The value `192.0.2.10/32` in CIDR notation refers to a single IP address, `192.0.2.10`.) The objects are available only from January 1, 2013 10:00 am UTC until January 2, 2013 10:00 am UTC:

```
{  
    "Statement": [  
        {  
            "Resource": "http:///*",  
            "Condition": {  
                "IpAddress": {"AWS:SourceIp": "192.0.2.10/32"},  
                "DateGreaterThanOrEqual": {"AWS:EpochTime": 1357034400},  
                "DateLessThanOrEqual": {"AWS:EpochTime": 1357120800}  
            }  
        }  
    ]  
}
```

Each signed cookie in which you use this policy includes a base URL that identifies a specific object in a specific CloudFront distribution, for example:

`http://d111111abcdef8.cloudfront.net/training/orientation.pdf`

The signed cookie also includes a key pair ID, which must be associated with a trusted signer in the distribution (`d111111abcdef8.cloudfront.net`) that you specify in the base URL.

Creating a Signature for a Signed Cookie That Uses a Custom Policy

The signature for a signed cookie that uses a custom policy is a hashed, signed, and base64-encoded version of the policy statement.

For additional information and examples of how to hash, sign, and encode the policy statement, see:

- [Using a Linux Command and OpenSSL for Base64-Encoding and Encryption \(p. 213\)](#)
- [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

To create a signature for a signed cookie by using a custom policy

1. Use the SHA-1 hash function and RSA to hash and sign the JSON policy statement that you created in the procedure [To create the policy statement for a signed URL that uses a custom policy \(p. 191\)](#). Use the version of the policy statement that no longer includes whitespace but that has not yet been base64-encoded.

For the private key that is required by the hash function, use the private key that is associated with the applicable active trusted signer.

Note

The method that you use to hash and sign the policy statement depends on your programming language and platform. For sample code, see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

2. Remove whitespace (including tabs and newline characters) from the hashed and signed string.
3. Base64-encode the string using MIME base64 encoding. For more information, see [Section 6.8, Base64 Content-Transfer-Encoding in RFC 2045, MIME \(Multipurpose Internet Mail Extensions\) Part One: Format of Internet Message Bodies](#).
4. Replace characters that are invalid in a URL query string with characters that are valid. The following table lists invalid and valid characters.

| Replace these invalid characters | With these valid characters |
|----------------------------------|-----------------------------|
| + | - (hyphen) |
| = | _ (underscore) |
| / | ~ (tilde) |

5. Include the resulting value in the `Set-Cookie` header for the `CloudFront-Signature= name-value` pair, and return to [To set a signed cookie using a custom policy \(p. 205\)](#) to add the `Set-Cookie` header for `CloudFront-Key-Pair-Id`.

Using a Linux Command and OpenSSL for Base64-Encoding and Encryption

You can use the following Linux command-line command and OpenSSL to hash and sign the policy statement, base64-encode the signature, and replace characters that are not valid in URL query string parameters with characters that are valid.

For information about OpenSSL, go to <http://www.openssl.org>.

```
❶ cat policy | ❷ tr -d "\n" | ❸ openssl sha1 -sign private-key.pem | ❹
openssl base64 | ❺ tr -- '+=/-' '_~'
```

where:

- ❶ `cat` reads the policy file.
- ❷ `tr -d "\n"` removes a newline character that was added by `cat`.
- ❸ OpenSSL hashes the file using SHA-1 and signs it using RSA and the private key file `private-key.pem`.
- ❹ OpenSSL base64-encodes the hashed and signed policy statement.
- ❺ `tr` replaces characters that are not valid in URL query string parameters with characters that are valid.

For code examples that demonstrate creating a signature in several programming languages see [Code Examples for Creating a Signature for a Signed URL \(p. 214\)](#).

Code Examples for Creating a Signature for a Signed URL

This section includes downloadable application examples that demonstrate how to create signatures for signed URLs. Examples are available in Perl, PHP, C#, and Java. You can use any of the examples to create signed URLs. The Perl script runs on Linux/Mac platforms. The PHP example will work on any server that runs PHP. The C# example uses the .NET Framework.

For an example of how to use cookies with Ruby on Rails, see [Tools and Code Examples for Configuring Private Content \(p. 357\)](#) in the topic [Amazon CloudFront Resources \(p. 355\)](#).

You can find example code for signed URLs and for signed cookies in a variety of programming languages. Perform an Internet search on sample app *language* cloudfront signed URLs or on sample app *language* cloudfront signed cookies.

Topics

- [Create a URL Signature Using Perl \(p. 214\)](#)
- [Create a URL Signature Using PHP \(p. 216\)](#)
- [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#)
- [Create a URL Signature Using Java \(p. 226\)](#)

Create a URL Signature Using Perl

The Perl script creates the signature for private content from command line arguments that specify the CloudFront URL, the path to the private key of the signer, the key ID, and an expiration date for the URL. The tool can also decode signed URLs. To get the tool `cfsign.pl`, go to [Amazon CloudFront Signed URLs Helper Tool](#).

Note

Creating a URL signature is just one part of the process of serving private content using a signed URL. For more information about the entire process, see [Using Signed URLs \(p. 179\)](#).

The following example shows how you might use `cfsign.pl` to create an RTMP distribution signature.

```
$ cfsign.pl --action encode --stream example/video.mp4 --private-key  
/path/to/my-private-key.pem --key-pair-id PK12345EXAMPLE --expires 1265838202
```

This tool generates the policy statement from the command line arguments. The signature that it generates is an SHA1 hash of the policy statement.

The following is a example base64-encoded stream name.

```
mp4:example/video.mp4%3FPolicy%3DewogICJTdGF0ZW1lbnQiOlt7CiAgICAgICJSZXNvdXJjZSI  
6ImRyciIsCiAgICAgICJDb25kaXRpb24iOnsKICAgICAgICAiSXBBZGRyZXNzIjp7IkFXUzpTb3VY2V  
JcCI6IjAuMC4wLjAvMCJ9LAogICAgICAgICJEYXR1TGVzc1RoYW4iOnsiQVdTOkVwb2NoVGltZSI6MjE  
ONTkxNjgwMH0KICAgICAgfQogICAgEXAMPLE_%26Signature%3DewtHqEXK-68tsZt-eOFnZKGwTf2a  
J1bKhXkK5SSiVqcG9pieCRV3xTEPtC29OzeXlsDvRycOM2WK0cXzcyYZhpl9tv2796ihHiCTAwIHQ8yP  
17Af4nWtOLIZHoH6wkR3tu1cQHs8R1d-g-S1ZGjNBXr~J2MbaJzm8i6EXAMPLE_%26Key-Pair-Id%3  
DPK12345EXAMPLE
```

This signature authenticates the request to stream private content, `example/video.mp4`. If you're using Adobe Flash Player and the stream name is passed in from a web page using JavaScript, you must base64-encode the signature and replace characters that are invalid in a URL request parameter (+, =,

/ with characters that are valid (-, _, and ~, respectively). If the stream name is not passed in from a web page, you don't need to base64-encode the signature. For example, you would not base64-encode the signature if you write your own player and the stream names are fetched from within the Adobe Flash .swf file.

The following example uses jwplayer with CloudFront.

```
<script type='text/javascript'>
    var sol = new SWFObject
        ('http://d841721fxaaqy9.cloudfront.net/player/player.swf',
        'mpl', '640', '360', '9');
    sol.addParam('allowfullscreen','true');
    sol.addParam('allowscriptaccess','always');
    sol.addParam('wmode','opaque');
    sol.addVariable('streamer','rtmp://s3r3xe4ayhhis.cloudfront.net/cfx/st');
    sol.addVariable("file","mp4:example/video.mp4?Policy=DewogICJtDGF0ZW1lbnQiOlt7CiAgICJSZXNvdXJjZSI6ImRyciIsCiAgICAgICJDb25kaXRpb24iOnsKICAgICAgICAiSXBBZGRyZXNzIjp7IkFXUzpTb3VyY2VJcCI6IjAuMC4wLjAvMCJ9LAogICAgICAgICJEFYXR1TGVzc1RoYW4iOnsiQVdTOKVwb2NoVGltZSI6MjE0NTkxNjgwMH0KICAgICAgfQogICAgEXAMPLE_%26Signature%DewtHqEXK~68tsZt-eOFnZKGwTf2aJlbKhXkK5SSiVqcG9pieCRV3xTEPtc290zeXlsDvRycOM2WK0cXzcyYZhp19tv2796ihHiCTAwIHQ8yP17Af4nWtOLIZHoH6wkR3tU1cQHs8R1d-g-S1ZGjNBXr~J2MbaJzm8i6EXAMPLE_%26Key-Pair-Id%3DPK12345EXAMPLE
    sol.write('flv');
</script>
```

When you retrieve a stream to play from within an Adobe Flash .swf file, do not URL-encode the stream name, for example:

```
mp4:example/video.mp4?Policy=ewogICJtDGF0ZW1lbnQiOlt7CiAgICAgICJSZXNvdXJjZSI6ImRyciIsCiAgICAgICJDb25kaXRpb24iOnsKICAgICAgICAiSXBBZGRyZXNzIjp7IkFXUzpTb3VyY2VJcCI6IjAuMC4wLjAvMCJ9LAogICAgICAgICJEFYXR1TGVzc1RoYW4iOnsiQVdTOKVwb2NoVGltZSI6MjE0NTkxNjgwMH0KICAgICAgfQogICAgEXAMPLE_%26Signature=ewtHqEXK~68tsZt-eOFnZKGwTf2aJlbKhXkK5SSiVqcG9pieCRV3xTEPtc290zeXlsDvRycOM2WK0cXzcyYZhp19tv2796ihHiCTAwIHQ8yP17Af4nWtOLIZHoH6wkR3tU1cQHs8R1d-g-S1ZGjNBXr~J2MbaJzm8i6EXAMPLE_%26Key-Pair-Id=PK12345EXAMPLE
```

See the comments in the Perl source code for more information about the command line switches and features of this tool.

See also

- [Create a URL Signature Using PHP \(p. 216\)](#)
- [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#)
- [Create a URL Signature Using Java \(p. 226\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Create a URL Signature Using PHP

Any web server that runs PHP can use the PHP demo code to create policy statements and signatures for private CloudFront RTMP distributions. The example creates a functioning web page with signed URL links that play a video stream using CloudFront streaming. To get the example, download [Signature Code for Video Streaming in PHP](#).

You can also create signed URLs by using the `UrlSigner` class in the AWS SDK for PHP. For more information, see [Class UrlSigner](#) in the *AWS SDK for PHP API Reference*.

Note

Creating a URL signature is just one part of the process of serving private content using a signed URL. For more information about the entire process, see [Using Signed URLs \(p. 179\)](#).

In the following code segment, the function `rsa_sha1_sign` hashes and signs the policy statement. The arguments required are a policy statement, an out parameter to contain the signature, and the private key for your AWS account or for a trusted AWS account that you specify. Next, the `url_safe_base64_encode` function creates a URL-safe version of the signature.

Example RSA SHA1 Hashing in PHP

```
function rsa_sha1_sign($policy, $private_key_filename) {
    $signature = "";

    // load the private key
    $fp = fopen($private_key_filename, "r");
    $priv_key = fread($fp, 8192);
    fclose($fp);
    $pkeyid = openssl_get_privatekey($priv_key);

    // compute signature
    openssl_sign($policy, $signature, $pkeyid);

    // free the key from memory
    openssl_free_key($pkeyid);

    return $signature;
}

function url_safe_base64_encode($value) {
    $encoded = base64_encode($value);
    // replace unsafe characters +, = and / with
    // the safe characters -, _ and ~
    return str_replace(
        array('+', '=', '/'),
        array('-', '_', '~'),
        $encoded);
}
```

The following code constructs a *canned* policy statement needed for creating the signature. For more information about canned policies, see [Creating a Signed URL Using a Canned Policy \(p. 182\)](#).

Example Canned Signing Function in PHP

```
function get_canned_policy_stream_name($video_path, $private_key_filename,
$key_pair_id, $expires) {
    // this policy is well known by CloudFront, but you still need to sign it,
    // since it contains your parameters
    $canned_policy = '{"Statement": [{"Resource": "' . $video_path . '", "Condition": {"DateLessThan": {"AWS:EpochTime": "' . $expires . '"}}}]}'';

    // sign the canned policy
    $signature = rsa_shal_sign($canned_policy, $private_key_filename);
    // make the signature safe to be included in a url
    $encoded_signature = url_safe_base64_encode($signature);

    // combine the above into a stream name
    $stream_name = create_stream_name($video_path, null, $encoded_signature,
$key_pair_id, $expires);
    // url-encode the query string characters to work around a flash player bug

    return encode_query_params($stream_name);
}
```

The following code constructs a *custom* policy statement needed for creating the signature. For more information about custom policies, see [Creating a Signed URL Using a Custom Policy \(p. 189\)](#).

Example Custom Signing Function in PHP

```
function get_custom_policy_stream_name($video_path, $private_key_filename,
$key_pair_id, $policy) {
    // sign the policy
    $signature = rsa_shal_sign($policy, $private_key_filename);
    // make the signature safe to be included in a url
    $encoded_signature = url_safe_base64_encode($signature);

    // combine the above into a stream name
    $stream_name = create_stream_name($video_path, $encoded_policy, $encoded_sig
nature, $key_pair_id, null);
    // url-encode the query string characters to work around a flash player bug

    return encode_query_params($stream_name);
}
```

For more information about the OpenSSL implementation of SHA-1, see [The Open Source Toolkit for SSL/TLS](#).

See also

- [Create a URL Signature Using Perl \(p. 214\)](#)
- [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#)
- [Create a URL Signature Using Java \(p. 226\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Create a URL Signature Using C# and the .NET Framework

The C# examples in this section implement an example application that demonstrates how to create the signatures for CloudFront private distributions using canned and custom policy statements. The examples includes utility functions based on the [AWS .NET SDK](#) that can be useful in .NET applications.

You can also create signed URLs and signed cookies by using the AWS SDK for .NET. In the [AWS SDK for .NET API Reference](#), see the following topics:

- **Signed URLs** – Amazon.CloudFront > AmazonCloudFrontUrlSigner
- **Signed cookies** – Amazon.CloudFront > AmazonCloudFrontCookieSigner

Note

Creating a URL signature is just one part of the process of serving private content using a signed URL. For more information about the entire process, see [Using Signed URLs \(p. 179\)](#).

To download the code, go to [Signature Code in C#](#).

To use the RSA keys provided by [AWS Account/Security](#) in the .NET framework, you must convert the AWS-supplied .pem files to the XML format that the .NET framework uses.

After conversion, the RSA private key file is in the following format:

Example RSA Private Key in the XML .NET Framework Format

```
<RSAKeyValue>
  <Modulus>
    w05IvYCP5UcoCKDoldcspoMehWBZcyfs9QEzGi6Oe5y+ewGr1oW+vB2GPB
    ANBiVPcUHTFWhwaIBd3oglmF01GQ1jP/jOfmXHUK2kUUnLnJp+oOBL2Ni
    uFtqcW6h/L51IpD8Yq+NRHg
    Ty4zDsyr2880MvXv88yEFURCkqEXAMPLE=
  </Modulus>
  <Exponent>AQAB</Exponent>
  <P>
    5bmKDaTz
    npENGvqz4Cea8XPH+sxt+2VaAwYnsarVUoS
    BeVt8WLl0VuZGG9IZYmH5KtexEu7fZveYd9UEXAMPLE==
  </P>
  <Q>
    1v91/WN1a1N3rOK4VGoCokx7kR2SyTMSbZgF9IWJNOugR/WZw7HTnjipO3c9dy1Ms9pUKwUF4
    6d7049EXAMPLE==
  </Q>
  <DP>
    RgrSKuLWXMyBH+/11Dx/I4tXuAJIr1Pyo+VmiOc7b5NzHptkSHEPfR9s1
    OK0Vqjknc1qCJ3Ig860METEXAMPLE==
  </DP>
  <DQ>
    pjPjvSFw+RoaTu0pgCA/jwW/FGyfN6iim1RFbktT4
    z49DZb2IM885f3vf35eLTaEYRYUHQgZtChNEV0TEXAMPLE==
  </DQ>
  <InverseQ>
    nkvoJTg5QtGNgWb9i
    cVtzrL/1pFEOHbJXwEJdU99N+7sMK+1066DL/HSBUCD63qD4USpnf0myc24in0EXAMPLE==</In
    verseQ>
  <D>
    Bc7mp7XYHynuPZxChjWNJZIq+A73gm0ASDv6At7F8Vi9r0xUlQe/v0AQS3ycN8QlyR4XMbzMLYk
    3yjxFDXo4ZKQtOGzLGteCU2srANiLv26/imXA8FVidZftTAtLviWQZB
    VPTeYIA69ATUYPEq0a5u5wjGy
    UOij9OWyuEXAMPLE=
  </D>
</RSAKeyValue>
```

The following C# code creates a signed URL that uses a canned policy by performing the following steps:

- Creates a policy statement.
- Hashes the policy statement using SHA1, and signs the result using RSA and the private key for your AWS account or for a trusted AWS account that you specify.
- Base64-encodes the hashed and signed policy statement and replaces special characters to make the string safe to use as a URL request parameter.
- Concatenates the applicable values.

For the complete implementation, see the example at [Signature Code in C#](#).

Example Canned Policy Signing Method in C#

```
public static string ToUrlSafeBase64String(byte[] bytes)
{
    return System.Convert.ToBase64String(bytes)
        .Replace('+', '-')
        .Replace('=', '_')
        .Replace('/', '~');
}

public static string CreateCannedPrivateURL(string urlString,
    string durationUnits, string durationNumber, string pathToPolicyStmnt,
    string pathToPrivateKey, string privateKeyId)
{
    // args[] 0-thisMethod, 1-resourceUrl, 2-seconds-minutes-hours-days
    // to expiration, 3-numberOfPreviousUnits, 4-pathToPolicyStmnt,
    // 5-pathToPrivateKey, 6-PrivateKeyId

    TimeSpan timeSpanInterval = GetDuration(durationUnits, durationNumber);

    // Create the policy statement.
    string strPolicy = CreatePolicyStatement(pathToPolicyStmnt,
        urlString,
        DateTime.Now,
        DateTime.Now.Add(timeSpanInterval),
        "0.0.0.0/0");
    if ("Error!" == strPolicy) return "Invalid time frame." +
        "Start time cannot be greater than end time.";

    // Copy the expiration time defined by policy statement.
    string strExpiration = CopyExpirationTimeFromPolicy(strPolicy);

    // Read the policy into a byte buffer.
    byte[] bufferPolicy = Encoding.ASCII.GetBytes(strPolicy);

    // Initialize the SHA1CryptoServiceProvider object and hash the policy data.

    using (SHA1CryptoServiceProvider
        cryptoSHA1 = new SHA1CryptoServiceProvider())
    {
        bufferPolicy = cryptoSHA1.ComputeHash(bufferPolicy);

        // Initialize the RSACryptoServiceProvider object.
        RSACryptoServiceProvider providerRSA = new RSACryptoServiceProvider();

        XmlDocument xmlPrivateKey = new XmlDocument();

        // Load PrivateKey.xml, which you created by converting your
        // .pem file to the XML format that the .NET framework uses.
        // Several tools are available.
        xmlPrivateKey.Load(pathToPrivateKey);

        // Format the RSACryptoServiceProvider providerRSA and
        // create the signature.
        providerRSA.FromXmlString(xmlPrivateKey.InnerXml);
        RSAPKCS1SignatureFormatter rsaFormatter =
            new RSAPKCS1SignatureFormatter(providerRSA);
```

```
rsaFormatter.SetHashAlgorithm("SHA1");
byte[] signedPolicyHash = rsaFormatter.CreateSignature(bufferPolicy);

// Convert the signed policy to URL-safe base64 encoding and
// replace unsafe characters + / with the safe characters - _ ~
string strSignedPolicy = ToUrlSafeBase64String(signedPolicyHash);

// Concatenate the URL, the timestamp, the signature,
// and the key pair ID to form the signed URL.
return urlString +
    "?Expires=" +
    strExpiration +
    "&Signature=" +
    strSignedPolicy +
    "&Key-Pair-Id=" +
    privateKeyId;
}
```

The following C# code creates a signed URL that uses a custom policy by performing the following steps:

- Creates a policy statement.
- Base64-encodes the policy statement and replaces special characters to make the string safe to use as a URL request parameter.
- Hashes the policy statement using SHA1, and encrypts the result using RSA and the private key for your AWS account or for a trusted AWS account that you specify.
- Base64-encodes the hashed policy statement and replacing special characters to make the string safe to use as a URL request parameter.
- Concatenates the applicable values.

For the complete implementation, see the example at [Signature Code in C#](#).

Example Custom Policy Signing Method in C#

```
public static string ToUrlSafeBase64String(byte[] bytes)
{
    return System.Convert.ToBase64String(bytes)
        .Replace('+', '-')
        .Replace('=', '_')
        .Replace('/', '~');
}

public static string CreateCustomPrivateURL(string urlString,
    string durationUnits, string durationNumber, string startIntervalFromNow,
    string ipAddress, string pathToPolicyStmnt, string pathToPrivateKey,
    string PrivateKeyId)
{
    // args[] 0-thisMethod, 1-resourceUrl, 2-seconds-minutes-hours-days
    // to expiration, 3-numberOfPreviousUnits, 4-starttimeFromNow,
    // 5-ip_address, 6-pathToPolicyStmt, 7-pathToPrivateKey, 8-privateKeyId

    TimeSpan timeSpanInterval = GetDuration(durationUnits, durationNumber);
    TimeSpan timeSpanToStart = GetDurationByUnits(durationUnits,
        startIntervalFromNow);
    if (null == timeSpanToStart)
        return "Invalid duration units." +
            "Valid options: seconds, minutes, hours, or days";

    string strPolicy = CreatePolicyStatement(
        pathToPolicyStmnt, urlString, DateTime.Now.Add(timeSpanToStart),
        DateTime.Now.Add(timeSpanInterval), ipAddress);

    // Read the policy into a byte buffer.
    byte[] bufferPolicy = Encoding.ASCII.GetBytes(strPolicy);

    // Convert the policy statement to URL-safe base64 encoding and
    // replace unsafe characters + = / with the safe characters - _ ~

    string urlSafePolicy = ToUrlSafeBase64String(bufferPolicy);

    // Initialize the SHA1CryptoServiceProvider object and hash the policy data.

    byte[] bufferPolicyHash;
    using (SHA1CryptoServiceProvider cryptoSHA1 =
        new SHA1CryptoServiceProvider())
    {
        bufferPolicyHash = cryptoSHA1.ComputeHash(bufferPolicy);

        // Initialize the RSACryptoServiceProvider object.
        RSACryptoServiceProvider providerRSA = new RSACryptoServiceProvider();

        XmlDocument xmlPrivateKey = new XmlDocument();

        // Load PrivateKey.xml, which you created by converting your
        // .pem file to the XML format that the .NET framework uses.
        // Several tools are available.
        xmlPrivateKey.Load("PrivateKey.xml");
    }
}
```

```
// Format the RSACryptoServiceProvider providerRSA
// and create the signature.
providerRSA.FromXmlString(xmlPrivateKey.InnerXml);
RSAPKCS1SignatureFormatter RSAFormatter =
    new RSAPKCS1SignatureFormatter(providerRSA);
RSAFormatter.SetHashAlgorithm("SHA1");
byte[] signedHash = RSAFormatter.CreateSignature(bufferPolicyHash);

// Convert the signed policy to URL-safe base64 encoding and
// replace unsafe characters + = / with the safe characters - _ ~
string strSignedPolicy = ToUrlSafeBase64String(signedHash);

return urlString +
    "?Policy=" +
    urlSafePolicy +
    "&Signature=" +
    strSignedPolicy +
    "&Key-Pair-Id=" +
    PrivateKeyId;
}
}
```

Example Utility Methods for Signature Generation

The following methods get the policy statement from a file and parse time intervals for signature generation.

```
public static string CreatePolicyStatement(string policyStmnt,
    string resourceUrl,
    DateTime startTime,
    DateTime endTime,
    string ipAddress)

{
    // Create the policy statement.
    FileStream streamPolicy = new FileStream(policyStmnt, FileMode.Open,
    FileAccess.Read);
    using (StreamReader reader = new StreamReader(streamPolicy))
    {
        string strPolicy = reader.ReadToEnd();

        TimeSpan startTimeSpanFromNow = (startTime - DateTime.Now);
        TimeSpan endTimeSpanFromNow = (endTime - DateTime.Now);
        TimeSpan intervalStart =
            (DateTime.UtcNow.Add(startTimeSpanFromNow)) -
            new DateTime(1970, 1, 1, 0, 0, 0, DateTimeKind.Utc);
        TimeSpan intervalEnd =
            (DateTime.UtcNow.Add(endTimeSpanFromNow)) -
            new DateTime(1970, 1, 1, 0, 0, 0, DateTimeKind.Utc);

        int startTimestamp = (int)intervalStart.TotalSeconds; // START_TIME
        int endTimestamp = (int)intervalEnd.TotalSeconds; // END_TIME

        if (startTimestamp > endTimestamp)
            return "Error!";

        // Replace variables in the policy statement.
        strPolicy = strPolicy.Replace("RESOURCE", resourceUrl);
        strPolicy = strPolicy.Replace("START_TIME", startTimestamp.ToString());
        strPolicy = strPolicy.Replace("END_TIME", endTimestamp.ToString());
        strPolicy = strPolicy.Replace("IP_ADDRESS", ipAddress);
        strPolicy = strPolicy.Replace("EXPIRES", endTimestamp.ToString());
        return strPolicy;
    }
}

public static TimeSpan GetDuration(string units, string numUnits)
{
    TimeSpan timeSpanInterval = new TimeSpan();
    switch (units)
    {
        case "seconds":
            timeSpanInterval = new TimeSpan(0, 0, 0, int.Parse(numUnits));
            break;
        case "minutes":
            timeSpanInterval = new TimeSpan(0, 0, int.Parse(numUnits), 0);
            break;
        case "hours":
            timeSpanInterval = new TimeSpan(0, int.Parse(numUnits), 0, 0);
            break;
        case "days":
            timeSpanInterval = new TimeSpan(int.Parse(numUnits), 0, 0, 0);
            break;
    }
}
```

```
        timeSpanInterval = new TimeSpan(int.Parse(numUnits),0 ,0 ,0);
        break;
    default:
        Console.WriteLine("Invalid time units;" +
            "use seconds, minutes, hours, or days");
        break;
    }
    return timeSpanInterval;
}

private static TimeSpan GetDurationByUnits(string durationUnits,
    string startIntervalFromNow)
{
    switch (durationUnits)
    {
        case "seconds":
            return new TimeSpan(0, 0, int.Parse(startIntervalFromNow));
        case "minutes":
            return new TimeSpan(0, int.Parse(startIntervalFromNow), 0);
        case "hours":
            return new TimeSpan(int.Parse(startIntervalFromNow), 0, 0);
        case "days":
            return new TimeSpan(int.Parse(startIntervalFromNow), 0, 0, 0);
        default:
            return new TimeSpan(0, 0, 0, 0);
    }
}

public static string CopyExpirationTimeFromPolicy(string policyStatement)
{
    int startExpiration = policyStatement.IndexOf("EpochTime");
    string strExpirationRough = policyStatement.Substring(startExpiration +
        "EpochTime".Length);
    char[] digits = { '0', '1', '2', '3', '4', '5', '6', '7', '8', '9' };

    List<char> listDigits = new List<char>(digits);
    StringBuilder buildExpiration = new StringBuilder(20);

    foreach (char c in strExpirationRough)
    {
        if (listDigits.Contains(c))
            buildExpiration.Append(c);
    }
    return buildExpiration.ToString();
}
```

See also

- [Create a URL Signature Using Perl \(p. 214\)](#)
- [Create a URL Signature Using PHP \(p. 216\)](#)
- [Create a URL Signature Using Java \(p. 226\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Create a URL Signature Using Java

The [Open source Java toolkit for Amazon S3 and CloudFront](#) provides example code and information about CloudFront development in Java. For information about private distributions, go to Private Distributions at [Programmer Guide: Code Samples](#).

You can also create signed URLs by using the `CloudFrontUrlSigner` class in the AWS SDK for Java. For more information, see [Class UrlSigner](#) in the *AWS SDK for Java API Reference*.

Note

Creating a URL signature is just one part of the process of serving private content using a signed URL. For more information about the entire process, see [Using Signed URLs \(p. 179\)](#).

The following methods are from the Java open source toolkit for Amazon S3 and CloudFront. You must convert the private key from PEM to DER format for Java implementations to use it.

Example Java Policy and Signature Encryption Methods

```
// Signed URLs for a private distribution
// Note that Java only supports SSL certificates in DER format,
// so you will need to convert your PEM-formatted file to DER format.
// To do this, you can use openssl:
// openssl pkcs8 -topk8 -nocrypt -in origin.pem -inform PEM -out new.der
//   -outform DER
// So the encoder works correctly, you should also add the bouncy castle jar
// to your project and then add the provider.

Security.addProvider(new org.bouncycastle.jce.provider.BouncyCastleProvider());

String distributionDomain = "alb2c3d4e5f6g7.cloudfront.net";
String privateKeyFilePath = "/path/to/rsa-private-key.der";
String s3ObjectKey = "s3/object/key.txt";
String policyResourcePath = "http://" + distributionDomain + "/" + s3ObjectKey;

// Convert your DER file into a byte array.

byte[] derPrivateKey = ServiceUtils.readInputStreamToBytes(new
    FileInputStream(privateKeyFilePath));

// Generate a "canned" signed URL to allow access to a
// specific distribution and object

String signedUrlCanned = CloudFrontService.signUrlCanned(
    "http://" + distributionDomain + "/" + s3ObjectKey, // Resource URL or Path

    keyPairId,      // Certificate identifier,
                    // an active trusted signer for the distribution
    derPrivateKey, // DER Private key data
    ServiceUtils.parseIso8601Date("2011-11-14T22:20:00.000Z") // DateLessThan
);
System.out.println(signedUrlCanned);

// Build a policy document to define custom restrictions for a signed URL.

String policy = CloudFrontService.buildPolicyForSignedUrl(
    // Resource path (optional, can include '*' and '?' wildcards)
    policyResourcePath,
    // DateLessThan
    ServiceUtils.parseIso8601Date("2011-11-14T22:20:00.000Z"),
    // CIDR IP address restriction (optional, 0.0.0.0/0 means everyone)
    "0.0.0.0/0",
    // DateGreater Than (optional)
    ServiceUtils.parseIso8601Date("2011-10-16T06:31:56.000Z")
);

// Generate a signed URL using a custom policy document.

String signedUrl = CloudFrontService.signUrl(
    // Resource URL or Path
    "http://" + distributionDomain + "/" + s3ObjectKey,
    // Certificate identifier, an active trusted signer for the distribution
    keyPairId,
    // DER Private key data
    derPrivateKey,
```

```
// Access control policy  
policy  
);  
System.out.println(signedUrl);
```

See also

- [Create a URL Signature Using Perl \(p. 214\)](#)
- [Create a URL Signature Using PHP \(p. 216\)](#)
- [Create a URL Signature Using C# and the .NET Framework \(p. 218\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)

Using an HTTPS Connection to Access Your Objects

Topics

- [How CloudFront Works with HTTPS Connections \(p. 230\)](#)
- [How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin \(p. 230\)](#)
- [Supported Protocols and Ciphers \(p. 233\)](#)
- [Using Alternate Domain Names and HTTPS \(p. 234\)](#)
- [Charges for HTTPS Connections \(p. 242\)](#)

For web distributions, you can use HTTPS requests to ensure that your objects are encrypted when CloudFront serves them to viewers and, optionally, when CloudFront gets the objects from your origin:

- **To require HTTPS between CloudFront and viewers:** Configure the **Viewer Protocol Policy** for some or all of your CloudFront cache behaviors either to redirect HTTP requests to HTTPS requests or to require that viewers use only the HTTPS protocol to access your objects in the CloudFront cache. You can also configure one or more cache behaviors in the same distribution to allow both HTTP and HTTPS, so you can require HTTPS for some objects but not for others.
- **To require HTTPS between CloudFront and your origin (optional):** Configure the **Origin Protocol Policy** for one or more CloudFront origins either to require that CloudFront fetches objects from your origin by using HTTPS or to require that CloudFront uses the protocol that the viewer used to request the objects. For example, if you choose **Match Viewer** for the **Origin Protocol Policy** and the viewer uses HTTPS to request an object from CloudFront, CloudFront also uses HTTPS to forward the request to your origin. When your origin is an Amazon S3 bucket, **Match Viewer** is the default setting and cannot be changed.

Important

If your Amazon S3 bucket is configured as a website endpoint, you cannot configure CloudFront to use HTTPS to communicate with your origin because Amazon S3 doesn't support HTTPS connections in that configuration.

For information about the SSL/TLS versions and the ciphers that CloudFront can use to forward requests to custom origins, see [Encryption \(p. 148\)](#) in the topic [How CloudFront Processes and Forwards Requests to Your Custom Origin Server \(p. 146\)](#).

If you're using an HTTP server as your origin, and if you want to use HTTPS both between viewers and CloudFront and between CloudFront and your origin, you must install an SSL/TLS certificate on the HTTP

server that is signed by a trusted certificate authority, for example, Comodo, DigiCert, or Symantec. If your origin is an Elastic Load Balancing load balancer, you can use an SSL/TLS certificate from the Amazon Trust Services certificate authority (via AWS Certificate Manager).

Caution

If the origin server returns an expired certificate, an invalid certificate or a self-signed certificate, or if the origin server returns the certificate chain in the wrong order, CloudFront drops the TCP connection, returns HTTP error code 502, and sets the `X-Cache` header to `Error from cloudfront`.

How CloudFront Works with HTTPS Connections

The following example of how CloudFront works with HTTPS connections assumes the following:

- Your CloudFront distribution has one cache behavior (the default cache behavior) and one origin.
- You have configured your distribution to use HTTPS between viewers and CloudFront and between CloudFront and your origin.
- Your origin has an SSL/TLS certificate that was signed by a trusted certificate authority.

The process works basically the same way whether your origin server is an Amazon S3 bucket or an HTTP server.

CloudFront Process for Serving Objects Using HTTPS

1. A viewer submits an HTTPS request to CloudFront. There's some SSL negotiation here between the viewer and CloudFront. In the end, the viewer submits the request in an encrypted format.
2. If the object is in the CloudFront edge cache, CloudFront encrypts the object and returns it to the viewer, and the viewer decrypts it.
3. If the object is not in the CloudFront cache, CloudFront performs the SSL negotiation with your origin and, when the negotiation is complete, forwards the request to your origin in an encrypted format.
4. Your origin decrypts the request, encrypts the requested object, and returns the object to CloudFront.
5. CloudFront decrypts the object, re-encrypts it, and forwards the object to the viewer. CloudFront also saves the object in the edge cache so the object is available next time it's requested.
6. The viewer decrypts the object.

How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin

You can configure CloudFront to require HTTPS for communication between viewers and CloudFront and, optionally, between CloudFront and your origin.

Note

To ensure that objects are encrypted from the origin to CloudFront edge caches and from edge caches to viewers, use only HTTPS. If you ever configure CloudFront to get objects from your origin using HTTP, CloudFront adds the objects to the edge cache and continues to serve them to viewers until the objects expire, or until you remove or replace them. For more information about removing or replacing objects in a distribution, see [Adding, Removing, or Replacing Objects in a Distribution \(p. 114\)](#).

For a list of supported ciphers, see [Encryption \(p. 148\)](#).

If you want to use alternate domain names (for example, `example.com`) instead of the domain name that CloudFront assigns to your distribution, also see [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

The procedure that you use to require HTTPS for communication between viewers, CloudFront, and your origin depends on whether you're using a custom origin or Amazon S3. See the applicable procedure:

- [To require HTTPS for communication between viewers, CloudFront, and your custom origin \(p. 231\)](#)
- [To require HTTPS for communication between viewers, CloudFront, and your Amazon S3 origin \(p. 232\)](#)

To require HTTPS for communication between viewers, CloudFront, and your custom origin

1. Get an SSL/TLS certificate from a trusted certificate authority such as Comodo, DigiCert, or Symantec, and install it on your origin web server. If your origin is an Elastic Load Balancing load balancer, you can also use AWS Certificate Manager to provision a certificate.

For CloudFront to use HTTPS when communicating with your origin, one of the domain names in the certificate must match one or both of the following values:

- The value that you specified for **Origin Domain Name** for the applicable origin in your distribution.
- If you configured CloudFront to forward the `Host` header to your origin, the value of the `Host` header. For more information about forwarding headers to your origin, see [Configuring CloudFront to Cache Objects Based on Request Headers \(p. 108\)](#).

The SSL/TLS certificate on your origin includes a domain name in the `Common Name` field and possibly several more in the `Subject Alternative Names` field. (CloudFront supports wildcard characters in certificate domain names.) If your certificate doesn't contain any domain names that match either **Origin Domain Name** or the domain name in the `Host` header, CloudFront returns an HTTP status code 502 (Bad Gateway) to the viewer.

Important

When CloudFront uses HTTPS to communicate with your origin, CloudFront verifies that the certificate was issued by a trusted certificate authority. CloudFront supports the same certificate authorities as Mozilla; for the current list, see [Mozilla Included CA Certificate List](#).

You cannot use a self-signed certificate.

For more information about getting and installing an SSL/TLS certificate, refer to the documentation for your HTTP server software and to the documentation for the certificate authority. For information about AWS Certificate Manager, see the [AWS Certificate Manager User Guide](#).

2. To require HTTPS for communication between viewers and CloudFront, configure your distribution either to redirect viewer HTTP requests to HTTPS or to require that viewers use HTTPS when communicating with CloudFront. To do this in the CloudFront console, create or update one or more cache behaviors in your distribution to have one of the following settings for **Viewer Protocol Policy**:
 - **Redirect to HTTPS:** If a viewer sends an HTTP request instead of an HTTPS request, CloudFront returns an HTTP status code of 301 (Moved Permanently) along with the new HTTPS URL. The viewer then resubmits the request to CloudFront using the HTTPS URL.

Important

CloudFront doesn't redirect `DELETE`, `OPTIONS`, `PATCH`, `POST`, or `PUT` requests from HTTP to HTTPS. If you configure a cache behavior to redirect to HTTPS, CloudFront responds to HTTP `DELETE`, `OPTIONS`, `PATCH`, `POST`, or `PUT` requests for that cache behavior with an HTTP status code 403 (Forbidden).

When a viewer makes an HTTP request that is redirected to an HTTPS request, CloudFront charges for both requests. For the HTTP request, the charge is only for the request and for the headers that CloudFront returns to the viewer. For the HTTPS request, the charge is for the request, and for the headers and the object returned by your origin.

- **HTTPS Only:** If a viewer sends an HTTP request instead of an HTTPS request, CloudFront returns an HTTP status code of 403 (Forbidden) and does not return the object.

For information about using the CloudFront console to update a web distribution, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

For information about using the CloudFront API to update a web distribution, see [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*. If you're using the API, see the `ViewerProtocolPolicy` element.

3. Choose the protocols that you want CloudFront to use when communicating with your origin:
 - **CloudFront Console:** For `Origin SSL Protocols`, choose the applicable protocols.
 - **CloudFront API:** For `SslProtocol`, specify `SSLv3`, `TLSv1`, `TLSv1.1`, and/or `TLSv1.2`.
4. To configure CloudFront to use HTTPS when communicating with your origin, create or update one or more origins in your distribution to have the following settings:
 - **CloudFront Console:** For `Origin Protocol Policy`, specify **HTTPS Only** or **Match Viewer**.
 - **CloudFront API:** For `OriginProtocolPolicy`, specify `https-only` or `match-viewer`.
5. Confirm the following:
 - The path pattern in each cache behavior applies only to the requests for which you want viewers to use HTTPS.
 - The cache behaviors are listed in the desired order. For more information, see [Path Pattern \(p. 69\)](#).
 - The cache behaviors are routing requests to the origins for which you have configured an **Origin Protocol Policy of HTTPS Only or Match Viewer**, if applicable.
 - If you're using a custom origin and you configured CloudFront to use HTTPS when communicating with the origin, the origin must have a valid certificate signed by a trusted certificate authority.
6. Test the configuration before you use it in a production environment.

To require HTTPS for communication between viewers, CloudFront, and your Amazon S3 origin

1. To require HTTPS for communication between viewers and CloudFront, configure your distribution either to redirect viewer HTTP requests to HTTPS or to require that viewers use HTTPS when communicating with CloudFront. To do this in the CloudFront console, create or update one or more cache behaviors in your distribution to have one of the following settings for **Viewer Protocol Policy**:
 - **Redirect to HTTPS:** If a viewer sends an HTTP request instead of an HTTPS request, CloudFront returns an HTTP status code of 301 (Moved Permanently) along with the new HTTPS URL. The viewer then resubmits the request to CloudFront using the HTTPS URL.

Note

When a viewer makes an HTTP request that is redirected to an HTTPS request, CloudFront charges for both requests. For the HTTP request, the charge is only for the request and for the headers that CloudFront returns to the viewer. For the HTTPS request, the charge is for the request, and for the headers and the object returned by Amazon S3.

- **HTTPS Only:** If a viewer makes an HTTP request instead of an HTTPS request, CloudFront returns an HTTP status code of 403 (Forbidden) and does not return the object.

Note

The setting that controls the protocol that CloudFront uses to communicate with the origin, **Origin Protocol Policy**, has a default setting of **Match Viewer** for Amazon S3 buckets.

This value can't be changed. When you configure CloudFront to require HTTPS between the viewer and CloudFront, CloudFront automatically uses HTTPS to communicate with Amazon S3.

CloudFront doesn't redirect DELETE, OPTIONS, PATCH, POST, or PUT requests from HTTP to HTTPS. If you configure a cache behavior to redirect to HTTPS, CloudFront responds to DELETE, OPTIONS, PATCH, POST, or PUT requests for that cache behavior with an HTTP status code 403 (Forbidden).

For information about using the CloudFront console to update a web distribution, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

For information about using the CloudFront API to update a web distribution, see [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*. If you're using the API, see the `ViewerProtocolPolicy` element.

2. Confirm the following:
 - The path pattern in each cache behavior applies only to the requests for which you want viewers to use HTTPS.
 - The cache behaviors are listed in the desired order. For more information, see [Path Pattern \(p. 69\)](#).
 - The cache behaviors are routing requests to the correct Amazon S3 buckets.
3. Test the configuration before you use it in a production environment.

Supported Protocols and Ciphers

You can require viewers to use HTTPS to send requests to CloudFront and require CloudFront to forward requests to your custom origin by using the protocol that is used by the viewer. For more information, see the following distribution settings:

- [Viewer Protocol Policy \(p. 70\)](#)
- [Origin Protocol Policy \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#)

You can also choose whether you want viewers to submit HTTPS requests to CloudFront by using TLSv1.0 or later, or you want to allow viewers to use the less secure SSLv3 protocol. For more information, see the distribution setting [Minimum SSL Protocol Version \(p. 77\)](#).

Important

CloudFront supports only viewer requests using SSLv3 and TLSv1.0, 1.1, and 1.2.

In addition, you can choose the protocols that you want CloudFront to use when establishing an HTTPS connection with your origin. For more information, see the distribution setting [Origin SSL Protocols \(Amazon EC2 and Other Custom Origins Only\) \(p. 67\)](#).

Viewers can use the following ciphers to encrypt communication with CloudFront. With the exception of RC4-MD5, all ciphers are supported whether you selected SSLv3 or TLSv1.0 as the value for [Minimum SSL Protocol Version \(p. 77\)](#). CloudFront chooses a cipher in the following order from among the ciphers that the viewer supports:

- ECDHE-RSA-AES128-GCM-SHA256
- ECDHE-RSA-AES128-SHA256
- ECDHE-RSA-AES128-SHA
- ECDHE-RSA-AES256-GCM-SHA384
- ECDHE-RSA-AES256-SHA384
- ECDHE-RSA-AES256-SHA
- AES128-GCM-SHA256
- AES256-GCM-SHA384
- AES128-SHA256
- AES256-SHA
- AES128-SHA
- DES-CBC3-SHA
- RC4-MD5 (supported only when the value of [Minimum SSL Protocol Version \(p. 77\)](#) is **SSLv3**)

A viewer must support at least one of these ciphers to establish an SSL connection with CloudFront. If you're using an SSL/TLS certificate that you got from AWS Certificate Manager, a viewer must support one of the *-RSA-* ciphers.

Using Alternate Domain Names and HTTPS

Topics

- [Choosing How CloudFront Serves HTTPS Requests \(p. 234\)](#)
- [Requirements and Limits on Using SSL/TLS Certificates with CloudFront \(p. 236\)](#)
- [To use alternate domain names with HTTPS \(p. 238\)](#)
- [Determining the Size of the Public Key in an SSL/TLS Certificate \(p. 239\)](#)
- [Rotating SSL/TLS Certificates \(p. 240\)](#)
- [Reverting from a Custom SSL/TLS Certificate to the Default CloudFront Certificate \(p. 241\)](#)
- [Switching from a Custom SSL/TLS Certificate with Dedicated IP Addresses to SNI \(p. 241\)](#)

By default, you can deliver your content to viewers over HTTPS by using your CloudFront distribution domain name in your URLs, for example, `https://d111111abcdef8.cloudfront.net/image.jpg`. For more information, see [How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin \(p. 230\)](#).

If you want your viewers to use HTTPS and you want to use your own domain name in the URLs for your objects (for example, `https://www.example.com/image.jpg`), you need to perform several additional steps, as explained in this topic.

Important

When you add a certificate to your distribution, CloudFront immediately propagates the certificate to all of its edge locations. As new edge locations become available, CloudFront will propagate the certificate to those locations, too. You cannot restrict the edge locations to which CloudFront propagates the certificates.

Choosing How CloudFront Serves HTTPS Requests

If you want your users to use HTTPS and to use alternate domain names for your objects, you need to choose how CloudFront serves HTTPS requests. When you configure CloudFront to use alternate domain

names, CloudFront can serve HTTPS requests either by using a dedicated IP address in each edge location or by using Server Name Indication (SNI).

Serving HTTPS Requests Using Dedicated IP Addresses (Works for All Clients)

If you configure CloudFront to serve HTTPS requests using dedicated IP addresses, CloudFront associates your alternate domain name with a dedicated IP address in each CloudFront edge location. When a viewer submits an HTTPS request for your content, DNS routes the request to the IP address for your distribution in the applicable edge location. CloudFront uses the IP address to identify your distribution and to determine which SSL/TLS certificate to return to the viewer. The viewer and CloudFront perform SSL negotiation using your SSL/TLS certificate, and CloudFront returns the requested content to the viewer. This method works for every HTTPS request, regardless of the browser or other viewer that the user is using.

Important

If you configure CloudFront to serve HTTPS requests using dedicated IP addresses, you incur an additional monthly charge. The charge begins when you associate your SSL/TLS certificate with a distribution and you enable the distribution. For more information about CloudFront pricing, see [Amazon CloudFront Pricing](#).

Serving HTTPS Requests Using SNI (Works for Most Clients)

If you configure CloudFront to serve HTTPS requests using Server Name Indication (SNI), CloudFront associates your alternate domain name with an IP address for each edge location, but the IP address is not dedicated to your distribution. When a viewer submits an HTTPS request for your content, DNS routes the request to the IP address for the applicable edge location. However, because the IP address isn't dedicated to your distribution, CloudFront can't determine, based on the IP address, which domain the request is for.

SSL negotiation occurs very early in the process of establishing an HTTPS connection. If CloudFront can't immediately determine which domain the request is for, it drops the connection. Using a dedicated IP address is one way to associate a request with a domain. The other is SNI, which is an extension to the TLS protocol that is supported by most modern browsers. Browsers that support SNI automatically get the domain name from the request URL and add it to a new field in the request header. When CloudFront receives an HTTPS request from a browser that supports SNI, it finds the domain name in the request header and responds to the request with the applicable SSL/TLS certificate. The viewer and CloudFront perform SSL negotiation, and CloudFront returns the requested content to the viewer.

For a current list of the browsers that support SNI, see the Wikipedia entry [Server Name Indication](#).

If you want to use SNI but some of your users' browsers don't support SNI, you have several options:

- Configure CloudFront to serve HTTPS requests by using dedicated IP addresses instead of SNI.
- Use the CloudFront SSL/TLS certificate instead of a custom certificate. This requires that you use the CloudFront domain name for your distribution in the URLs for your objects, for example, `https://d111111abcdef8.cloudfront.net/logo.png`.

You also need to change the SSL/TLS certificate that CloudFront is using from a custom certificate to the default CloudFront certificate:

- If you haven't used your distribution to distribute your content, you can just change the configuration. For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).
- If you have used your distribution to distribute your content, you need to create a new CloudFront distribution and change the URLs for your objects to reduce or eliminate the amount of time that your content is unavailable. For more information, see [Reverting from a Custom SSL/TLS Certificate to the Default CloudFront Certificate \(p. 241\)](#).

- If you can control which browser your users use, have them upgrade their browser to one that supports SNI.
- Use HTTP instead of HTTPS.

Requirements and Limits on Using SSL/TLS Certificates with CloudFront

Note the following requirements for certificates:

Certificate Issuer

The certificate must be issued by a trusted certificate authority (CA) such as Comodo, DigiCert, or Symantec. If your origin is an Elastic Load Balancing load balancer, you can also use a certificate provisioned by Amazon (via AWS Certificate Manager). Self-signed certificates are not accepted.

Certificate Format

The certificate must be in X.509 PEM format. This is the default format if you're using AWS Certificate Manager.

Intermediate Certificates

If you're using a CA other than Amazon (via AWS Certificate Manager), in the .pem file, list all of the intermediate certificates in the certificate chain, beginning with one for the CA that signed the certificate for your domain. Typically, you'll find a file on your CA's website that lists intermediate and root certificates in the proper chained order.

Important

Do not include the root certificate, intermediate certificates that are not in the trust path, or your CA's public key certificate.

Here's an example:

```
-----BEGIN CERTIFICATE-----
Intermediate certificate 2
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
Intermediate certificate 1
-----END CERTIFICATE-----
```

Private Key

If you're using a CA other than Amazon (via AWS Certificate Manager), the private key must match the public key that is in the certificate. It must also be an RSA private key in PEM format, where the PEM header is BEGIN RSA PRIVATE KEY and the footer is END RSA PRIVATE KEY. The private key cannot be encrypted with a password.

If you're using Amazon as the CA, AWS Certificate Manager doesn't release the private key. The private key is stored in AWS Certificate Manager for use by AWS services that are integrated with AWS Certificate Manager.

Permissions

You must have permission to use and upload the SSL/TLS certificate, including permission from the certificate authority that issued the certificate to upload it onto a content delivery network.

If you're using AWS Certificate Manager, we recommend that you use IAM permissions to restrict access to the certificates. For more information, see [Permissions and Policies](#) in the *AWS Certificate Manager User Guide*.

Maximum Size of the Public Key

The maximum size of the public key in an SSL/TLS certificate is 2048 bits. For information about the public keys for AWS Certificate Manager certificates, see [ACM Certificate Characteristics](#) in the AWS

Certificate Manager User Guide. For information about how to determine the size of the public key, see [Determining the Size of the Public Key in an SSL/TLS Certificate \(p. 239\)](#).

Supported Types of Certificates

CloudFront supports all types of certificates including domain-validated certificates, extended validation (EV) certificates, high-assurance certificates, wildcard certificates (*.example.com), subject alternative name (SAN) certificates (example.com and example.net), and so on.

Certificate Expiration Date and Renewal

If you're using a CA other than Amazon (via AWS Certificate Manager), you are responsible for monitoring certificate expiration dates and for renewing SSL/TLS certificates that you upload and use with CloudFront. AWS Certificate Manager renews certificates automatically. For more information, see [Managed Renewal](#) in the *AWS Certificate Manager User Guide*.

Domain Names in the CloudFront Distribution and in the Certificate

When you're using a custom origin, the SSL/TLS certificate on your origin includes a domain name in the Common Name field and possibly several more in the Subject Alternative Names field. (CloudFront supports wildcard characters in certificate domain names.) One of the domain names in the certificate must match the domain name that you specify for Origin Domain Name. If the domain names don't match, CloudFront returns an HTTP status code 502 (Bad Gateway) to the viewer.

In addition, note the following limits on using SSL/TLS certificates with CloudFront:

Maximum Number of Certificates per CloudFront Distribution

You can associate a maximum of one SSL/TLS certificate with each CloudFront distribution.

Maximum Number of Certificates in the IAM Certificate Store

If you obtained your SSL/TLS certificates from a CA other than Amazon (via AWS Certificate Manager), you need to upload them to the IAM certificate store as explained later in this topic. You can upload a maximum of 10 certificates to the IAM certificate store for each AWS account. To request a higher limit, see [Request IAM limit increase](#).

Maximum Number of Certificates per AWS Account

If you want to serve HTTPS requests using dedicated IP addresses, note the following:

- By default, AWS gives you permission to use two certificates with your AWS account, one for everyday use and one for when you need to rotate certificates for multiple distributions.
- If you're already using this feature but you need to increase the number of custom SSL/TLS certificates that you can use with your AWS account, go to the [Support Center](#) and create a case. Indicate how many certificates you need permission to use, and describe the circumstances in your request. We'll update your account as soon as possible.

Using the Same Certificate for CloudFront Distributions that Were Created by Using Different AWS Accounts

If you're using a CA other than Amazon (via AWS Certificate Manager) and if you want to use the same certificate with multiple CloudFront distributions that were created by using different AWS accounts, you must upload the certificate to the IAM certificate store once for each AWS account.

If you're using Amazon (via AWS Certificate Manager) as your CA, you can't configure CloudFront to use certificates that were created by a different AWS account.

Using the Same Certificate for CloudFront and for Other AWS Services

If you're using a CA other than AWS Certificate Manager and if you want to use the same certificate both for CloudFront and for other AWS services, you must upload the certificate twice: once for CloudFront and once for the other services. For information about how to upload the certificate for CloudFront, see the following procedure.

If you're using Amazon (via AWS Certificate Manager) as your CA, the certificates are stored in AWS Certificate Manager.

Using the Same Certificate for Multiple CloudFront Distributions

Whether you're using AWS Certificate Manager or another CA, you can use the same certificate for any or all of the CloudFront distributions that you're using to serve HTTPS requests. You can use

the same certificate both for serving requests using dedicated IP addresses and for serving requests using SNI. (You can associate only one certificate with each distribution.)

Each distribution must include one or more alternate domain names that also appear in the Common Name field or the Subject Alternative Names field in the certificate. If you're serving HTTPS requests using dedicated IP addresses and you created all of your distributions by using the same AWS account, this can significantly reduce your cost because you're charged for each certificate, not for each distribution. For example, suppose you create three distributions by using the same AWS account, and you use the same certificate for all three distributions. You would be charged only one fee for using dedicated IP addresses.

However, if you're serving HTTPS requests using dedicated IP addresses and using the same certificate to create CloudFront distributions in different AWS accounts, each account will be charged the fee for using dedicated IP addresses. For example, if you create three distributions by using three different AWS accounts and you use the same certificate for all three distributions, each account will be charged the full fee for using dedicated IP addresses.

To use alternate domain names with HTTPS

1. Get an SSL/TLS certificate if you don't already have one. For more information, see the applicable documentation:
 - To have AWS Certificate Manager provision a certificate, see the [AWS Certificate Manager User Guide](#). Then skip to step 4.

Note

You can only use AWS Certificate Manager to provision a certificate if the origin for your CloudFront distribution is an Elastic Load Balancing load balancer.

- To get a certificate from another certificate authority, see the following topics in the [Creating, Uploading, and Deleting Server Certificates](#) topic in [IAM User Guide](#):
 - [Prerequisites](#)
 - [Create a Private Key](#)
 - [Create a Certificate Signing Request](#)
 - [Submit the CSR to a Certificate Authority](#)

Then continue with step 2.

2. *Certificates that you get from a certificate authority other than Amazon (via AWS Certificate Manager)*
 - If you want to serve HTTPS requests using Server Name Indication (SNI), skip to step 3.

If you want to serve HTTPS requests by using dedicated IP addresses, and if you need to permanently associate two or more certificates with your distributions, request an increase in the number of certificates that you can use:

- a. Go to the [Support Center](#) and create a case.
 - b. Indicate how many certificates you need permission to use, and describe the circumstances in your request. We'll update your account as soon as possible.
3. *Certificates that you get from a certificate authority other than Amazon (via AWS Certificate Manager)*
 - Use the following AWS CLI command to upload your SSL/TLS certificate to the IAM certificate store:

```
aws iam upload-server-certificate --server-certificate-name CertificateName
--certificate-body file://public_key_certificate_file --private-key
file://privatekey.pem --certificate-chain file://certificate_chain_file -
-path /cloudfront/path/
```

Note the following:

- **AWS Account** – You must upload the certificate to the IAM certificate store using the same AWS account that you used to create your CloudFront distribution.
- **--path Parameter** – When you upload the certificate to IAM, the value of the `-path` parameter (certificate path) must start with `/cloudfront/`, for example, `/cloudfront/production/` or `/cloudfront/test/`. The path also must end with a `/`.
- **Using the CloudFront Console** – If you plan to use the CloudFront console to create or update your distribution, the value that you specify for the `--server-certificate-name` parameter in the AWS CLI, for example, `myServerCertificate`, is the value that will appear in the **SSL Certificate** list in the CloudFront console.
- **Using the CloudFront API** – If you plan to use the CloudFront API to create or update your distribution, make note of the alphanumeric string that the AWS CLI returns, for example, `AS1A2M3P4L5E67SIIXR3J`. This is the value that you will specify in the `IAMCertificateId` element. You don't need the IAM ARN, which is also returned by the CLI.

For more information about the AWS CLI, see the [AWS Command Line Interface User Guide](#) and the [AWS Command Line Interface Reference](#).

4. Update your distribution to include your alternate domain names, to specify which SSL/TLS certificate you want to use, and to specify whether you want CloudFront to use dedicated IP addresses or SNI to serve HTTPS requests. You also need to add or update DNS records. For more information and a procedure, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Caution

After you associate your SSL/TLS certificate with your CloudFront distribution, do not delete the certificate from the IAM certificate store until you remove the certificate from all distributions and until the status of the distributions has changed to **Deployed**.

Determining the Size of the Public Key in an SSL/TLS Certificate

When you're using CloudFront alternate domain names and HTTPS, the size of the public key in an SSL/TLS certificate cannot exceed 2048 bits. (This is not the number of characters in the public key.) You can determine the size of the public key by running the following OpenSSL command:

```
openssl x509 -in path and filename of SSL/TLS certificate -text -noout
```

where:

- `-in` specifies the path and filename of your SSL/TLS certificate.
- `-text` causes OpenSSL to display the length of the public key in bits.
- `-noout` prevents OpenSSL from displaying the public key.

Example output:

Public-Key: (2048 bit)

Rotating SSL/TLS Certificates

If you're using AWS Certificate Manager, you don't need to rotate certificates. AWS Certificate Manager automatically renews certificates.

If you're using another certificate authority, occasionally you'll need to replace one SSL/TLS certificate with another, because, for example, the expiration date is approaching. The process depends on whether you have associated your SSL/TLS certificate with one or more CloudFront distributions under the same AWS account:

- **SSL/TLS certificate associated with one distribution:** You can just update your distribution and replace the old certificate with the new one. For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).
- **SSL/TLS certificate associated with two or more distributions under the same AWS account:** By default, you can associate only two SSL/TLS certificates with the CloudFront distributions under one AWS account. Typically, you'll use the second certificate only when you have more than one distribution and you need to rotate certificates. One certificate is associated with distributions that you haven't updated yet, and the other certificate is associated with distributions that you have updated. Perform the following procedure.

Important

While you're rotating certificates, you might incur an additional, pro-rated charge for using the second certificate. We recommend that you update your distributions promptly to minimize the additional charge.

Viewers can continue to access your content while you rotate certificates as well as after the process is complete.

To rotate SSL/TLS certificates for two or more CloudFront distributions

1. If you configured CloudFront to use dedicated IP addresses to serve HTTPS requests and you have already associated the maximum number of SSL/TLS certificates permitted by AWS for your account, request permission to associate an additional certificate. Go to the [Support Center](#) and create a case. Indicate how many certificates you need permission to use, and explain that you're rotating certificates. We'll update your account as soon as possible.
2. Upload the new certificate to the IAM certificate store. For more information, see step 3 of the procedure [To use alternate domain names with HTTPS \(p. 238\)](#).

Note that you must specify different values for the `--server-certificate-name` and `--path` parameters than the values that are associated with existing certificates.

3. Update your distributions one at a time to use the new certificate.

If you submitted a request to AWS in step 1, wait until you receive notification that your AWS account has been updated.

For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

4. (Optional) After you have updated all of your CloudFront distributions, you can delete the old certificate from the IAM certificate store.

Caution

Do not delete an SSL/TLS certificate from the IAM certificate store until you remove it from all distributions and until the status of the distributions that you have updated has changed to **Deployed**.

Reverting from a Custom SSL/TLS Certificate to the Default CloudFront Certificate

If you configured CloudFront to use a custom SSL/TLS certificate and you want to change your configuration to use CloudFront's SSL/TLS certificate, the process depends on whether you've used your distribution to distribute your content:

- If you have not used your distribution to distribute your content, you can just change the configuration. For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).
- If you have used your distribution to distribute your content, you need to create a new CloudFront distribution and change the URLs for your objects to reduce or eliminate the amount of time that your content is unavailable. Perform the following procedure.

To revert to the default CloudFront certificate

1. Create a new CloudFront distribution with the desired configuration. For **SSL Certificate**, choose **Default CloudFront Certificate (*.cloudfront.net)**.
For more information, see [Task List for Creating a Web Distribution \(p. 58\)](#).
2. For objects that you're distributing using CloudFront, update the URLs in your application to use the domain name that CloudFront assigned to the new distribution. For example, change
`https://www.example.com/images/logo.png` to
`https://d111111abcdef8.cloudfront.net/images/logo.png`.
3. Either delete the distribution that is associated with a custom SSL/TLS certificate, or update the distribution to change the value of **SSL Certificate** to **Default CloudFront Certificate (*.cloudfront.net)**. For more information, see [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).

Important

Until you complete this step, Amazon Web Services continues to charge you for using a custom SSL/TLS certificate.

4. (Optional) Use the AWS CLI to delete your custom SSL/TLS certificate from the IAM certificate store. This is the same application that you used to add the custom SSL/TLS certificate to the IAM certificate store:
 - a. Run the AWS CLI command `list-signing-certificates` to get the certificate ID of the certificate that you want to delete. For more information, see [list-signing-certificates](#) in the *AWS Command Line Interface Reference*.
 - b. Run the AWS CLI command `delete-signing-certificate` to delete the certificate. For more information, see [delete-signing-certificate](#) in the *AWS Command Line Interface Reference*.

Switching from a Custom SSL/TLS Certificate with Dedicated IP Addresses to SNI

If you configured CloudFront to use a custom SSL/TLS certificate with dedicated IP addresses, you can switch to using a custom SSL/TLS certificate with SNI instead. The following procedure shows you how.

Important

This update to your CloudFront configuration has no effect on viewers that support SNI; they can access your content before and after the change, as well as while the change is propagating to CloudFront edge locations. Viewers that don't support SNI cannot access your content after

the change. For more information, see [Choosing How CloudFront Serves HTTPS Requests \(p. 234\)](#).

To switch from a custom SSL/TLS certificate with dedicated IP addresses to SNI

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the top pane of the CloudFront console, select the distribution that you want to view or update.
3. Choose **Distribution Settings**.
4. On the **General** tab, choose **Edit**.
5. Change the setting of **Custom SSL Client Support** to **Only Clients that Support Server Name Indication (SNI)**.
6. Choose **Yes, Edit**.

Charges for HTTPS Connections

You always incur a surcharge for HTTPS requests. For more information, see [Amazon CloudFront Pricing](#).

Authentication and Access Control for CloudFront

To perform any operation on CloudFront resources, such as creating a web distribution or an invalidation, [AWS Identity and Access Management \(IAM\)](#) requires you to authenticate that you're an approved AWS user. If you're using the CloudFront console, you authenticate your identity by providing your AWS user name and a password. If you're accessing CloudFront programmatically, your application authenticates your identity for you by using access keys or by signing requests.

After you authenticate your identity, IAM controls your access to AWS by verifying that you have permissions to perform operations and access resources. If you are an account administrator, you can use IAM to control the access of other users to the resources that are associated with your account.

This chapter explains how to use [AWS Identity and Access Management \(IAM\)](#) and CloudFront to help secure your resources.

Topics

- [Authentication \(p. 243\)](#)
- [Access Control \(p. 244\)](#)

Authentication

You can access AWS as any of the following types of identities:

- **AWS account root user** – When you sign up for AWS, you provide an email address and password that is associated with your AWS account. These are your *root credentials* and they provide complete access to all of your AWS resources.

Important

For security reasons, we recommend that you use the root credentials only to create an *administrator user*, which is an *IAM user* with full permissions to your AWS account. Then, you can use this administrator user to create other IAM users and roles with limited permissions.

For more information, see [IAM Best Practices](#) and [Creating an Admin User and Group](#) in the *IAM User Guide*.

- **IAM user** – An *IAM user* is simply an identity within your AWS account that has specific custom permissions (for example, permissions to create a web distribution in CloudFront). You can use an IAM

user name and password to sign in to secure AWS webpages like the [AWS Management Console](#), [AWS Discussion Forums](#), or the [AWS Support Center](#).

In addition to a user name and password, you can also generate [access keys](#) for each user. You can use these keys when you access AWS services programmatically, either through [one of the several SDKs](#) or by using the [AWS Command Line Interface \(CLI\)](#). The SDK and CLI tools use the access keys to cryptographically sign your request. If you don't use the AWS tools, you must sign the request yourself. CloudFront supports *Signature Version 4*, a protocol for authenticating inbound API requests. For more information about authenticating requests, see [Signature Version 4 Signing Process](#) in the [AWS General Reference](#).

- **IAM role** – An [IAM role](#) is another IAM identity you can create in your account that has specific permissions. It is similar to an *IAM user*, but it is not associated with a specific person. An IAM role enables you to obtain temporary access keys that can be used to access AWS services and resources. IAM roles with temporary credentials are useful in the following situations:
 - **Federated user access** – Instead of creating an IAM user, you can use preexisting user identities from AWS Directory Service, your enterprise user directory, or a web identity provider. These are known as *federated users*. AWS assigns a role to a federated user when access is requested through an [identity provider](#). For more information about federated users, see [Federated Users and Roles](#) in the *IAM User Guide*.
 - **Cross-account access** – You can use an IAM role in your account to grant another AWS account permissions to access your account's resources. For an example, see [Tutorial: Delegate Access Across AWS Accounts Using IAM Roles](#) in the *IAM User Guide*.
 - **AWS service access** – You can use an IAM role in your account to grant an AWS service permissions to access your account's resources. For example, you can create a role that allows Amazon Redshift to access an Amazon S3 bucket on your behalf and then load data stored in the bucket into an Amazon Redshift cluster. For more information, see [Creating a Role to Delegate Permissions to an AWS Service](#) in the *IAM User Guide*.
 - **Applications running on Amazon EC2** – Instead of storing access keys within the EC2 instance for use by applications running on the instance and making AWS API requests, you can use an IAM role to manage temporary credentials for these applications. To assign an AWS role to an EC2 instance and make it available to all of its applications, you can create an instance profile that is attached to the instance. An instance profile contains the role and enables programs running on the EC2 instance to get temporary credentials. For more information, see [Using Roles for Applications on Amazon EC2](#) in the *IAM User Guide*.

Access Control

To create, update, delete, or list CloudFront resources, you need permissions to perform the operation, and you need permissions to access the corresponding resources. In addition, to perform the operation programmatically, you need valid access keys.

The following sections describe how to manage permissions for CloudFront:

- Overview of Managing Access Permissions to Your CloudFront Resources (p. 245)
- Using Identity-Based Policies (IAM Policies) for CloudFront (p. 248)
- CloudFront API Permissions: Actions, Resources, and Conditions Reference (p. 253)

Overview of Managing Access Permissions to Your CloudFront Resources

Every AWS resource is owned by an AWS account, and permissions to create or access a resource are governed by permissions policies.

Note

An account *administrator* (or administrator user) is a user that has administrator privileges. For more information about administrators, see [IAM Best Practices](#) in the *IAM User Guide*.

When you grant permissions, you decide who gets the permissions, the resources they get permissions for, and the actions that they get permission to perform.

Topics

- [ARNs for CloudFront Resources \(p. 245\)](#)
- [Understanding Resource Ownership \(p. 245\)](#)
- [Managing Access to Resources \(p. 246\)](#)
- [Specifying Policy Elements: Resources, Actions, Effects, and Principals \(p. 247\)](#)
- [Specifying Conditions in a Policy \(p. 247\)](#)

ARNs for CloudFront Resources

All CloudFront resources—web and RTMP distributions, invalidations, and origin access identities—use the same format for Amazon Resource Names (ARNs):

`arn:aws:cloudfront::optional-account-id:*`

CloudFront provides API actions to work with each of these types of resources. For more information, see the [Amazon CloudFront API Reference](#). For a list of actions and the ARN that you specify to grant or deny permission to use each action, see [CloudFront API Permissions: Actions, Resources, and Conditions Reference \(p. 253\)](#).

Understanding Resource Ownership

An AWS account owns the resources that are created in the account, regardless of who created the resources. Specifically, the resource owner is the AWS account of the principal entity (that is, the root account, an IAM user, or an IAM role) that authenticates the resource creation request.

The following examples illustrate how this works:

- If you use the root account credentials of your AWS account to create a web distribution, your AWS account is the owner of the distribution.
- If you create an IAM user in your AWS account and grant permissions to create a web distribution to that user, the user can create a web distribution. The AWS account that created the user owns the distribution.

- If you create an IAM role in your AWS account with permissions to create a web distribution, anyone who can assume the role can create a web distribution. Your AWS account, to which the role belongs, owns the distribution.

Managing Access to Resources

A *permissions policy* specifies who has access to what. This section explains the options for creating permissions policies for CloudFront. For general information about IAM policy syntax and descriptions, see the [AWS IAM Policy Reference](#) in the *IAM User Guide*.

Policies attached to an IAM identity are referred to as identity-based policies (IAM policies), and policies attached to a resource are referred to as resource-based policies. CloudFront supports only identity-based policies (IAM policies).

Topics

- [Identity-Based Policies \(IAM Policies\) \(p. 246\)](#)
- [Resource-Based Policies \(p. 247\)](#)

Identity-Based Policies (IAM Policies)

You can attach policies to IAM identities. For example, you can do the following:

- **Attach a permissions policy to a user or a group in your account** – An account administrator can use a permissions policy that is associated with a particular user to grant permissions for that user to create a web distribution.
- **Attach a permissions policy to a role (grant cross-account permissions)** – You can grant permissions to perform CloudFront actions to a user that was created in another AWS account. To do so, you attach a permissions policy to an IAM role, and then you allow the user in the other account to assume the role. The following example explains how this works for two AWS accounts, account A and account B:
 1. Account A administrator creates an IAM role and attaches to the role a permissions policy that grants permissions to create or access resources that are owned by account A.
 2. Account A administrator attaches a trust policy to the role. The trust policy identifies account B as the principal that can assume the role.
 3. Account B administrator can then delegate permissions to assume the role to users or groups in account B. This allows users in account B to create or access resources in account A.

For more information about how to delegate permissions to users in another AWS account, see [Access Management](#) in the *IAM User Guide*.

The following example policy allows a user to perform the `CreateDistribution` action to programmatically create a web distribution for your AWS account:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "cloudfront:CreateDistribution"  
            ],  
            "Resource": "*"  
        }  
    ]  
}
```

```
    ]  
}
```

For information about the permissions required to perform operations by using the CloudFront console, see [Permissions Required to Use the CloudFront Console \(p. 248\)](#). For more information about attaching policies to identities for CloudFront, see [Using Identity-Based Policies \(IAM Policies\) for CloudFront \(p. 248\)](#). For more information about users, groups, roles, and permissions, see [Identities \(Users, Groups, and Roles\)](#) in the *IAM User Guide*.

Resource-Based Policies

Other services, such as Amazon S3, support attaching permissions policies to resources. For example, you can attach a policy to an S3 bucket to manage access permissions to that bucket. CloudFront doesn't support attaching policies to resources.

Specifying Policy Elements: Resources, Actions, Effects, and Principals

CloudFront includes API actions (see [Amazon CloudFront API Reference](#)) that you can use on each CloudFront resource (see [ARNs for CloudFront Resources \(p. 245\)](#)). You can grant a user or a federated user permission to perform any or all of these actions.

The following are the basic policy elements:

- **Resource** – You use an Amazon Resource Name (ARN) to identify the resource that the policy applies to. For more information, see [ARNs for CloudFront Resources \(p. 245\)](#).
- **Action** – You use action keywords to identify resource operations that you want to allow or deny. For example, depending on the specified Effect, the `cloudfront:CreateDistribution` permission allows or denies the user permissions to perform the CloudFront `CreateDistribution` action.
- **Effect** – You specify the effect, either allow or deny, when a user tries to perform the action on the specified resource. If you don't explicitly grant access to an action, access is implicitly denied. You can also explicitly deny access to a resource, which you might do to make sure that a user cannot access it, even if a different policy grants access.
- **Principal** – In identity-based policies (IAM policies), the user that the policy is attached to is the implicit principal. For resource-based policies, you specify the user, account, service, or other entity that you want to receive permissions (applies to resource-based policies only). CloudFront doesn't support resource-based policies.

For more information about IAM policy syntax and descriptions, see the [AWS IAM Policy Reference](#) in the *IAM User Guide*.

For a list showing all of the CloudFront API operations and the resources that they apply to, see [CloudFront API Permissions: Actions, Resources, and Conditions Reference \(p. 253\)](#).

Specifying Conditions in a Policy

When you grant permissions, you can use the IAM policy language to specify when a policy should take effect. For example, you might want a policy to be applied only after a specific date. For more information about specifying conditions in a policy language, see [Condition](#) in the *IAM User Guide*.

To express conditions, you use predefined condition keys. There are no condition keys specific to CloudFront. However, there are AWS-wide condition keys that you can use as appropriate. For a complete list of AWS-wide keys, see [Available Keys for Conditions](#) in the *IAM User Guide*.

Using Identity-Based Policies (IAM Policies) for CloudFront

This topic provides examples of identity-based policies that demonstrate how an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles) and thereby grant permissions to perform operations on CloudFront resources.

Important

We recommend that you first review the introductory topics that explain the basic concepts and options to manage access to your CloudFront resources. For more information, see [Overview of Managing Access Permissions to Your CloudFront Resources](#) (p. 245).

Topics

- [Permissions Required to Use the CloudFront Console](#) (p. 248)
- [AWS Managed \(Predefined\) Policies for CloudFront](#) (p. 250)
- [Customer Managed Policy Examples](#) (p. 250)

The following shows a permissions policy. The `Sid`, or statement ID, is optional:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "AllowAllCloudFrontPermissions",  
            "Effect": "Allow",  
            "Action": ["cloudfront:*"],  
            "Resource": "*"  
        }  
    ]  
}
```

The policy grants permissions to perform all CloudFront operations, which is sufficient to access CloudFront programmatically. If you're using the console to access CloudFront, see [Permissions Required to Use the CloudFront Console](#) (p. 248).

For a list of actions and the ARN that you specify to grant or deny permission to use each action, see [CloudFront API Permissions: Actions, Resources, and Conditions Reference](#) (p. 253).

Permissions Required to Use the CloudFront Console

To grant full access to the CloudFront console, you grant the permissions in the following permissions policy:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "acm>ListCertificates",  
                "cloudfront:*,  
                "cloudfront:Get*"  
            ]  
        }  
    ]  
}
```

```
        "cloudwatch:DescribeAlarms",
        "cloudwatch:PutMetricAlarm",
        "cloudwatch:GetMetricStatistics",
        "elasticloadbalancing:DescribeLoadBalancers",
        "iam>ListServerCertificates",
        "sns>ListSubscriptionsByTopic",
        "sns>ListTopics",
        "waf>GetWebACL",
        "waf>ListWebACLS"
    ],
    "Resource": "*"
},
{
    "Effect": "Allow",
    "Action": [
        "s3>ListAllMyBuckets",
        "s3>PutBucketPolicy"
    ],
    "Resource": "arn:aws:s3:::/*"
}
]
```

Here's why the permissions are required:

acm>ListCertificates

When you're creating and updating web distributions by using the CloudFront console and you want to configure CloudFront to require HTTPS between the viewer and CloudFront or between CloudFront and the origin, lets you view a list of ACM (ACM) certificates.

This permission isn't required if you aren't using the CloudFront console.

cloudfront:*

Lets you perform all CloudFront actions.

cloudwatch:DescribeAlarms and cloudwatch:PutMetricAlarm

Let you create and view CloudWatch alarms in the CloudFront console. See also `sns>ListSubscriptionsByTopic` and `sns>ListTopics`.

These permissions aren't required if you aren't using the CloudFront console.

cloudwatch:GetMetricStatistics

Lets CloudFront render CloudWatch metrics in the CloudFront console.

This permission isn't required if you aren't using the CloudFront console.

elasticloadbalancing:DescribeLoadBalancers

When creating and updating web distributions, lets you view a list of Elastic Load Balancing load balancers in the list of available origins.

This permission isn't required if you aren't using the CloudFront console.

iam>ListServerCertificates

When you're creating and updating web distributions by using the CloudFront console and you want to configure CloudFront to require HTTPS between the viewer and CloudFront or between CloudFront and the origin, lets you view a list of certificates in the IAM certificate store.

This permission isn't required if you aren't using the CloudFront console.

s3>ListAllMyBuckets

When you're creating and updating web and RTMP distributions, lets you perform the following operations:

- View a list of S3 buckets in the list of available origins
- View a list of S3 buckets that you can save access logs in

This permission isn't required if you aren't using the CloudFront console.

s3:PutBucketPolicy

When you're creating or updating distributions that restrict access to S3 buckets, lets a user update the bucket policy to grant access to the CloudFront origin access identity. For more information, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

This permission isn't required if you aren't using the CloudFront console.

sns>ListSubscriptionsByTopic and sns>ListTopics

When you create CloudWatch alarms in the CloudFront console, lets you choose an SNS topic for notifications.

These permissions aren't required if you aren't using the CloudFront console.

waf:GetWebACL and waf>ListWebACLs

Lets you view a list of AWS WAF web ACLs in the CloudFront console.

These permissions aren't required if you aren't using the CloudFront console.

AWS Managed (Predefined) Policies for CloudFront

AWS addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. These AWS managed policies grant necessary permissions for common use cases so that you can avoid having to investigate what permissions are needed. For more information, see [AWS Managed Policies](#) in the *IAM User Guide*. For CloudFront, IAM provides two managed policies:

- **CloudFrontFullAccess** – Grants full access to CloudFront resources.
- **CloudFrontReadOnlyAccess** – Grants read-only access to CloudFront resources.

Note

You can review these permissions policies by signing in to the IAM console and searching for specific policies there. You can also create your own custom IAM policies to allow permissions for CloudFront API operations. You can attach these custom policies to the IAM users or groups that require those permissions.

Customer Managed Policy Examples

You can create your own custom IAM policies to allow permissions for CloudFront API actions. You can attach these custom policies to the IAM users or groups that require the specified permissions. These policies work when you are using the CloudFront API, the AWS SDKs, or the AWS CLI. The following examples show permissions for a few common use cases. For the policy that grants a user full access to CloudFront, see [Permissions Required to Use the CloudFront Console \(p. 248\)](#).

Examples

- [Example 1: Allow Read Access to All Web Distributions \(p. 250\)](#)
- [Example 2: Allow Creation, Updating, and Deletion of Web Distributions \(p. 251\)](#)
- [Example 3: Allow Creation and Listing of Invalidations \(p. 252\)](#)

Example 1: Allow Read Access to All Web Distributions

The following permissions policy grants the user permissions to view all web distributions in the CloudFront console:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "acm>ListCertificates",  
                "cloudfront:GetDistribution",  
                "cloudfront:GetDistributionConfig",  
                "cloudfront>ListDistributions",  
                "cloudfront>ListCloudFrontOriginAccessIdentities",  
                "elasticloadbalancing:DescribeLoadBalancers",  
                "iam>ListServerCertificates",  
                "sns>ListSubscriptionsByTopic",  
                "sns>ListTopics",  
                "waf:GetWebACL",  
                "waf>ListWebACLs"  
            ],  
            "Resource": "*"  
        },  
        {  
            "Effect": "Allow",  
            "Action": [  
                "s3>ListAllMyBuckets"  
            ],  
            "Resource": "arn:aws:s3:::*"  
        }  
    ]  
}
```

Example 2: Allow Creation, Updating, and Deletion of Web Distributions

The following permissions policy allows users to create, update, and delete web distributions by using the CloudFront console:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "acm>ListCertificates",  
                "cloudfront>CreateDistribution",  
                "cloudfront>DeleteDistribution",  
                "cloudfront:GetDistribution",  
                "cloudfront:GetDistributionConfig",  
                "cloudfront>ListDistributions",  
                "cloudfront:UpdateDistribution",  
                "cloudfront>ListCloudFrontOriginAccessIdentities",  
                "elasticloadbalancing:DescribeLoadBalancers",  
                "iam>ListServerCertificates",  
                "sns>ListSubscriptionsByTopic",  
                "sns>ListTopics",  
                "waf:GetWebACL",  
                "waf>ListWebACLs"  
            ]  
        }  
    ]  
}
```

```

        ],
        "Resource": "*"
    },
{
    "Effect": "Allow",
    "Action": [
        "s3>ListAllMyBuckets",
        "s3>PutBucketPolicy"
    ],
    "Resource": "arn:aws:s3:::/*"
}
]
}

```

The `cloudfront>ListCloudFrontOriginAccessIdentities` permission allows users to automatically grant to an existing origin access identity the permission to access objects in an Amazon S3 bucket. If you also want users to be able to create origin access identities, you also need to allow the `cloudfront>CreateCloudFrontOriginAccessIdentity` permission.

Example 3: Allow Creation and Listing of Invalidations

The following permissions policy allows users to create and list invalidations. It includes read access to CloudFront distributions because you create and view invalidations by first displaying settings for a distribution:

```

{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "acm>ListCertificates",
                "cloudfront>GetDistribution",
                "cloudfront>GetDistributionConfig",
                "cloudfront>ListDistributions",
                "cloudfront>ListCloudFrontOriginAccessIdentities",
                "cloudfront>CreateInvalidation",
                "cloudfront>GetInvalidation",
                "cloudfront>ListInvalidations",
                "elasticloadbalancing>DescribeLoadBalancers",
                "iam>ListServerCertificates",
                "sns>ListSubscriptionsByTopic",
                "sns>ListTopics",
                "waf>GetWebACL",
                "waf>ListWebACLs"
            ],
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action": [
                "s3>ListAllMyBuckets"
            ],
            "Resource": "arn:aws:s3:::/*"
        }
    ]
}

```

]
}

CloudFront API Permissions: Actions, Resources, and Conditions Reference

When you are setting up [Access Control \(p. 244\)](#) and writing a permissions policy that you can attach to an IAM identity (identity-based policies), you can use the following lists as a reference. The lists include each CloudFront API operation, the corresponding actions for which you can grant permissions to perform the action, and the AWS resource for which you can grant the permissions. You specify the actions in the policy's `Action` field, and you specify the resource value in the policy's `Resource` field.

You can use AWS-wide condition keys in your CloudFront policies to express conditions. For a complete list of AWS-wide keys, see [Available Keys](#) in the *IAM User Guide*.

Topics

- [Required Permissions for Actions on Web Distributions \(p. 253\)](#)
- [Required Permissions for Actions on RTMP Distributions \(p. 254\)](#)
- [Required Permissions for Actions on Invalidations \(p. 255\)](#)
- [Required Permissions for Actions on Origin Access Identities \(p. 255\)](#)
- [Required Permissions for Actions on Tags \(p. 255\)](#)

Required Permissions for Actions on Web Distributions

[POST Distribution \(CreateDistribution\)](#)

Required Permissions (API Action): `cloudfront:CreateDistribution`

Resources: *

[POST Distribution With Tags \(CreateDistributionWithTags\)](#)

Required Permissions (API Action): `cloudfront:CreateDistribution`,
`cloudfront:TagResource`

Resources: *

[GET Distribution \(GetDistribution\)](#)

Required Permissions (API Action): `cloudfront:GetDistribution`

Resources: *

[GET Distribution Config \(GetDistributionConfig\)](#)

Required Permissions (API Action): `cloudfront:GetDistributionConfig`

Resources: *

[GET Distribution List \(ListDistributions\)](#)

Required Permissions (API Action): `cloudfront>ListDistributions`

Resources: *

[PUT Distribution Config \(UpdateDistribution\)](#)

Required Permissions (API Action): `cloudfront:UpdateDistribution`

Resources: *

[DELETE Distribution \(DeleteDistribution\)](#)

Required Permissions (API Action): `cloudfront:DeleteDistribution`

Resources: *

Required Permissions for Actions on RTMP Distributions

[POST Streaming Distribution \(CreateStreamingDistribution\)](#)

Required Permissions (API Action): `cloudfront:CreateStreamingDistribution`

Resources: *

[POST Streaming Distribution With Tags \(CreateStreamingDistributionWithTags\)](#)

Required Permissions (API Action): `cloudfront:CreateStreamingDistribution`,
`cloudfront:TagResource`

Resources: *

[GET Streaming Distribution \(GetStreamingDistribution\)](#)

Required Permissions (API Action): `cloudfront:GetStreamingDistribution`

Resources: *

[GET Streaming Distribution Config \(GetStreamingDistributionConfig\)](#)

Required Permissions (API Action): `cloudfront:GetStreamingDistributionConfig`

Resources: *

[GET Streaming Distribution List \(ListStreamingDistributions\)](#)

Required Permissions (API Action): `cloudfront>ListStreamingDistributions`

Resources: *

[PUT Streaming Distribution Config \(UpdateStreamingDistribution\)](#)

Required Permissions (API Action): `cloudfront:UpdateStreamingDistribution`

Resources: *

[DELETE Streaming Distribution \(DeleteStreamingDistribution\)](#)

Required Permissions (API Action): `cloudfront:DeleteDistribution`

Resources: *

Required Permissions for Actions on Invalidations

[POST Invalidation \(CreateInvalidation\)](#)

Required Permissions (API Action): `cloudfront>CreateInvalidation`

Resources: *

[GET Invalidation \(GetInvalidation\)](#)

Required Permissions (API Action): `cloudfront:GetInvalidation`

Resources: *

[GET Invalidation List \(ListInvalidations\)](#)

Required Permissions (API Action): `cloudfront>ListInvalidations`

Resources: *

Required Permissions for Actions on Origin Access Identities

[POST Origin Access Identity \(CreateCloudFrontOriginAccessIdentity\)](#)

Required Permissions (API Action): `cloudfront:CreateCloudFrontOriginAccessIdentity`

Resources: *

[GET Origin Access Identity \(GetCloudFrontOriginAccessIdentity\)](#)

Required Permissions (API Action): `cloudfront:GetCloudFrontOriginAccessIdentity`

Resources: *

[GET Origin Access Identity Config \(GetCloudFrontOriginAccessIdentityConfig\)](#)

Required Permissions (API Action):

`cloudfront:GetCloudFrontOriginAccessIdentityConfig`

Resources: *

[GET Origin Access Identity List \(ListCloudFrontOriginAccessIdentities\)](#)

Required Permissions (API Action): `cloudfront>ListDistributions`

Resources: *

[PUT Origin Access Identity Config \(UpdateCloudFrontOriginAccessIdentity\)](#)

Required Permissions (API Action): `cloudfront:UpdateCloudFrontOriginAccessIdentity`

Resources: *

[DELETE Origin Access Identity \(DeleteCloudFrontOriginAccessIdentity\)](#)

Required Permissions (API Action): `cloudfront>DeleteCloudFrontOriginAccessIdentity`

Resources: *

Required Permissions for Actions on Tags

[POST Tag Resource](#)

Required Permissions (API Action): `cloudfront:TagResource`

Resources: *

<http://docs.aws.amazon.com/AmazonCloudFront/latest/APIReference/tags-untag-resource.html>
POST Untag Resource

Required Permissions (API Action): `cloudfront:UntagResource`

Resources: *

[GET Tags](#)

Required Permissions (API Action): `cloudfront>ListTagsForResource`

Resources: *

Access Logs

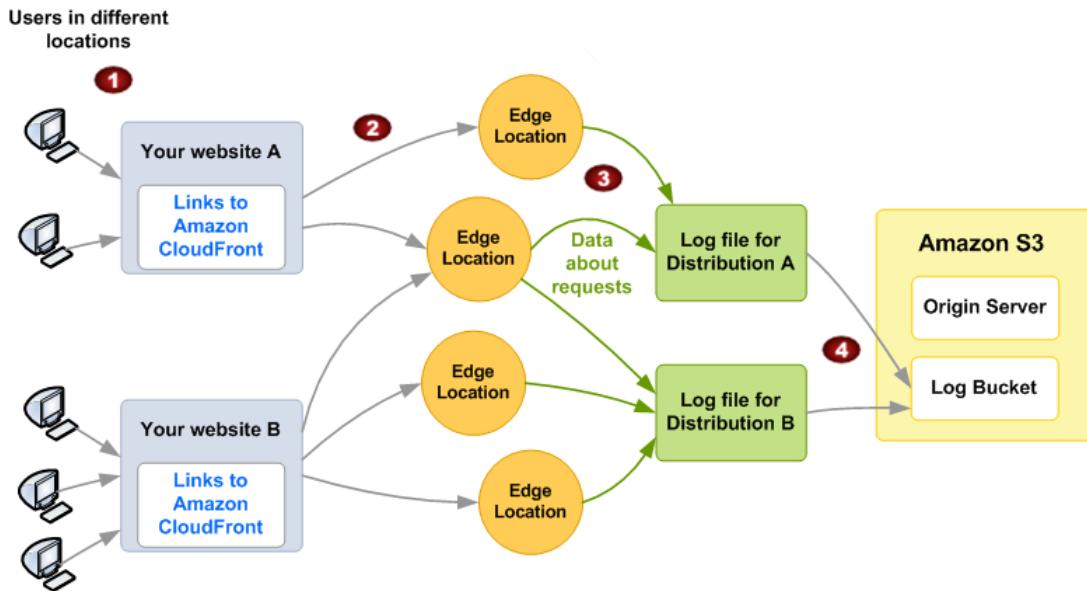
You can configure CloudFront to create log files that contain detailed information about every user request that CloudFront receives. These access logs are available for both web and RTMP distributions. If you enable logging, you can also specify the Amazon S3 bucket that you want CloudFront to save files in.

Topics

- [How Logging Works \(p. 256\)](#)
- [Choosing an Amazon S3 Bucket for Your Access Logs \(p. 257\)](#)
- [Amazon S3 Permissions Required to Access Your Log Files \(p. 258\)](#)
- [File Name Format \(p. 258\)](#)
- [Timing of Log File Delivery \(p. 258\)](#)
- [Analyzing Access Logs \(p. 259\)](#)
- [Editing Your Logging Settings \(p. 259\)](#)
- [Deleting Log Files from an Amazon S3 Bucket \(p. 260\)](#)
- [Log File Format \(p. 260\)](#)
- [Charges for Access Logs \(p. 269\)](#)

How Logging Works

The following diagram shows how CloudFront logs information about requests for your objects.



How CloudFront Logs Information About Requests for Your Objects

| | |
|----------|---|
| 1 | In this diagram, you have two websites, A and B, and two corresponding CloudFront distributions. Users request your objects using URLs that are associated with your distributions. |
| 2 | CloudFront routes each request to the appropriate edge location. |
| 3 | CloudFront writes data about each request to a log file specific to that distribution. In this example, information about requests related to Distribution A goes into a log file just for Distribution A, and information about requests related to Distribution B goes into a log file just for Distribution B. |
| 4 | CloudFront periodically saves the log file for a distribution in the Amazon S3 bucket that you specified when you enabled logging. CloudFront then starts saving information about subsequent requests in a new log file for the distribution. |

Each entry in a log file gives details about a single request. For more information about log file format, see [Log File Format \(p. 260\)](#).

Choosing an Amazon S3 Bucket for Your Access Logs

When you enable logging for a distribution, you specify the Amazon S3 bucket that you want CloudFront to store log files in. If you're using Amazon S3 as your origin, we recommend that you do not use the same bucket for your log files; using a separate bucket simplifies maintenance.

You can store the log files for multiple distributions in the same bucket. When you enable logging, you can specify an optional prefix for the file names, so you can keep track of which log files are associated with which distributions.

If no users access your content during a given hour, you don't receive any log files for that hour.

Amazon S3 Permissions Required to Access Your Log Files

Your AWS account must have Amazon S3 `FULL_CONTROL` permission for the bucket that you specify for log files. If you're the bucket owner, your account has this permission by default. If you're not, the bucket owner must update the access control list (ACL) for the bucket to grant your AWS account `FULL_CONTROL` permission.

When you enable logging, CloudFront automatically updates the ACL for the bucket to give the `awsdatafeeds` account `FULL_CONTROL` permission. This account writes log files to the bucket.

Note

If you update the ACL for the bucket to remove permissions for the `awsdatafeeds` account, CloudFront updates the ACL again the next time the `awsdatafeeds` account needs to write a log file to your log bucket.

In addition to the ACL on the bucket, there's an ACL on each log file. The bucket owner has `FULL_CONTROL` permission on each log file, the distribution owner (if different from the bucket owner) has no permission, and the `awsdatafeeds` account has read and write permissions.

If you disable logging, CloudFront doesn't delete the ACLs for either the bucket or the log files. If you want, you can do that yourself.

File Name Format

The name of each log file that CloudFront saves in your Amazon S3 bucket uses the following file name format:

`bucket-name.s3.amazonaws.com/optional-prefix/distribution-ID.YYYY-MM-DD-HH.unique-ID.gz`

The date and time are in Coordinated Universal time (UTC).

For example, if your bucket name is `mylogs`, your prefix is `myprefix/`, and your distribution ID is `EMLARXS9EXAMPLE`, your file names look similar to this:

`mylogs.s3.amazonaws.com/myprefix/EMLARXS9EXAMPLE.2014-11-14-20.RT4KCN4SGK9.gz`

When you enable logging for a distribution, you can specify an optional prefix for the file names, so you can keep track of which log files are associated with which distributions. If you include a value for the log file prefix and your prefix doesn't include a `/`, CloudFront adds one automatically. If your value does include a `/`, CloudFront doesn't add another one.

The `.gz` at the end of the file name indicates that CloudFront has compressed the log file using gzip.

Timing of Log File Delivery

CloudFront delivers access logs for a distribution up to several times an hour. In general, a log file contains information about the requests that CloudFront received during a given time period. CloudFront usually delivers the log file for that time period to your Amazon S3 bucket within an hour of the events that appear in the log. Note, however, that some or all log file entries for a time period can sometimes be delayed by up to 24 hours. When log entries are delayed, CloudFront saves them in a log file for which the file name includes the date and time of the period in which the requests occurred, not the date and time when the file was delivered.

When creating a log file, CloudFront consolidates information for your distribution from all of the edge locations that received requests for your objects during the time period that the log file covers.

CloudFront can save more than one file for a time period depending on how many requests CloudFront receives for the objects associated with a distribution.

CloudFront begins to reliably deliver access logs about four hours after you enable logging. You might get a few access logs before that time.

Note

If no users request your objects during the time period, you don't receive any log files for that period.

Analyzing Access Logs

Because you can receive multiple access logs an hour, we recommend that you combine all the log files you receive for a given period into one file. You can then analyze the data for that period more quickly and accurately.

Important

We recommend that you use the logs to understand the nature of the requests for your content, not as a complete accounting of all requests. CloudFront delivers access logs on a best-effort basis. The log entry for a particular request might be delivered long after the request was actually processed and, in rare cases, a log entry might not be delivered at all. When a log entry is omitted from access logs, the number of entries in the access logs won't match the usage that appears in the AWS usage and billing reports.

For more information about CloudFront access logs, including recommendations for tools that you can use to analyze access logs, see [Using CloudFront Logging \(p. 356\)](#).

Editing Your Logging Settings

You can enable or disable logging, change the Amazon S3 bucket where your logs are stored, and change the prefix for log files by using the CloudFront console or the CloudFront API. Your changes to logging settings take effect within 12 hours.

For more information, see the following topics:

- Updating a web or an RTMP distribution using the CloudFront console: [Listing, Viewing, and Updating CloudFront Distributions \(p. 48\)](#).
- Updating a web distribution using the CloudFront API: [PUT Distribution Config](#) in the *Amazon CloudFront API Reference*.
- Updating an RTMP distribution using the CloudFront API: [PUT Streaming Distribution Config](#) in the *Amazon CloudFront API Reference*.

To use the CloudFront API to change access log settings for web distributions, you must use the 2009-04-02 or later version of the API. To use the CloudFront API to change access log settings for RTMP distributions, you must use the 2010-05-01 or later version of the API.

Deleting Log Files from an Amazon S3 Bucket

CloudFront does not automatically delete log files from your Amazon S3 bucket. For information about deleting log files from an Amazon S3 bucket, see the following topics:

- Using the Amazon S3 console: [Deleting an Object](#) in the *Amazon Simple Storage Service Console User Guide*.
- Using the REST API: [DELETE Object](#) in the *Amazon Simple Storage Service API Reference*.
- Using the SOAP API: [DeleteObject](#) in the *Amazon Simple Storage Service API Reference*.

Log File Format

Topics

- [Web Distribution Log File Format \(p. 261\)](#)
- [RTMP Distribution Log File Format \(p. 267\)](#)

Each entry in a log file gives details about a single user request. The log files for web and for RTMP distributions are not identical, but they share the following characteristics:

- Use the W3C extended log file format. (For more information, go to <http://www.w3.org/TR/WD-logfile.html>.)
- Contain tab-separated values.
- Contain records that are not necessarily in chronological order.
- Contain two header lines: one with the file-format version, and another that lists the W3C fields included in each record.
- Substitute URL-encoded equivalents for spaces and non-standard characters in field values.

These non-standard characters consist of all ASCII codes below 32 and above 127, plus the characters in the following table. The URL encoding standard is RFC 1738. For more information, go to <http://www.ietf.org/rfc/rfc1738.txt>.

| URL-Encoded Value | Character |
|-------------------|-----------|
| %3C | < |
| %3E | > |
| %22 | " |
| %23 | # |
| %25 | % |
| %7B | { |
| %7D | } |
| %7C | |
| %5C | \ |
| %5E | ^ |

| URL-Encoded Value | Character |
|-------------------|-----------|
| %7E | ~ |
| %5B | [|
| %5D |] |
| %60 | ` |
| %27 | ' |
| %20 | space |

Web Distribution Log File Format

The log file for a web distribution includes the following fields in the listed order.

| Field Number | Field Name | Description |
|--------------|-----------------|---|
| 1 | date | The date on which the event occurred in the format yyyy-mm-dd, for example, 2015-06-30. The date and time are in Coordinated Universal Time (UTC). |
| 2 | time | The time when the CloudFront server finished responding to the request (in UTC), for example, 01:42:39. |
| 3 | x-edge-location | The edge location that served the request. Each edge location is identified by a three-letter code and an arbitrarily assigned number, for example, DFW3. The three-letter code typically corresponds with the International Air Transport Association airport code for an airport near the edge location. (These abbreviations might change in the future.) For a list of edge locations, see the Amazon CloudFront detail page, http://aws.amazon.com/cloudfront . |
| 4 | sc-bytes | The total number of bytes that CloudFront served to the viewer in response to the request, including headers, for example, 1045619. |
| 5 | c-ip | The IP address of the viewer that made the request, for example, 192.0.2.183. If the viewer used an HTTP proxy or a load balancer to send the request, the value of c-ip is the IP address of the proxy or load balancer. See also X-Forwarded-For in field 20. |
| 6 | cs-method | The HTTP access method: DELETE, GET, HEAD, OPTIONS, PATCH, POST, or PUT. |
| 7 | cs(Host) | The domain name of the CloudFront distribution, for example, d11111abcdef8.cloudfront.net. |
| 8 | cs-uri-stem | The portion of the URI that identifies the path and object, for example, /images/daily-ad.jpg. |

| Field Number | Field Name | Description |
|--------------|----------------|--|
| 9 | sc-status | <p>One of the following values:</p> <ul style="list-style-type: none"> • An HTTP status code (for example, 200). For a list of HTTP status codes, see RFC 2616, Hypertext Transfer Protocol—HTTP 1.1, section 10, Status Code Definitions. For more information, see How CloudFront Processes and Caches HTTP 4xx and 5xx Status Codes from Your Origin (p. 158). • 000, which indicates that the viewer closed the connection (for example, closed the browser tab) before CloudFront could respond to a request. |
| 10 | cs(Referer) | The name of the domain that originated the request. Common referrers include search engines, other websites that link directly to your objects, and your own website. |
| 11 | cs(User-Agent) | The value of the User-Agent header in the request. The User-Agent header identifies the source of the request, such as the type of device and browser that submitted the request and, if the request came from a search engine, which search engine. For more information, see User-Agent Header (p. 154) . |
| 12 | cs-uri-query | <p>The query string portion of the URI, if any. When a URI doesn't contain a query string, the value of cs-uri-query is a hyphen (-).</p> <p>For more information, see Configuring CloudFront to Cache Based on Query String Parameters (p. 105).</p> |
| 13 | cs(Cookie) | <p>The cookie header in the request, including name-value pairs and the associated attributes. If you enable cookie logging, CloudFront logs the cookies in all requests regardless of which cookies you choose to forward to the origin: none, all, or a whitelist of cookie names. When a request doesn't include a cookie header, the value of cs(Cookie) is a hyphen (-).</p> <p>For more information about cookies, see Configuring CloudFront to Cache Objects Based on Cookies (p. 106).</p> |

| Field Number | Field Name | Description |
|--------------|--------------------|---|
| 14 | x-edge-result-type | <p>How CloudFront classified the response after the last byte left the edge location. In some cases, the result type can change between the time that CloudFront is ready to send the response and the time that CloudFront has finished sending the response. For example, in HTTP streaming, suppose CloudFront finds a segment in the edge cache. The value of <code>x-edge-response-result-type</code>, the result type immediately before CloudFront begins to respond to the request, is <code>Hit</code>. However, if the user closes the viewer before CloudFront has delivered the entire segment, the final result type—the value of <code>x-edge-result-type</code>—changes to <code>Error</code>.</p> <p>Possible values include:</p> <ul style="list-style-type: none"> • <code>Hit</code> – CloudFront served the object to the viewer from the edge cache. <p>For information about a situation in which CloudFront classifies the result type as <code>Hit</code> even though the response from the origin contains a <code>Cache-Control: no-cache</code> header, see Simultaneous Requests for the Same Object (Traffic Spikes) (p. 154).</p> <ul style="list-style-type: none"> • <code>RefreshHit</code> – CloudFront found the object in the edge cache but it had expired, so CloudFront contacted the origin to determine whether the cache has the latest version of the object and, if not, to get the latest version. • <code>Miss</code> – The request could not be satisfied by an object in the edge cache, so CloudFront forwarded the request to the origin server and returned the result to the viewer. • <code>LimitExceeded</code> – The request was denied because a CloudFront limit was exceeded. • <code>CapacityExceeded</code> – CloudFront returned an HTTP 503 status code (<code>Service Unavailable</code>) because the CloudFront edge server was temporarily unable to respond to requests. • <code>Error</code> – Typically, this means the request resulted in a client error (<code>sc-status</code> is <code>4xx</code>) or a server error (<code>sc-status</code> is <code>5xx</code>). <p>If <code>sc-status</code> is <code>403</code> and you configured CloudFront to restrict the geographic distribution of your content, the request might have come from a restricted location. For more information about geo restriction, see Restricting the Geographic Distribution of Your Content (p. 82).</p> <p>If the value of <code>x-edge-result-type</code> is <code>Error</code> and the value of <code>x-edge-response-result-type</code> is not <code>Error</code>, the client disconnected before finishing the download.</p> |
| 15 | x-edge-request-id | An encrypted string that uniquely identifies a request. |

| Field Number | Field Name | Description |
|--------------|-----------------|--|
| 16 | x-host-header | <p>The value that the viewer included in the <code>Host</code> header for this request. This is the domain name in the request:</p> <ul style="list-style-type: none"> If you're using the CloudFront domain name in your object URLs, such as <code>http://d111111abcdef8.cloudfront.net/logo.png</code>, the <code>x-host-header</code> field contains that domain name. If you're using alternate domain names in your object URLs, such as <code>http://example.com/logo.png</code>, the <code>x-host-header</code> field contains the alternate domain name, such as <code>example.com</code>. To use alternate domain names, you must add them to your distribution. For more information, see Using Alternate Domain Names (CNAMEs) (p. 50). <p>If you're using alternate domain names, see <code>cs(Host)</code> in field 7 for the domain name that is associated with your distribution.</p> |
| 17 | cs-protocol | The protocol that the viewer specified in the request, either <code>http</code> or <code>https</code> . |
| 18 | cs-bytes | The number of bytes of data that the viewer included in the request (client to server bytes), including headers. |
| 19 | time-taken | The number of seconds (to the thousandth of a second, for example, <code>0.002</code>) between the time that a CloudFront edge server receives a viewer's request and the time that CloudFront writes the last byte of the response to the edge server's output queue as measured on the server. From the perspective of the viewer, the total time to get the full object will be longer than this value due to network latency and TCP buffering. |
| 20 | x-forwarded-for | <p>If the viewer used an HTTP proxy or a load balancer to send the request, the value of <code>c-ip</code> in field 5 is the IP address of the proxy or load balancer. In that case, <code>x-forwarded-for</code> is the IP address of the viewer that originated the request.</p> <p>If the viewer did not use an HTTP proxy or a load balancer, the value of <code>x-forwarded-for</code> is a hyphen (-).</p> |
| 21 | ssl-protocol | <p>When <code>cs-protocol</code> in field 17 is <code>https</code>, the SSL protocol that the client and CloudFront negotiated for transmitting the request and response. When <code>cs-protocol</code> is <code>http</code>, the value for <code>ssl-protocol</code> is a hyphen (-).</p> <p>Possible values include the following:</p> <ul style="list-style-type: none"> • <code>SSLv3</code> • <code>TLSv1</code> • <code>TLSv1.1</code> • <code>TLSv1.2</code> |

| Field Number | Field Name | Description |
|--------------|------------|---|
| 22 | ssl-cipher | <p>When <code>cs-protocol</code> in field 17 is <code>https</code>, the SSL cipher that the client and CloudFront negotiated for encrypting the request and response. When <code>cs-protocol</code> is <code>http</code>, the value for <code>ssl-cipher</code> is a hyphen (-).</p> <p>Possible values include the following:</p> <ul style="list-style-type: none">• ECDHE-RSA-AES128-GCM-SHA256• ECDHE-RSA-AES128-SHA256• ECDHE-RSA-AES128-SHA• ECDHE-RSA-AES256-GCM-SHA384• ECDHE-RSA-AES256-SHA384• ECDHE-RSA-AES256-SHA• AES128-GCM-SHA256• AES256-GCM-SHA384• AES128-SHA256• AES256-SHA• AES128-SHA• DES-CBC3-SHA• RC4-MD5 |

| Field Number | Field Name | Description |
|--------------|-----------------------------|--|
| 23 | x-edge-response-result-type | <p>How CloudFront classified the response just before returning the response to the viewer. See also <code>x-edge-result-type</code> in field 14.</p> <p>Possible values include:</p> <ul style="list-style-type: none"> • Hit – CloudFront served the object to the viewer from the edge cache. • RefreshHit – CloudFront found the object in the edge cache but it had expired, so CloudFront contacted the origin to verify that the cache has the latest version of the object. • Miss – The request could not be satisfied by an object in the edge cache, so CloudFront forwarded the request to the origin server and returned the result to the viewer. • LimitExceeded – The request was denied because a CloudFront limit was exceeded. • CapacityExceeded – CloudFront returned a 503 error because the edge location didn't have enough capacity at the time of the request to serve the object. • Error – Typically, this means the request resulted in a client error (<code>sc-status</code> is <code>4xx</code>) or a server error (<code>sc-status</code> is <code>5xx</code>). <p>If <code>sc-status</code> is <code>403</code> and you configured CloudFront to restrict the geographic distribution of your content, the request might have come from a restricted location. For more information about geo restriction, see Restricting the Geographic Distribution of Your Content (p. 82).</p> <p>If the value of <code>x-edge-result-type</code> is <code>Error</code> and the value of <code>x-edge-response-result-type</code> is not <code>Error</code>, the client disconnected before finishing the download.</p> |
| 24 | cs-protocol-version | The HTTP version that the viewer specified in the request. Possible values include <code>HTTP/0.9</code> , <code>HTTP/1.0</code> , and <code>HTTP/1.1</code> . |

Note

Question marks (?) in URLs and query strings are not included in the log.

The following is an example log file for a web distribution:

```
#Version: 1.0
#Fields: date time x-edge-location sc-bytes c-ip cs-method cs(Host) cs-uri-stem
sc-status cs(Referer) cs(User-Agent) cs-uri-query cs(Cookie) x-edge-result-
type x-edge-request-id x-host-header cs-protocol cs-bytes time-taken x-forwarded-
for ssl-protocol ssl-cipher x-edge-response-result-type cs-protocol-version
2014-05-23 01:13:11 FRA2 182 192.0.2.10 GET d111111abcdef8.cloudfront.net
/view/my/file.html 200 www.displaymyfiles.com Mozilla/4.0%20(compat
ible;%20MSIE%205.0b1;%20Mac_PowerPC) - zip=98101 RefreshHit MRVMF7KydIvxMwf
JIlgwHQwZsbG2IhRJ07sn9AkUFHS9EXAMPLE== d111111abcdef8.cloudfront.net http -
0.001 - - RefreshHit HTTP/1.1
2014-05-23 01:13:12 LAX1 2390282 192.0.2.202 GET d111111abcdef8.cloudfront.net
/soundtrack/happy.mp3 304 www.unknownsingers.com Mozilla/4.0%20(compat
```

```
ible;%20MSIE%207.0;%20Windows%20NT%205.1) a=b&c=d zip=50158 Hit
xGN7KWpVEmB9Dp7ctcVFQC4E-nrcOcEKS3QyAez--06dV7TEXAMPLE== d111111abcdef8.cloud
front.net http - 0.002 - - - Hit HTTP/1.1
```

RTMP Distribution Log File Format

Each record in an RTMP access log represents a playback event, for example, connect, play, pause, stop, disconnect, and so on. As a result, CloudFront generates multiple log records each time a viewer watches a video. To relate log records that stem from the same stream ID, use the *x-sid* field.

Note

Some fields have values for all events, and some have values only for Play, Stop, Pause, Unpause, and Seek events. Usually, when the log file contains a hyphen (-) for a field, the field isn't relevant for the corresponding event.

The following table describes the fields that are present in each record in the RTMP distribution log file, regardless of the type of event. The fields appear in the log in the order listed.

| Field Number | Field Name | Description |
|--------------|-----------------|---|
| 1 | date | The date on which the event occurred in the format yyyy-mm-dd, for example, 2014-05-23. The date and time are in Coordinated Universal Time (UTC). |
| 2 | time | The time when the server received the request (in UTC), for example, 01:42:39. |
| 3 | x-edge-location | The edge location where the playback event occurred. Each edge location is identified by a three-letter code and an arbitrarily assigned number, for example, DFW3. The three-letter code typically corresponds with the International Air Transport Association airport code for an airport near the edge location. (These abbreviations might change in the future.) For a list of edge locations, see the Amazon CloudFront detail page, http://aws.amazon.com/cloudfront . |
| 4 | c-ip | Client IP, for example, 192.0.2.183. |
| 5 | x-event | The event type. This is a Connect, Disconnect, Play, Stop, Pause, Unpause, or Seek event. |
| 6 | sc-bytes | The running total number of bytes sent from the server to the client, up to the time of the event. |
| 7 | x-cf-status | A code indicating the status of the event. Currently, "OK" is the only value for this field. New functionality in the future could require new status codes. |
| 8 | x-cf-client-id | An opaque string identifier that can be used to differentiate clients. This value is unique for each connection. |
| 9 | cs-uri-stem | The stem portion of the URI, including the application and the application instance. This is sometimes referred to as the FMS <i>connect string</i> . For example, <code>rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st</code> . |
| 10 | cs-uri-query | The query string portion of the URI that is included on the connect string. |

| Field Number | Field Name | Description |
|--------------|--------------|---|
| 11 | c-referrer | The URI of the referrer. |
| 12 | x-page-url | The URL of the page from which the SWF is linked. |
| 13 | c-user-agent | The value of the User-Agent header in the request. The User-Agent header identifies the type of device that submitted the request. For more information, see User-Agent Header (p. 154) . |

The following fields usually have values only for Play, Stop, Pause, Unpause, and Seek events. For other events, they contain a single hyphen (-). These fields appear in the log after the fields in the preceding table and in the order listed.

| Field | Description |
|---------------|--|
| x-sname | The stream name. |
| x-sname-query | The stream query string, if any. |
| x-file-ext | The stream type, for example, FLV. |
| x-sid | The stream ID. This is a unique integer identifier for the connection. |

Note

Question marks (?) in URLs and query strings are not included in the log.

The following is an example of a log file for an RTMP distribution:

```
#Version: 1.0
#Fields: date time x-edge-location c-ip x-event sc-bytes x-cf-status x-cf-client-id cs-uri-stem cs-uri-query c-referrer x-page-url c-user-agent x-sname x-sname-query x-file-ext x-sid
2010-03-12 23:51:20 SEA4 192.0.2.147 connect 2014 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
-
2010-03-12 23:51:21 SEA4 192.0.2.222 play 3914 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
myvideo p=2&q=4 flv 1
2010-03-12 23:53:44 SEA4 192.0.2.4 stop 323914 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
dir/other/myvideo p=2&q=4 flv 1
2010-03-12 23:53:44 SEA4 192.0.2.103 play 8783724 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
dir/favs/myothervideo p=42&q=14 mp4 2
2010-03-12 23:56:21 SEA4 192.0.2.199 stop 429822014 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
```

```
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
dir/favs/myothervideo p=42&q=14 mp4 2
2010-03-12 23:59:44 SEA4 192.0.2.14 disconnect 429824092 OK
bfd8a98bee0840d9b871b7f6ade9908f rtmp://shqshne4jdp4b6.cloudfront.net/cfx/st
key=value http://player.longtailvideo.com/player.swf http://www.long
tailvideo.com/support/jw-player-setup-wizard?example=204 LNX%2010,0,32,18
- - - -
```

Charges for Access Logs

Access logging is an optional feature of CloudFront. There is no extra charge for enabling access logging. However, you accrue the usual Amazon S3 charges for storing and accessing the files on Amazon S3 (you can delete them at any time). For more information about charges for CloudFront, see [CloudFront Reports \(p. 15\)](#).

Monitoring CloudFront Activity Using CloudWatch

Amazon CloudFront integrates with Amazon CloudWatch metrics so that you can monitor your website or application. CloudFront currently provides six free metrics, and these metrics don't count against [CloudWatch limits](#). When viewing metrics, you can specify a time interval of as little as one minute for time periods in the previous two weeks.

You can view the following CloudFront metrics in the CloudWatch console:

- **Requests** – Number of requests for all HTTP methods and for both HTTP and HTTPS requests
- **BytesDownloaded** – Number of bytes downloaded by viewers for GET, HEAD, and OPTIONS requests
- **BytesUploaded** – Number of bytes uploaded to your origin with CloudFront using POST and PUT requests
- **TotalErrorRate** – Percentage of all requests for which the HTTP status code is 4xx or 5xx
- **4xxErrorRate** – Percentage of all requests for which the HTTP status code is 4xx
- **5xxErrorRate** – Percentage of all requests for which the HTTP status code is 5xx

Note

CloudFront is a global service, and metrics are available only when you choose the **US East (N. Virginia)** region in the AWS console. If you choose another region, no CloudFront metrics will appear in the CloudWatch console.

To view metrics for a distribution in the CloudWatch console

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. In the navigation pane, click **Monitoring and Alarms**.
3. In the **CloudFront Metrics and Alarms From CloudWatch** pane, specify the following values:

From and To

Select the date and time range for which you want to display CloudWatch metrics.

Granularity

Specify the interval of the data points, for example, one per minute or one per hour. Note that the time period that you choose affects the available granularity. For example, if you choose to

view data for two weeks, the finest granularity is one hour, and if you choose to view data for 24 hours, the finest granularity is one minute.

Web Distribution

Select the distribution that you want to display metrics for.

4. Click **Update Graph** to refresh the graph based on the settings that you specified.

To receive an Amazon Simple Notification Service (Amazon SNS) notification based on a CloudFront metric

1. On the **CloudFront Metrics and Alarms From CloudWatch** page, expand the list of existing alarms to confirm that the alarm that you want to create doesn't already exist.
2. Click **Create Alarm**.
3. In the **Create Alarm** dialog box, specify the following values:

Metric

Choose the metric for which you want to create the alarm.

Distribution

Choose the CloudFront distribution for which you want to create the alarm.

Name of alarm

Enter a name for the alarm.

Send notification to

Choose the existing Amazon SNS topic that you want to send notification to if the status of this metric triggers an alarm.

Whenever *metric operator value*

Specify when CloudWatch should trigger an alarm and send a notification to the specified email list. For example, to receive notification when the 5xx error rate exceeds 1%, you'd specify the following:

Whenever Average of 5xxErrorRate > 1

Note the following about specifying values for *value*:

- Enter only whole numbers without punctuation. For example, to specify one thousand, enter **1000**.
- For 4xx, 5xx, and total error rates, the value that you specify is a percentage.
- For requests, bytes downloaded, and bytes uploaded, the value you specify is in units, for example, **1000000000** bytes.

For at least *x* consecutive periods of *time period*

Specify how many consecutive time periods of the specified duration the metric must meet the criteria before CloudWatch sends notification. When you choose a value, you need to find an appropriate balance between a value that produces frequent notifications for fleeting problems and delayed notifications for real problems.

4. If you created a new Amazon SNS topic, when you click **Create**, Amazon SNS sends you an email with information about the new topic. Follow the instructions in the email.

Downloading Data in CSV Format

You can download the CloudWatch Metrics report in CSV format. This section explains how to download the report and describes the values in the report.

To download the CloudWatch Metrics report in CSV format

1. While viewing the CloudWatch metrics, click **CSV**.
2. In the **Opening file name** dialog box, choose whether to open or save the file.

Information About the Report

The first few rows of the report include the following information:

Version

The CloudFront reporting version.

Report

The name of the report.

DistributionID

The ID of the distribution that you ran the report for.

StartDateUTC

The beginning of the date range for which you ran the report, in Coordinated Universal Time (UTC).

EndDateUTC

The end of the date range for which you ran the report, in Coordinated Universal Time (UTC).

GeneratedTimeUTC

The date and time on which you ran the report, in Coordinated Universal Time (UTC).

Granularity

The time period for each row in the report, for example, ONE_MINUTE.

Data in the CloudWatch Metrics Report

The report includes the following values:

DistributionID

The ID of the distribution that you ran the report for.

FriendlyName

An alternate domain name (CNAME) for the distribution, if any. If a distribution has no alternate domain names, the list includes an origin domain name for the distribution.

TimeBucket

The hour or the day that data applies to, in Coordinated Universal Time (UTC).

Requests

The total number of requests for all HTTP status codes (for example, 200 or 404) and all methods (for example, GET, HEAD, or POST) during the time period.

BytesDownloaded

The number of bytes that viewers downloaded for the specified distribution during the time period.

BytesUploaded

The number of bytes that viewers uploaded to your origin for the specified distribution during the time period.

TotalErrorRatePct

Requests for which the HTTP status code was a 4xx or 5xx error for the specified distribution during the time period.

4xxErrorRatePct

Requests for which the HTTP status code was a 4xx error for the specified distribution during the time period.

5xxErrorRatePct

Requests for which the HTTP status code was a 5xx error for the specified distribution during the time period.

Using AWS CloudTrail to Capture Requests Sent to the CloudFront API

CloudFront is integrated with CloudTrail, an AWS service that captures information about every request that is sent to the CloudFront API by your AWS account, including your IAM users. CloudTrail periodically saves log files of these requests to an Amazon S3 bucket that you specify. CloudTrail captures information about all requests, whether they were made using the CloudFront console, the CloudFront API, the AWS SDKs, the CloudFront CLI, or another service, for example, AWS CloudFormation.

You can use information in the CloudTrail log files to determine which requests were made to CloudFront, the source IP address from which each request was made, who made the request, when it was made, and so on. To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

Note

CloudFront is a global service. To view CloudFront requests in CloudTrail logs, you must update an existing trail to include global services. For more information, see [Updating a Trail](#) and [About Global Service Events](#) in the [AWS CloudTrail User Guide](#).

Topics

- [CloudFront Information in CloudTrail Log Files \(p. 274\)](#)
- [Understanding CloudFront Log File Entries \(p. 275\)](#)

CloudFront Information in CloudTrail Log Files

When you enable CloudTrail, CloudTrail captures every request that you make to every AWS service that CloudTrail supports. (For a list of supported services, see [Supported Services](#) in the [AWS CloudTrail User Guide](#).) The log files aren't organized or sorted by service; each log file might contain records from more than one service. CloudTrail determines when to create a new log file.

Note

CloudTrail supports all CloudFront API actions.

Every log file entry contains information about who made the request. The user identity information in the log file helps you determine whether the request was made using root or IAM user credentials, using temporary security credentials for a role or federated user, or by another AWS service. For more information, see [userIdentity Element](#) in the *AWS CloudTrail User Guide*.

You can store log files for as long as you want. You can also define Amazon S3 lifecycle rules to archive or delete log files automatically.

By default, your log files are encrypted by using Amazon S3 server-side encryption (SSE).

You can choose to have CloudTrail publish Amazon SNS notifications when new log files are delivered if you want to take quick action upon log file delivery. For more information, see [Configuring Amazon SNS Notifications](#) in the *AWS CloudTrail User Guide*.

You can also aggregate log files from multiple AWS regions and multiple AWS accounts into a single Amazon SNS bucket. For more information, see [Aggregating CloudTrail Log Files to a Single Amazon S3 Bucket](#) in the *AWS CloudTrail User Guide*.

Understanding CloudFront Log File Entries

Each JSON-formatted CloudTrail log file can contain one or more log entries. A log entry represents a single request from any source and includes information about the requested action, including any parameters, the date and time of the action, and so on. The log entries are not guaranteed to be in any particular order; they are not an ordered stack trace of API calls.

The `eventName` element identifies the action that occurred and the API version that was used to perform that action. For example, the following `eventName` value indicates that a web distribution was updated, and the 2014-01-31 API version was used to perform the action:

```
UpdateDistribution2014_01_31
```

The following example shows a CloudTrail log entry that demonstrates five actions:

- Updating a web distribution configuration. The value of `eventName` is `UpdateDistribution`.
- Listing web distributions that are associated with the current account. The value of `eventName` is `ListDistributions`.
- Getting the configuration for a specific web distribution. The value of `eventName` is `GetDistribution`.
- Creating an invalidation batch request. The value of `eventName` is `CreateInvalidation`.
- Listing origin access identities that are associated with the current account. The value of `eventName` is `ListCloudFrontOriginAccessIdentities`.

```
{  
    "Records": [ {  
        "eventVersion": "1.01",  
        "userIdentity": {  
            "type": "IAMUser",  
            "principalId": "A1B2C3D4E5F6G7EXAMPLE",  
            "arn": "arn:aws:iam::111122223333:user/smithj",  
            "accountId": "111122223333",  
            "accessKeyId": "AKIAIOSFODNN7EXAMPLE",  
            "userName": "smithj"  
        },  
        "eventTime": "2014-05-06T18:00:32Z",  
        "eventName": "UpdateDistribution2014_01_31",  
        "requestParameters": {  
            "Action": "UpdateDistribution",  
            "DistributionId": "E4D99A983E8D4D8A983E8D4D8A983E8D",  
            "CallerReference": "14000000000000000000000000000000",  
            "Comment": "Updated distribution",  
            "Enabled": true,  
            "Origins": [ {  
                "Id": "1",  
                "CustomHeaders": {},  
                "CustomOriginConfig": {  
                    "HTTPPort": 80,  
                    "HTTPSPort": 443,  
                    "OriginProtocolPolicy": "http-only",  
                    "OriginType": "HTTP",  
                    "OriginKeepaliveTimeout": 0  
                },  
                "OriginPath": "",  
                "OriginProtocol": "HTTP",  
                "OriginReadTimeout": 0  
            } ],  
            "DefaultRootObject": "index.html",  
            "LambdaFunctionAssociations": [ {  
                "LambdaFunctionARN": "arn:aws:lambda:us-east-1:111122223333:function:myfunction",  
                "EventType": "viewer-request",  
                "InvocationType": "RequestResponse"  
            } ],  
            "PriceClass": "PriceClass_100",  
            "Restrictions": {  
                "GeoRestriction": {}  
            },  
            "SmoothStreaming": false,  
            "SmoothStreamingManifest": "smoothmanifest.m3u8",  
            "SmoothStreamingManifestType": "mpd",  
            "SmoothStreamingManifestVersion": 1,  
            "SmoothStreamingManifestWindow": 10,  
            "SmoothStreamingManifestWindowOffset": 0,  
            "SmoothStreamingManifestWindowUnit": "seconds",  
            "SmoothStreamingManifestWindowType": "absolute",  
            "SmoothStreamingManifestWindowUnitValue": 10,  
            "SmoothStreamingManifestWindowTypeValue": "seconds",  
            "SmoothStreamingManifestWindowTypeValueUnit": "seconds",  
            "SmoothStreamingManifestWindowTypeValueUnitValue": 10  
        },  
        "ResponseParameters": {  
            "CacheBehaviors": [ {  
                "ForwardedValues": {  
                    "Cookies": "none",  
                    "Headers": "none",  
                    "QueryString": "none",  
                    "QueryStringCacheKey": "none"  
                },  
                "FunctionAssociations": [ {  
                    "LambdaFunctionARN": "arn:aws:lambda:us-east-1:111122223333:function:myfunction",  
                    "EventType": "viewer-request",  
                    "InvocationType": "RequestResponse"  
                } ],  
                "MinTTL": 0,  
                "SmoothStreaming": false,  
                "TrustedSigners": {  
                    "Quantity": 0  
                },  
                "TrustedSigner": {}  
            } ],  
            "TrustedSigners": {  
                "Quantity": 0  
            },  
            "TrustedSigner": {}  
        },  
        "Tracing": {  
            "Enabled": false  
        },  
        "WebACLId": "12345678901234567890123456789012",  
        "WebACLARN": "arn:aws:cloudfront:us-east-1:111122223333:webacl/12345678901234567890123456789012",  
        "WebACLType": "Standard",  
        "WebACLStatus": "Enabled",  
        "WebACLVersion": 1  
    } ]  
}
```

```
"sourceIPAddress": "192.0.2.17",
"userAgent": "aws-sdk-ruby/1.39.0 ruby/1.9.3 x86_64-linux",
"requestParameters": {
    "id": "EDFDVBD6EXAMPLE",
    "ifMatch": "E9LHASXEXAMPLE",
    "distributionConfig": {
        "restrictions": {
            "geoRestriction": {
                "quantity": 0,
                "restrictionType": "none"
            }
        },
        "customErrorResponses": {
            "quantity": 0
        },
        "defaultRootObject": "index.html",
        "aliases": {
            "quantity": 1,
            "items": ["example.com"]
        },
        "logging": {
            "bucket": "",
            "enabled": false,
            "prefix": "",
            "includeCookies": false
        },
        "viewerCertificate": {
            "iamCertificateId": "A1B2C3D4E5F6G7EXAMPLE",
            "sslSupportMethod": "sni-only"
        },
        "callerReference": "2014-05-06 64832",
        "defaultCacheBehavior": {
            "targetOriginId": "Images",
            "allowedMethods": {
                "items": ["GET",
                          "HEAD"],
                "quantity": 2
            },
            "forwardedValues": {
                "cookies": {
                    "forward": "none"
                },
                "queryString": false
            },
            "minTTL": 300,
            "trustedSigners": {
                "enabled": false,
                "quantity": 0
            },
            "viewerProtocolPolicy": "redirect-to-https",
            "smoothStreaming": false
        },
        "origins": {
            "items": [
                {
                    "customOriginConfig": {
                        "HTTPSPort": 443,
                        "originProtocolPolicy": "http-only",
                        "HTTPPort": 80
                    }
                }
            ]
        }
    }
}
```

```

        },
        "domainName": "myawsbucket.s3-website-us-east-1.amazonaws.com",
        "id": "Web page origin"
    },
    {
        "customOriginConfig": {
            "HTTPSPort": 443,
            "originProtocolPolicy": "http-only",
            "HTTPPort": 80
        },
        "domainName": "myotherawsbucket.s3-website-us-west-2.amazonaws.com",
        "id": "Images"
    ],
    "quantity": 2
},
"enabled": true,
"cacheBehaviors": {
    "allowedMethods": {
        "items": ["GET",
                  "HEAD"],
        "quantity": 2
    },
    "trustedSigners": {
        "enabled": false,
        "quantity": 0
    },
    "targetOriginId": "Web page origin",
    "smoothStreaming": false,
    "viewerProtocolPolicy": "redirect-to-https",
    "minTTL": 300,
    "forwardedValues": {
        "cookies": {
            "forward": "none"
        },
        "queryString": false
    },
    "pathPattern": "*.html"
}],
"quantity": 1
},
"priceClass": "PriceClass_All",
"comment": "Added an origin and a cache behavior"
}
},
"responseElements": {
    "eTag": "E2QWRUHEXAMPLE",
    "distribution": {
        "domainName": "d111111abcdef8.cloudfront.net",
        "status": "InProgress",
        "distributionConfig": {
            distributionConfig response omitted
        },
        "id": "EDFDVBD6EXAMPLE",
        "lastModifiedTime": "May 6, 2014 6:00:32 PM",
        "activeTrustedSigners": {
            "quantity": 0,

```

```
        "enabled": false
    },
    "inProgressInvalidationBatches": 0
}
},
{
    "requestID": "4e6b66f9-d548-11e3-a8a9-73e33example",
    "eventID": "5ab02562-0fc5-43d0-b7b6-90293example"
},
{
    "eventVersion": "1.01",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "A1B2C3D4E5F6G7EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user smithj",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "userName": "smithj"
    },
    "eventTime": "2014-05-06T18:01:35Z",
    "eventName": "ListDistributions2014_01_31",
    "sourceIPAddress": "192.0.2.17",
    "userAgent": "aws-sdk-ruby/1.39.0 ruby/1.9.3 x86_64-linux",
    "requestParameters": null,
    "responseElements": null,
    "requestID": "52de9f97-d548-11e3-8fb9-4dad0example",
    "eventID": "eb91f423-6dd3-4bb0-a148-3cdfbexample"
},
{
    "eventVersion": "1.01",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "A1B2C3D4E5F6G7EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user smithj",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "userName": "smithj"
    },
    "eventTime": "2014-05-06T18:01:59Z",
    "eventName": "GetDistribution2014_01_31",
    "sourceIPAddress": "192.0.2.17",
    "userAgent": "aws-sdk-ruby/1.39.0 ruby/1.9.3 x86_64-linux",
    "requestParameters": {
        "id": "EDFDVBD6EXAMPLE"
    },
    "responseElements": null,
    "requestID": "497b3622-d548-11e3-8fb9-4dad0example",
    "eventID": "c32289c7-005a-46f7-9801-cba4lexample"
},
{
    "eventVersion": "1.01",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "A1B2C3D4E5F6G7EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user smithj",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "userName": "smithj"
    },
}
```

```

    "eventTime": "2014-05-06T18:02:27Z",
    "eventName": "CreateInvalidation2014_01_31",
    "sourceIPAddress": "192.0.2.17",
    "userAgent": "aws-sdk-ruby/1.39.0 ruby/1.9.3 x86_64-linux",
    "requestParameters": {
        "invalidationBatch": {
            "callerReference": "2014-05-06 64947",
            "paths": {
                "quantity": 3,
                "items": ["/images/new.jpg",
                           "/images/logo.jpg",
                           "/images/banner.jpg"]
            }
        },
        "distributionId": "EDFDVBD6EXAMPLE"
    },
    "responseElements": {
        "invalidation": {
            "createTime": "May 6, 2014 6:02:27 PM",
            "invalidationBatch": {
                "callerReference": "2014-05-06 64947",
                "paths": {
                    "quantity": 3,
                    "items": ["/images/banner.jpg",
                               "/images/logo.jpg",
                               "/images/new.jpg"]
                }
            },
            "status": "InProgress",
            "id": "ISRZ85EXAMPLE"
        },
        "location": "https://cloudfront.amazonaws.com/2014-01-31/distribution/ED
FDVBD6EXAMPLE/invalidation/ISRZ85EXAMPLE"
    },
    "requestID": "4e200613-d548-11e3-a8a9-73e33example",
    "eventID": "191ebb93-66b7-4517-a741-92b0eexample"
},
{
    "eventVersion": "1.01",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "A1B2C3D4E5F6G7EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user/smithj",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "userName": "smithj"
    },
    "eventTime": "2014-05-06T18:03:08Z",
    "eventName": "ListCloudFrontOriginAccessIdentities2014_01_31",
    "sourceIPAddress": "192.0.2.17",
    "userAgent": "aws-sdk-ruby/1.39.0 ruby/1.9.3 x86_64-linux",
    "requestParameters": null,
    "responseElements": null,
    "requestID": "42ca4299-d548-11e3-8fb9-4dad0example",
    "eventID": "7aeb434f-eb55-4e2a-82d8-417d5example"
}
]
}

```

Tagging Amazon CloudFront Distributions

Tags are words or phrases that you can use to identify and organize your AWS resources. You can add multiple tags to each resource, and each tag includes a key and a value that you define. For example, the key might be "domain" and the value might be "example.com". You can search and filter your resources based on the tags you add.

When you apply tags to CloudFront distributions or other AWS resources (such as Amazon EC2 instances or Amazon S3 buckets) and activate the tags, AWS generates a cost allocation report as a comma-separated value (CSV file) with your usage and costs aggregated by your active tags. You can apply tags that represent business categories (such as cost centers, application names, or owners) to organize your costs across multiple services. For more information about using tags for cost allocation, see [Use Cost Allocation Tags](#) in the [AWS Billing and Cost Management User Guide](#).

For the current limit on the number of tags that you can add to a distribution, see [Limits \(p. 353\)](#). To request a higher limit, [create a case](#) with the AWS Support Center.

Note the following:

- You can tag web and RTMP distributions, but you can't tag origin access identities or invalidations.
- [Tag Editor](#) and [Resource Groups](#) are currently not supported for CloudFront.

You can also apply tags to resources by using the CloudFront API, AWS CLI, SDKs, and AWS Tools for Windows PowerShell. For more information, see the following documentation:

- CloudFront API – See [Actions on Tags](#) in the *Amazon CloudFront API Reference*
- AWS CLI – See [cloudfront](#) in the *AWS Command Line Interface Reference*
- SDKs – See the applicable SDK documentation on the [AWS Documentation](#) page
- Tools for Windows PowerShell – See [Amazon CloudFront](#) in the [AWS Tools for Windows PowerShell Reference](#)

Topics

- [Tag Restrictions \(p. 281\)](#)
- [Adding, Editing, and Deleting Tags for Distributions \(p. 281\)](#)

Tag Restrictions

The following basic restrictions apply to tags:

- Maximum number of tags per resource – 10
- Maximum key length – 128 Unicode characters
- Maximum value length – 256 Unicode characters
- Valid values for key and value – a-z, A-Z, 0-9, space, and the following characters: _ . : / = + - and @
- Tag keys and values are case sensitive
- Don't use `aws:` as a prefix for keys; it's reserved for AWS use

Adding, Editing, and Deleting Tags for Distributions

The following procedure explains how to add, edit, and delete tags for your distributions in the CloudFront console.

To add tags, edit, or delete tags for a distribution

1. Sign in to the AWS Management Console and open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose the ID for the distribution that you want to update.
3. Choose the **Tags** tab.
4. Choose **Add or edit tags**.
5. On the Add or edit tags page, you can do the following:

Add a tag

Enter a key and, optionally, a value for the tag.

Edit a tag

Change the key, the value, or both. You can also delete the value for a tag, but the key is required.

Delete a tag

Choose the X on the right side of the value field.

6. Choose Save.

Troubleshooting

Topics

- I can't view the files in my web distribution. (p. 282)
- I can't view the files in my RTMP distribution. (p. 284)
- Error Message: Certificate: <certificate-id> is being used by CloudFront. (p. 284)

I can't view the files in my web distribution.

If you cannot view file in your CloudFront web distribution, the following topics describe some common solutions.

Did you sign up for both CloudFront and Amazon S3?

To use Amazon CloudFront with an Amazon S3 origin, you must sign up for both CloudFront and Amazon S3, separately. For more information about signing up for CloudFront and Amazon S3, see [Getting Started with CloudFront \(p. 37\)](#).

Are your Amazon S3 bucket and object permissions set correctly?

If you are using CloudFront with an Amazon S3 origin, the original versions of your content are stored in an Amazon S3 bucket. The easiest way to use CloudFront with Amazon S3 is to make all your objects publicly readable in Amazon S3. To do this, you must explicitly enable public read privileges for each object you upload to Amazon S3.

If your content is not publicly readable, you need to create a CloudFront origin access identity so CloudFront can access it. For more information about CloudFront origin access identities, see [Using an Origin Access Identity to Restrict Access to Your Amazon S3 Content \(p. 166\)](#).

Object properties and bucket properties are independent. You must explicitly grant privileges to each object in Amazon S3. Objects do not inherit properties from buckets and object properties must be set independently of the bucket.

Is your alternate domain name (CNAME) correctly configured?

If you already have an existing CNAME record for your domain name, update that record or replace it with a new one that points to your distribution's domain name.

Also, make sure your CNAME record points to your distribution's domain name, not your Amazon S3 bucket. You can confirm that the CNAME record in your DNS system points to your distribution's domain name. To do so, use a DNS tool like dig. (For information about dig, go to <http://www.kloth.net/services/dig.php>.)

The following shows an example dig request on a domain name called `images.example.com`, and the relevant part of the response. Under `ANSWER SECTION`, see the line that contains `CNAME`. The CNAME record for your domain name is set up correctly if the value on the right side of `CNAME` is your CloudFront distribution's domain name. If it's your Amazon S3 origin server bucket or some other domain name, then the CNAME record is set up incorrectly.

```
[prompt]> dig images.example.com

; <>> DiG 9.3.3rc2 <>< images.example.com
;; global options: printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 15917
;; flags: qr rd ra; QUERY: 1, ANSWER: 9, AUTHORITY: 2, ADDITIONAL: 0
;; QUESTION SECTION:
;images.example.com.      IN      A
;; ANSWER SECTION:
images.example.com. 10800 IN  CNAME  d11111abcdef8.cloudfront.net.
...
...
```

For more information about CNAMEs, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Are you referencing the correct URL for your CloudFront distribution?

Make sure the URL you're referencing uses your CloudFront distribution domain name (or your CNAME), not your Amazon S3 bucket or custom origin.

Do you need help troubleshooting a custom origin?

If you need AWS to help you troubleshoot a custom origin, we will probably need to inspect the `X-Amz-Cf-Id` header entries from your requests. If you are not already logging these entries, you might want to consider it for the future. For more information, see [Requirements and Recommendations for Using Amazon EC2 and Other Custom Origins \(p. 81\)](#).

I can't view the files in my RTMP distribution.

If you cannot view the files in an RTMP distribution, are your URL and your playback client correctly configured? RTMP distributions require you to use an RTMP protocol instead of HTTP, and you must make a few minor configuration changes to your playback client. For information about creating RTMP distributions, see [Task List for Streaming Media Files Using RTMP \(p. 89\)](#).

Error Message: Certificate: <certificate-id> is being used by CloudFront.

Problem: You're trying to delete an SSL certificate from the IAM certificate store, and you're getting the message "Certificate: <certificate-id> is being used by CloudFront."

Solution: Every CloudFront web distribution must be associated either with the default CloudFront certificate or with a custom SSL certificate. Before you can delete an SSL certificate, you need to either rotate SSL certificates (replace the current custom SSL certificate with another custom SSL certificate) or revert from using a custom SSL certificate to using the default CloudFront certificate. Perform the procedure in the applicable section:

- [Rotating SSL/TLS Certificates \(p. 240\)](#)
- [Reverting from a Custom SSL/TLS Certificate to the Default CloudFront Certificate \(p. 241\)](#)

Load Testing CloudFront

Traditional load testing methods don't work well with CloudFront because CloudFront uses DNS to balance loads across geographically dispersed edge locations and within each edge location. When a client requests content from CloudFront, the client receives a DNS response that includes a set of IP addresses. If you test by sending requests to just one of the IP addresses that DNS returns, you're testing only a small subset of the resources in one CloudFront edge location, which doesn't accurately represent actual traffic patterns. Depending on the volume of data requested, testing in this way may overload and degrade the performance of that small subset of CloudFront servers.

CloudFront is designed to scale for viewers that have different client IP addresses and different DNS resolvers across multiple geographic regions. To perform load testing that accurately assesses CloudFront performance, we recommend that you do all of the following:

- Send client requests from multiple geographic regions.
- Configure your test so each client makes an independent DNS request; each client will then receive a different set of IP addresses from DNS.
- For each client that is making requests, spread your client requests across the set of IP addresses that are returned by DNS, which ensures that the load is distributed across multiple servers in a CloudFront edge location.

CloudFront Streaming Tutorials

The following tutorials explain how to use CloudFront for live streaming, for geoblocking, and for RTMP streaming.

Live Streaming

- [Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0 \(p. 286\)](#)
- [Live Smooth Streaming Using Amazon CloudFront and IIS Media Services 4.1 \(p. 304\)](#)
- [Live HTTP Streaming Using Wowza Streaming Engine 4.2 \(p. 314\)](#)
- [Live HTTP Streaming Using CloudFront and Any HTTP Origin \(p. 324\)](#)

On-Demand Streaming

- [On-Demand Media Streaming with Unified Streaming \(p. 325\)](#)

RTMP Streaming

- [On-Demand Video Streaming Using CloudFront and Adobe Flash Player \(p. 338\)](#)
- [On-Demand Video Streaming Using CloudFront and Flowplayer for Adobe Flash \(p. 343\)](#)
- [On-Demand Video Streaming Using CloudFront and JW Player \(p. 348\)](#)

Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0

Topics

- [Overview \(p. 287\)](#)
- [Steps to Configure Live Streaming \(p. 288\)](#)
- [Creating an Amazon Web Services Account \(p. 288\)](#)

- [Creating an Amazon EC2 Key Pair \(p. 288\)](#)
- [Subscribing to Adobe Media Server \(p. 289\)](#)
- [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#)
- [Verifying that Adobe Media Server Is Running \(p. 291\)](#)
- [Setting Up Adobe Flash Media Live Encoder to Publish a Live Stream \(p. 292\)](#)
- [Embedding Strobe Media Playback for an Amazon CloudFront Live HTTP Stream in a Web Application \(p. 295\)](#)
- [Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming \(p. 296\)](#)
- [Frequently Asked Questions \(p. 297\)](#)
- [Additional Documentation \(p. 303\)](#)

With Amazon Web Services live streaming, you can use Adobe Media Server version 5.0 to stream live performances, webinars, and other events. This tutorial walks you through the process of configuring live streaming with Adobe Media Server 5.0.

Overview

Adobe Media Server 5.0 supports two HTTP streaming formats:

- HLS (HTTP Live Streaming), supported by iOS devices
- HDS (HTTP Dynamic Streaming), supported by Flash applications (including Strobe Media Playback)

Note

An earlier version of this tutorial explained how to configure HDS streaming using the Flash Media Playback player, but Adobe stopped supporting that player. We've updated the tutorial to use Strobe Media Playback, an open-source media player that is similar in functionality to Flash Media Playback.

Here's how Adobe Media Server and CloudFront work together to stream an event in realtime:

1. You use AWS CloudFormation to provision an Amazon EC2 instance running Adobe Media Server 5.0 and to create a CloudFront distribution, as described in this tutorial.
2. You capture your event using a digital video camera, for example, the video camera in a laptop computer.
3. You use an encoder on the site of the event, for example, Adobe Flash Media Live Encoder, to compress the raw video feed and send it to Adobe Media Server. (Flash Media Live Encoder is a [free download](#) and is available for Windows and Mac OS.)
4. Adobe Media Server breaks the video stream into a series of smaller files. This server is the origin for your CloudFront distribution.
5. When your users browse to the CloudFront URL that you gave them to view the event, CloudFront routes their HTTP requests to the nearest edge location (by latency).
6. The edge location requests the video stream from Adobe Media Server.
7. Adobe Media Server returns the video stream in small files to the CloudFront edge location.
8. The CloudFront edge location serves the video stream to the viewer that made the request, and caches the small files to speed up the response to subsequent requests for the live stream.

This tutorial summarizes how to integrate CloudFront with Adobe Media Server running on an Amazon EC2 instance. For more information about Adobe Media Server and about the AWS services that you use for live streaming, see the following:

- For more information about Adobe Media Server options not covered in this tutorial, see [Additional Documentation \(p. 303\)](#).

- For information about available Adobe Media Server features, see [Adobe Media Server 5 on Amazon Web Services](#).
- To review the new features in Adobe Media Server 5.0, see [What's New in Adobe Media Server 5.0.1](#) on the Adobe website.
- For more information about how to manage and secure your Amazon EC2 instance, see the [Amazon EC2 documentation](#).
- For more information about AWS CloudFormation, see [AWS CloudFormation Documentation](#).
- For more help, see [Frequently Asked Questions \(p. 297\)](#).

Steps to Configure Live Streaming

To set up live streaming with Amazon Web Services (AWS), review the [system requirements for Adobe Flash Player](#). Then perform the procedures in the following sections:

1. [Creating an Amazon Web Services Account \(p. 288\)](#)
2. [Creating an Amazon EC2 Key Pair \(p. 288\)](#)
3. [Subscribing to Adobe Media Server \(p. 289\)](#)
4. [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#)
5. [Verifying that Adobe Media Server Is Running \(p. 291\)](#)
6. [Setting Up Adobe Flash Media Live Encoder to Publish a Live Stream \(p. 292\)](#)
7. [Embedding Strobe Media Playback for an Amazon CloudFront Live HTTP Stream in a Web Application \(p. 295\)](#)
8. [Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming \(p. 296\)](#)

Creating an Amazon Web Services Account

If you already have an AWS account, skip to [Creating an Amazon EC2 Key Pair \(p. 288\)](#). If you don't already have an AWS account, use the following procedure to create one.

Note

When you create an account, AWS automatically signs up the account for all services. You are charged only for the services you use.

To create an AWS account

1. Go to <http://aws.amazon.com>, and click **Create an AWS Account**.
2. Follow the on-screen instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Next: [Creating an Amazon EC2 Key Pair \(p. 288\)](#)

Creating an Amazon EC2 Key Pair

If you already have an Amazon EC2 key pair in the Amazon EC2 region in which you want to configure live streaming, skip to [Subscribing to Adobe Media Server \(p. 289\)](#). If you don't have a key pair in that region, perform the following procedure.

A key pair is a security credential similar to a password. You specify a key pair when you create an AWS CloudFormation stack for live streaming, later in this process. After live streaming is configured, you use the key pair to securely connect to your Amazon EC2 instance.

To create an Amazon EC2 key pair

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the **Region** list, click the region in which you want to create the key pair.

You must create the key pair in the same region in which you will create your AWS CloudFormation stack for live streaming later in this process. We recommend that you create the key pair and the stack for live streaming in the region that is closest to the users who will be doing the streaming.
3. In the navigation pane, click **Key Pairs**.
4. In the **Key Pairs** pane, click **Create Key Pair**.
5. In the Create Key Pair dialog box, enter a name for the key pair, and make note of the name. You'll enter this value when you create an AWS CloudFormation live-streaming stack, later in the process of setting up live streaming.
6. Click **Create**.
7. In the Opening <key_pair_name>.pem dialog box, save the .pem file to a safe place on your computer.

Important

This is the only opportunity you'll have to download and save your private key.

8. Click **Close** to close the Create Key Pair dialog box.

Next: [Subscribing to Adobe Media Server \(p. 289\)](#)

Subscribing to Adobe Media Server

Perform the following procedure to subscribe to Adobe Media Server for Amazon Web Services through AWS Marketplace.

Important

You can subscribe an AWS account to Adobe Media Server only once. If your AWS account already has an Adobe Media Server subscription, use that subscription to configure live streaming.

Adobe Media Server has a \$5.00 monthly subscription fee, which includes an unlimited number of Adobe Media Server instances. In addition to the monthly subscription fee, you pay a fee for hourly usage and a fee for data transfer. You can view a detailed price list as part of the following procedure.

Note

In an earlier version of this tutorial, you subscribed to Adobe Media Server using Amazon DevPay instead of AWS Marketplace. If you're currently running Adobe Media Server and you subscribed using Amazon DevPay, go to the [Adobe Media Server on Amazon Web Services](#) page and cancel your Amazon DevPay subscription to Adobe Media Server. Otherwise, you'll continue to be billed \$5 per month for the old subscription through Amazon DevPay, and you'll be billed an additional \$5 per month for the new subscription through AWS Marketplace.

To order Adobe Media Server 5 for Amazon Web Services

1. Go to the [Adobe Media Server 5 Extended](#) page on the AWS Marketplace website.
2. Review product information and click **Continue**.
3. On the **Launch on EC2: Adobe Media Server 5 Extended** page, click the **Manual Launch with EC2 Console, APIs or CLI** tab.
4. In the **Pricing Details** section, select the region in which to create an Amazon EC2 instance for live streaming. Review the corresponding pricing information.

Important

Don't use the buttons on this page to launch Adobe Media Server. In the next procedure, you create an AWS CloudFormation stack that launches an Amazon EC2 instance and installs Adobe Media Server.

5. Click **Accept Terms** to sign up for a monthly subscription.

Next: [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#)

Creating an AWS CloudFormation Stack for Live Streaming

The following procedure uses an AWS CloudFormation template to create a stack that launches the AWS resources required by live streaming, including an Amazon EC2 instance and a CloudFront distribution.

Important

You incur hourly charges for an Amazon EC2 instance beginning when you create the AWS CloudFormation stack that deploys the Amazon EC2 instance. Charges continue to accrue until you delete the AWS CloudFormation stack regardless of whether you use the Amazon EC2 instance to stream live video. For more information, see the [Adobe Media Server 5 Extended](#) page on the AWS Marketplace website. When your live event is over, delete the stack that you created for live streaming. This deletes the AWS resources that were created for your live-streaming event, and stops the AWS charges for the resources. For more information, see [Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming \(p. 296\)](#).

For more information about AWS CloudFormation, see [AWS CloudFormation Documentation](#).

To create an AWS CloudFormation stack for live streaming

1. To start the Create Stack wizard, click one of the following Amazon EC2 regions:
 - [Create a stack in US East \(N. Virginia\)](#)
 - [Create a stack in US West \(Oregon\)](#)
 - [Create a stack in US West \(N. California\)](#)
 - [Create a stack in EU \(Ireland\)](#)
 - [Create a stack in Asia Pacific \(Singapore\)](#)
 - [Create a stack in Asia Pacific \(Tokyo\)](#)
 - [Create a stack in Asia Pacific \(Sydney\)](#)
 - [Create a stack in South America \(São Paulo\)](#)

The wizard starts and the applicable URL automatically appears in the **Provide an S3 URL to template** field.

Note

If you want users to view your live stream using a Flash-based player that is hosted on your own domain, see [How do I update crossdomain.xml for a Flash-based stream hosted on my own domain? \(p. 299\)](#).

2. If you are not already signed in to the AWS Management Console, sign in when prompted.
3. (Optional) Change the **Stack Name**. The stack name must not contain spaces, and it must be unique within your AWS account.

Do not change the **Template** option or the address in **Provide an S3 URL to template**.

4. Click **Next Step**.

5. On the **Specify Parameters** page, for **AMSAAdminPassword**, enter a password (minimum 8 characters) for the AMS Administration Console.
6. For **AMSAAdminUserName**, enter a user name. You'll use this value and the password that you entered in the previous step to log in to the AMS Administration Console after your Amazon EC2 Adobe Media Server instance is created.
7. For **InstanceType**, enter an instance type, which determines pricing for your Adobe Media Server instance. For more information about Amazon EC2 instance types, see [Available Instance Types](#) in the *Amazon EC2 User Guide for Linux Instances*.

For information about pricing, see the [Adobe Media Server 5 Extended](#) page on the AWS Marketplace website.

8. For **KeyPair**, enter the name of an Amazon EC2 key pair in the same region that you chose in Step 1. The key pair must be associated with the account that you're currently signed in with. If you created a key pair when you performed the procedure in [Creating an Amazon EC2 Key Pair \(p. 288\)](#), enter the name of that key pair.
9. For **StreamName**, enter a short name (without spaces) for your live stream.
10. Click **Next Step**.
11. (Optional) On the **Add Tags** page, add one or more tags.
12. (Optional) To configure SNS notification, to specify how long you're willing to wait for the stack to be created, to choose whether to roll back changes if stack creation fails, and to enter a stack policy, click **Advanced**, and adjust settings as desired.
13. Click **Next Step**.
14. Review the settings for the stack. When you're satisfied with the settings, click **Create**, and AWS CloudFormation creates the stack.

Creating your stack may take several minutes. To track the progress of the stack creation, select the stack, and click the **Events** tab in the bottom frame. If AWS CloudFormation cannot create the stack, the Events tab lists error messages.

When your stack is ready, in the top frame, the status for the stack changes to **CREATE_COMPLETE**.

When your stack is created, click the **Outputs** tab, which displays the stack creation outputs. You will use these values when you set up Adobe Flash Media Live Encoder later in the process.

Next: [Verifying that Adobe Media Server Is Running \(p. 291\)](#)

Verifying that Adobe Media Server Is Running

After AWS CloudFormation creates the stack, perform the following procedure to verify Adobe Media Server is running on the Amazon Amazon EC2 instance you provisioned using AWS CloudFormation.

To verify that Adobe Media Server is running

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the top pane, select the stack that you created in [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#).
3. In the bottom pane, click the **Outputs** tab.
4. Click on the value of the **AMSServer** key, which is the URL to the Amazon EC2 instance that you provisioned when you performed the procedure in [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#).
5. The Adobe Media Server page appears and begins streaming content, which shows that Adobe Media Server is running.

If streaming does not start, return to [Overview \(p. 287\)](#), and verify that the values you specified in the first four tasks are correct.

If the values were all correct, but streaming still has not started, see [How do I troubleshoot my Amazon EC2 instance if streaming doesn't start? \(p. 303\)](#).

Next: [Setting Up Adobe Flash Media Live Encoder to Publish a Live Stream \(p. 292\)](#)

Setting Up Adobe Flash Media Live Encoder to Publish a Live Stream

Adobe Media Server on Amazon Web Services includes an application called livepkgr that packages published streams for delivery using HTTP Dynamic Streaming (HDS) and HTTP Live Streaming (HLS).

The following procedure shows how to set up Adobe Flash Media Live Encoder (FMLE) to publish your live stream to the livepkgr application on Adobe Media Server 5.0.

Note

The Windows version of Flash Media Live Encoder doesn't support the AAC audio format. To add support for AAC, Adobe recommends that you purchase the [MainConcept AAC encoder](#).

To specify live-streaming settings in Flash Media Live Encoder

1. Sign in to the computer that you'll use to broadcast the live stream.
2. Open a web browser, and go to the [Adobe Flash Media Live Encoder](#) page.
3. Download and install Flash Media Live Encoder.

Note

Flash Media Live Encoder is free, but to download it, you need an Adobe account (also free).

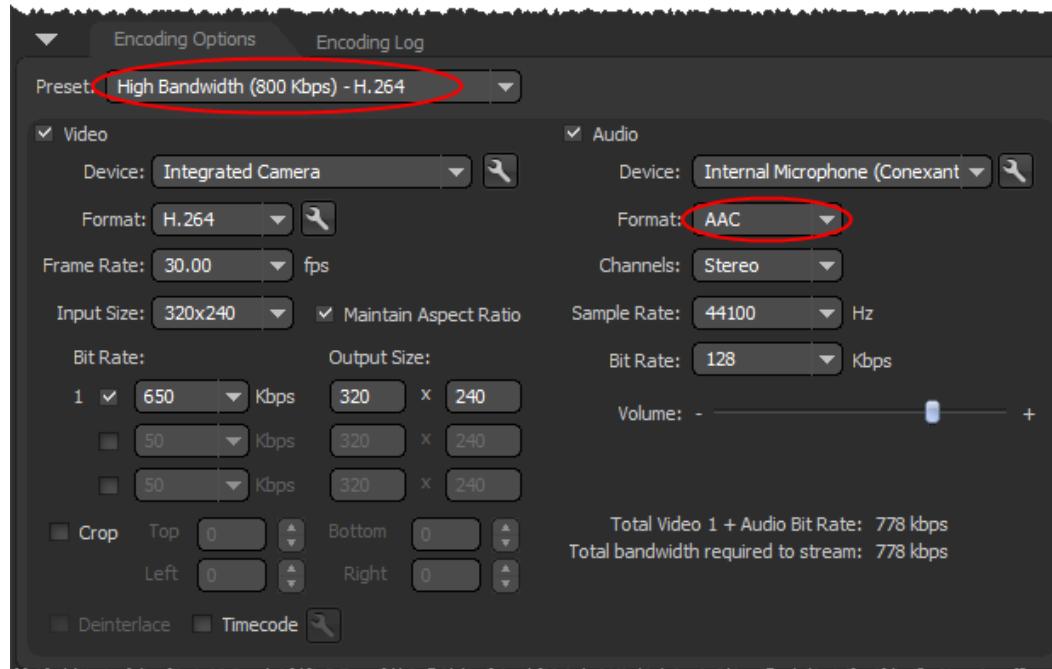
4. Open the Flash Media Live Encoder config.xml file in a text editor. The default installation location depends on your operating system:
 - **32-bit Windows:** C:\Program Files\Adobe\Flash Media Live Encoder 3.2.
 - **64-bit Windows:** C:\Program Files (x86)\Adobe\Flash Media Live Encoder 3.2\Conf.
 - **Macintosh:** Applications\Adobe\Flash Media Live Encoder 3.2.

5. In config.xml, set the value of the following <enable> element to true:

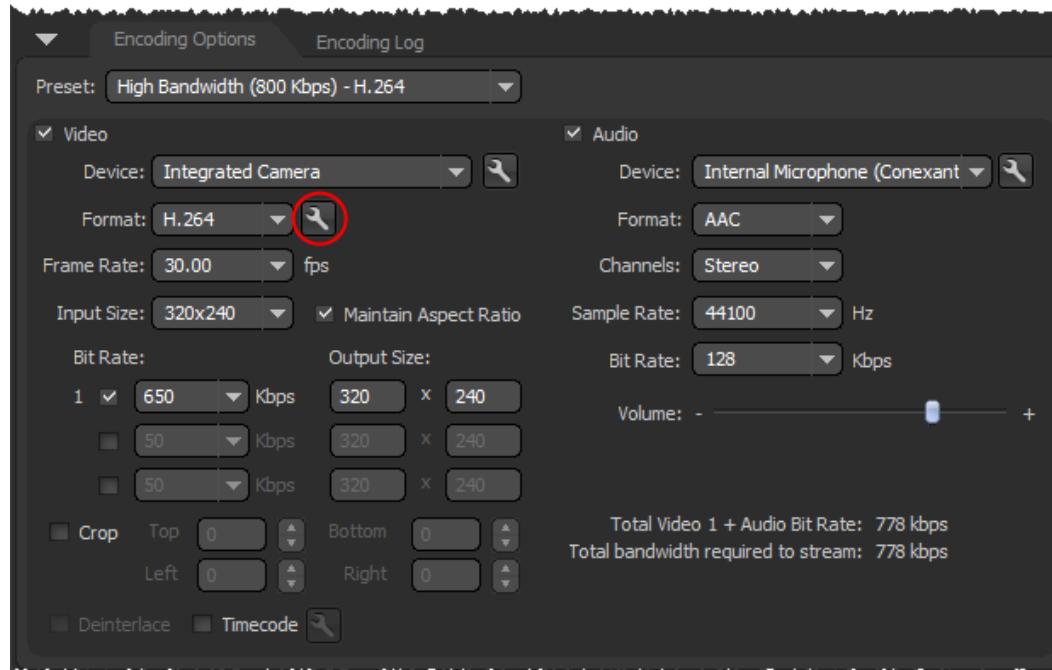
```
<flashmedialiveencoder_config>
  ...
  <mbrconfig>
    ...
    <streamsynchronization>
      ...
      <!-- "true" to enable this feature, "false" to disable. -->
      <enable>true</enable>
```

6. Save the file.
7. Run Flash Media Live Encoder.
8. On the **Encoding Options** tab, for **Preset**, select **High Bandwidth (800 Kbps) — H.264**.
9. On the **Encoding Options** tab, under the **Audio** check box, for **Format**, select **AAC**.

Amazon CloudFront Developer Guide
Setting Up Adobe Flash Media Live Encoder to Publish
a Live Stream

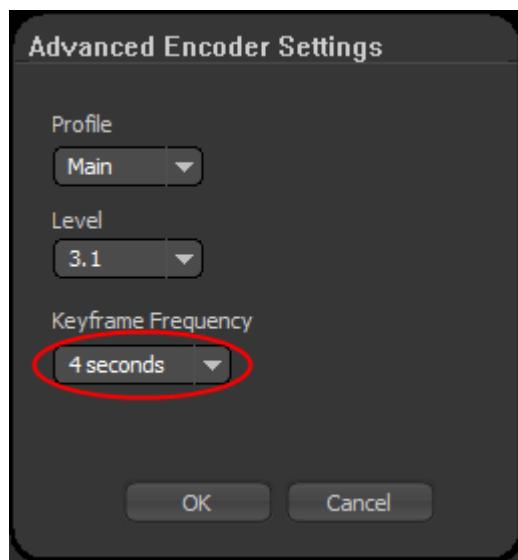


10. In the **Video** section of the **Encoding Options** tab, click the wrench icon to the right of the **Format** list to open the **Advanced Encoder Settings** dialog box.



11. In the **Advanced Encoder Settings** dialog box, for **Keyframe Frequency**, select **4 Seconds**.

You can also use a multiple of the value of the <FragmentDuration> element in the applications/livepkgr/events/_definst_/liveevent/Event.xml file. The default value of <FragmentDuration> is 4000 milliseconds (4 seconds).



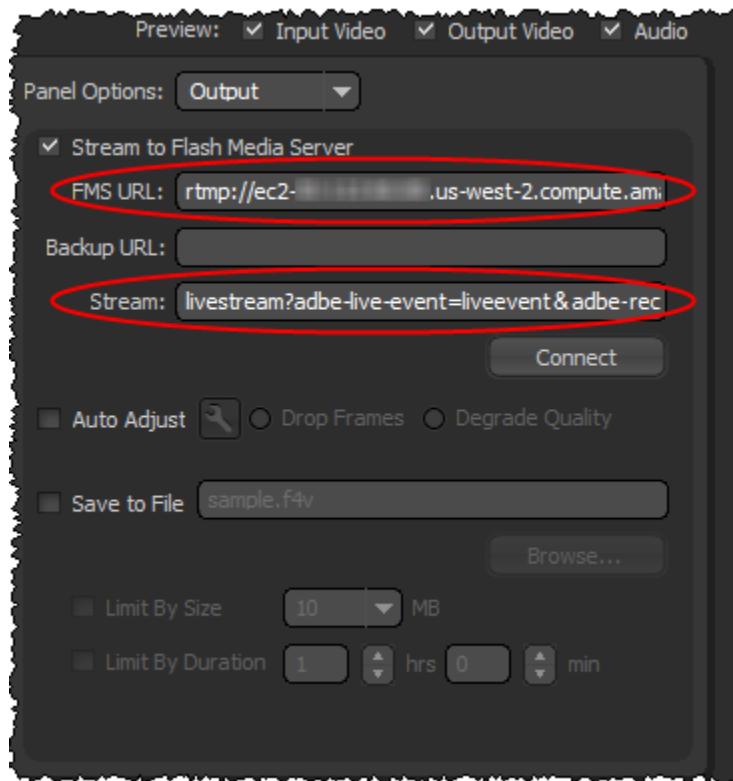
12. Click **OK** to save the setting and return to the main page. The selection for the **Preset** list changes to **Custom**.
13. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
14. Check the checkbox for the stack that you created for live streaming.
15. In the bottom pane, click the **Outputs** tab.
16. Copy the value of the **AMSLURL** key, for example,
rtmp://ec2-00-11-22-33.us-west-1.compute.amazonaws.com/livepkgr.
17. In Flash Media Live Encoder, in the Stream to Flash Media Server section, in the **FMS URL** setting, paste the value of the AMSURL key that you copied from the AWS CloudFormation console.
18. In the AWS CloudFormation console, copy the value of the **Stream** key, for example,
livestream?adbe-live-event=liveevent.
19. In Flash Media Live Encoder, in the **Stream** setting, paste the value of the **Stream** key that you copied from the AWS CloudFormation console.

Note

If you anticipate having to stop and restart the live stream, enter the following value in the **Stream** field instead:

livestream?adbe-live-event=liveevent&adbe-record-mode=record

If you publish a live stream in record mode (*adbe-record-mode=record*), and then stop the stream and restart it, Adobe Media Server will delete the previous stream and start a new stream instead of appending to the previous stream when you restart. However, if you don't use record mode and you stop the live stream, you have to reconfigure live streaming before you can restart the stream.



20. Uncheck **Save to File**.
21. Click **Connect** to connect to your Adobe Media Server instance.
22. Click **Start** to start encoding and publishing your live stream to the livepkgr application on your Adobe Media Server instance.

Next: [Embedding Strobe Media Playback for an Amazon CloudFront Live HTTP Stream in a Web Application \(p. 295\)](#)

Embedding Strobe Media Playback for an Amazon CloudFront Live HTTP Stream in a Web Application

Follow one of these procedures to get the embed code that you will include in your web page for the live stream:

- [To embed Strobe Media Playback for your HTTP stream \(p. 295\)](#)
- [To play your live HLS stream on an Apple device by using CloudFront \(p. 296\)](#)

To embed Strobe Media Playback for your HTTP stream

1. Download the latest version of Open Source Media Framework (OSMF), which contains Strobe Media Playback. OSMF is available at <http://sourceforge.net/projects/osmf.adobe/files/>.
2. Unzip the file that you downloaded in step 1.
3. In the location where you unzipped the downloaded file, find StrobeMediaPlayback.swf, and copy it to a location, such as an Amazon S3 bucket, that is accessible to your live-streaming users.
4. Confirm that your users have the permissions necessary to access StrobeMediaPlayback.swf.

5. Change permissions in the crossdomain.xml file to allow users to view the live stream using Strobe Media Playback. For more information, see [How do I update crossdomain.xml for a Flash-based stream hosted on my own domain? \(p. 299\)](#)
6. In the location where you unzipped the downloaded file, find setup.html and open it in a web browser.
7. On the **Change Your Flash Vars** page, in the **Embed Parameters** section, in the **Source** field, enter the full URL for StrobeMediaPlayback.swf. This is the file that you copied in step 3. For example:

`https://myawsbucket.s3.amazonaws.com/LiveStreaming/StrobeMediaPlayback.swf`

8. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 9. Select the stack for live streaming.
 10. In the bottom pane, click the **Outputs** tab.
 11. Copy the value of the **LiveHDSManifest** key, as shown in the following example:
- `http://d123.cloudfront.net/hds-live/livepkgr/_definst_/liveevent/livestream.f4m`
12. Back on the Change Your Flash Vars page, in the **Flash Vars** section, in the **src** field, paste the value that you copied in step 11.
 13. At the bottom of the Change Your Flash Vars page, click **Preview and Update**.
 14. Play the video to ensure that you're satisfied with the current settings, and update the settings as needed.
 15. If you change any settings, click **Preview and Update** again.
 16. To embed Strobe Media Playback in a web page, copy the contents of the **Preview Code** text box, and paste it into the HTML code for your website.

To play your live HLS stream on an Apple device by using CloudFront

1. Change permissions in the crossdomain.xml file to allow users to view the live stream using an Apple device. For more information, see [How do I update crossdomain.xml for a Flash-based stream hosted on my own domain? \(p. 299\)](#)
 2. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 3. Select the stack for live streaming.
 4. In the bottom pane, click the **Outputs** tab.
 5. Copy the value of the **LiveHLSManifest** key, as shown in the following example:
- `http://d123.cloudfront.net/hls-live/livepkgr/_definst_/liveevent/livestream.m3u8`
6. Navigate to this URL using an iOS device to verify that HLS streaming is working correctly.

For information about where to use the URL to serve various iOS devices, QuickTime, and Safari, see [HTTP Live Streaming Overview](#) in the iOS Developer Library.

For more information about publishing and playing live streams over HTTP, see [URLs for publishing and playing live streams over HTTP](#) in the *Adobe Media Server 5.0.1 Developer's Guide*.

Next: [Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming \(p. 296\)](#)

Deleting an AWS CloudFormation Stack and an Amazon EBS Volume for Live Streaming

When your live event is over, delete the stack that you created for live streaming. This deletes most of the AWS resources that were created for your live-streaming event, and stops most of the AWS charges for the resources. In addition, delete the Amazon EBS volume that is created by AWS CloudFormation but is not deleted when you delete the stack. This stops the rest of the AWS charges for the resources.

To delete an AWS CloudFormation stack and an Amazon EBS volume for live streaming

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Find the AWS CloudFormation stack that you created for live streaming, and make note of the creation time. This will help you identify the Amazon EBS volume that you'll delete later in this procedure.
3. Select the stack, and click **Delete Stack**.
4. Click **Yes, Delete** to confirm.
5. To track the progress of the stack deletion, select the stack, and click the **Events** tab in the bottom frame.
6. Navigate to the Amazon EC2 console.
7. In the navigation pane, click **Volumes**.
8. Select the volume that the AWS CloudFormation stack created, click **Actions**, and click **Delete Volume**.

If you have multiple Amazon EBS volumes, use the date and time that you made note of in step 2 to locate the volume that the AWS CloudFormation stack created.

9. If you don't plan to use live streaming again soon, you can cancel your subscription to Adobe Media Server on AWS Marketplace. To cancel the subscription, go to your subscriptions page on [AWS Marketplace](#), find the row for Adobe Media Server, click **Cancel Subscription**, and follow the on-screen prompts.

Frequently Asked Questions

- How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Adobe Media Server 5.0? (p. 297)
- How do I update crossdomain.xml for a Flash-based stream hosted on my own domain? (p. 299)
- What is the price for live HTTP streaming using CloudFront and Adobe Media Server 5.0? (p. 300)
- How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution? (p. 300)
- How can I connect to the Adobe Media Server Administration Console? (p. 300)
- Can I stream my live event both to Apple devices and to Flash Player-compatible devices? (p. 301)
- Does Adobe Media Server 5.0 support HTML5? (p. 301)
- Does Adobe Media Server have logging? (p. 302)
- How can I enable authentication on Adobe Media Server? (p. 302)
- What are the default cache-control settings on HDS- and HLS-related files? (p. 302)
- What is the difference between HLS and HDS? (p. 302)
- How do I troubleshoot my Amazon EC2 instance if streaming doesn't start? (p. 303)
- Where can I find the documentation for live streaming using Adobe Flash Media Server 4.5? (p. 303)

How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Adobe Media Server 5.0?

Note

By default, the SSH port for the Amazon EC2 instance (port 22) is disabled for security reasons. The following procedure explains how to enable the SSH port and how to use SSH to connect to your Amazon EC2 instance.

To enable access to port 22 on your Amazon EC2 instance that is running Adobe Media Server 5.0

1. Get the name of the Amazon EC2 security group that is associated with your Amazon EC2 instance:
 - a. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 - b. In the Region list, select the region in which you created your Amazon EC2 instance.
 - c. Click the row for your AWS CloudFormation stack.
 - d. In the bottom pane, click the **Resources** tab.
 - e. In the left column of the **Stack Resources** table, find the row for which the value is `AMSOiginServerSecurityGroup`.
 - f. For that row, write down the value of the **Physical ID** column.
2. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
3. In the navigation pane, click **Security Groups**.
4. On the Security Groups page, select the row in which the **Name** column matches the physical ID that you got in Step 1f.
5. In the bottom pane, click the **Inbound** tab.
6. For **Create a new rule**, select **SSH**.
7. Click **Add Rule**.
8. Click **Apply Rule Changes**.

To use SSH to connect to your Amazon EC2 instance that is running Adobe Media Server 5.0

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the navigation pane, click **Instances**.
3. Right-click the correct instance, and click **Connect** to view instructions on how to use SSH to connect to your Amazon EC2 instance.

Connect Help - Secure Shell (SSH) Cancel 

Instance: [REDACTED]

To access your instance using any SSH client

1. Open the SSH client of your choice (e.g., PuTTY, terminal).
2. Locate your private key file,
CompanyMeetingLiveStream.pem
3. Use chmod to make sure your key file isn't publicly
viewable, ssh won't work otherwise:
chmod 400 CompanyMeetingLiveStream.pem
4. Connect to your instance using its public DNS
[REDACTED].amazonaws.com].

Example

Enter the following command line:

```
ssh -i CompanyMeetingLiveStream.pem LOGIN@ec2-50-1-111-111.111.111.111
```

LOGIN varies by AMI. For Amazon Linux AMI use "ec2-user", for Ubuntu use "ubuntu", and for many others use "root". For more information, see the documentation for your AMI.

Close

How do I update crossdomain.xml for a Flash-based stream hosted on my own domain?

You can change permissions in `crossdomain.xml` either before or after you create the AWS CloudFormation stack:

- If you have not created your AWS CloudFormation stack, download the AWS CloudFormation template for Live Streaming using Amazon CloudFront and Adobe Media Server 5.0 at <https://s3.amazonaws.com/cloudfront-live/live-http-streaming-ams-5-0-1-using-cloudfront.txt>. In the template, edit the `UserData` section, which contains the `crossdomain.xml` settings, and save the updated template on your local computer. Then create your AWS CloudFormation stack using the updated template.
- If you have already created your AWS CloudFormation stack, log in to Adobe Media Server running on your Amazon EC2 instance, and change permissions in the cross-domain policy file, `/mnt/webroot/crossdomain.xml`.

For more information about editing the `crossdomain.xml` file, see [Adobe Cross Domain Policy File Specification](#).

What is the price for live HTTP streaming using CloudFront and Adobe Media Server 5.0?

In addition to the \$5.00 monthly subscription fee for Adobe Media Server on Amazon EC2, you pay only for the AWS resources you consume:

- For pricing information about Adobe Media Server running on Amazon EC2, see [Adobe Media Server 5 on Amazon Web Services / Pricing](#).
- For pricing information about CloudFront, see [Amazon CloudFront Pricing](#).

There is no charge for using AWS CloudFormation.

How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution?

Your Amazon EC2 instance running Adobe Media Server 5.0 comes with an internal and an external DNS name. Amazon EC2 does not provide access to modify these DNS settings. If you want to map an existing domain name to your Amazon EC2 instance running Adobe Media Server, use a DNS service provider such as [Amazon Route 53](#). When using your own domain name, we recommend that you map to the instance's external DNS name using a CNAME, not by using an A record that points to the instance's IP address.

To map your own domain name to your CloudFront distribution, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

How can I connect to the Adobe Media Server Administration Console?

To connect to the Adobe Media Server Administration Console

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Select the stack for live streaming.
3. In the bottom pane, click the **Outputs** tab.
4. Copy the value of the **AMSAadminConsoleServerAddress** key.
5. Click the value of the **AMSServerAdminConsole** key, for example, http://ec2-00-11-22-33.us-west-1.compute.amazonaws.com/ams_adminConsole.htm.
6. On the login page for the Adobe Media Server Administration Console, in **Server Address**, paste the **AMSAadminConsoleServerAddress** key that you copied in Step 4.
7. In the **Username** and **Password** fields, enter the values that you specified in [Creating an AWS CloudFormation Stack for Live Streaming \(p. 290\)](#).
8. Click **Login**.

For information about using the Adobe Media Server 5.0 Administration Console, see the [Adobe Media Server documentation](#).

Note

Adobe recommends that you block all external access to port 1111 so that access to the Administration Console is restricted only to clients that are within your firewall. As an alternative, you can restrict access to the server by using domain-based restrictions. For more information, see [Limit access to Adobe Media Administration Server](#) in the Adobe documentation.

To disable or restrict access to port 1111 on your Adobe Media Server

1. Get the name of the Amazon EC2 security group that is associated with your Amazon EC2 instance:
 - a. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 - b. For **Region**, click the name of the region in which you created your Amazon EC2 instance.
 - c. Select the row for your AWS CloudFormation stack.
 - d. In the bottom pane, click the **Resources** tab.
 - e. In the **Stack Resources** table, in the `AMSOiginServerSecurityGroup` row, write down the value of the **Physical ID** column.
2. Display the Amazon EC2 console.
3. In the navigation pane, click **Security Groups**.
4. In the **Security Groups** pane, select the security group that AWS CloudFormation created for your Amazon EC2 instance. The name is the value that you wrote down in Step 1e.
5. In the bottom pane, click the **Inbound** tab.
6. To completely disable access to the Adobe Media Server Administration console:
 - a. In the **TCP Port (Service)** column, find **1111**.
 - b. In the **Action** column for that row, click **Delete**.
 - c. Click **Apply Rule Changes**.
7. To restrict access to selected IP addresses:
 - a. In the **TCP Port (Service)** column, find **1111**, and click **Delete**.
 - b. For **Create a new rule**, accept the default value, **Custom TCP rule**.
 - c. For **Port range**, enter **1111**.
 - d. For **Source**, enter an IP address or range, or enter the name of another security group. For more information, click **Help**.
 - e. Click **Add Rule**.
 - f. To create additional rules, repeat Steps b through e.
 - g. Click **Apply Rule Changes**.

Can I stream my live event both to Apple devices and to Flash Player–compatible devices?

Yes, Adobe Media Server 5.0 enables the delivery of live streams to both Flash-based and iOS devices at the same time. You can stream to the Safari browser using an HTML5 player or an Objective C ("native") application. You can also use Adobe AIR for iOS to develop a rich video experience on iOS.

Does Adobe Media Server 5.0 support HTML5?

Yes. Adobe Media Server can deliver content to HTML5 on Apple iOS devices using the HLS streaming format. For other browsers supporting HTML5, you can use Adobe Media Server to deliver progressively.

Does Adobe Media Server have logging?

Yes. W3C-compliant ASCII logs, a real-time usage monitor, and a complete API for server and stream events help to ensure that you have all the tools you need to track and generate reports on your audience's content use. For more information about monitoring and managing log files in Adobe Media Server 5.0, see [Monitoring and Managing Log Files](#) in the Adobe documentation.

How can I enable authentication on Adobe Media Server?

You can restrict access to RTMP port 1935 (for both TCP and UDP) in the security group created by AWS CloudFormation for your Adobe Media Server Amazon EC2 instance. Just create new TCP and UDP rules for port 1935 and then delete the existing TCP and UDP rules for port 1935, which allow access to all IP addresses.

For a quick overview of how to add a rule to a security group, see [How can I connect to the Adobe Media Server Administration Console? \(p. 300\)](#). For more information about Amazon EC2 security groups, see [Amazon EC2 Security Groups](#) in the *Amazon EC2 User Guide for Linux Instances*.

What are the default cache-control settings on HDS- and HLS-related files?

The default cache control headers on HDS- and HLS-related files are set to the following values:

| File Type | Cache-Control Setting (Seconds) |
|--------------|---------------------------------|
| .bootstrap | 2 |
| HDS Fragment | 60 |
| .f4m | 2 |
| .m3u8 | 2 |
| .ts | 60 |

The CloudFront edge cache servers honor these cache control headers. You can change the default settings by changing the values of the `HttpStreamingF4MMaxAge`, `HttpStreamingBootstrapMaxAge`, and `HttpStreamingFragMaxAge` parameters on the server. For more information, see [HTTP streaming configuration file reference](#) in the Adobe documentation.

What is the difference between HLS and HDS?

HLS is a file container format optimized for Apple devices. The container supports H.264/AAC-encoded video and audio, and is based on MPEG-2 transport stream (TS). All video delivered to iOS (including AIR for IOS) must use this format.

HDS is a file container format optimized for applications that run in Flash Player. The container also supports H.264/AAC-encoded video and audio and is based on MPEG-4 TS. HDS is not supported on AIR for iOS.

How do I troubleshoot my Amazon EC2 instance if streaming doesn't start?

If you performed the procedure [To verify that Adobe Media Server is running \(p. 291\)](#) and streaming still hasn't started, perform the following procedure to confirm that the Amazon EC2 instance is functioning correctly.

To troubleshoot your Amazon EC2 instance running Adobe Media Server 5.0

1. In the AWS CloudFormation console, in the top pane, select the stack.
2. In the bottom pane, click the **Resources** tab.
3. For the **AMSOiginServer** row, write down the value of the **Physical ID** column.
4. Go to the Amazon EC2 console.
5. In the **Region** list, select the region in which you created the AWS CloudFormation stack.
6. In the navigation pane, click **Instances**.
7. In the **Instance** column, find the value that you wrote down in Step c.
8. Select the corresponding row.
9. In the bottom pane, review the information on the **Status Checks** tab, and take the recommended actions.
10. Return to the procedure [To verify that Adobe Media Server is running \(p. 291\)](#), and repeat Steps 2 through 5.

Where can I find the documentation for live streaming using Adobe Flash Media Server 4.5?

For the documentation for live streaming using Adobe Flash Media Server 4.5, see "Live Streaming Using CloudFront and Adobe Flash Media Server 4.5" in the "CloudFront Tutorials" chapter of the [Amazon CloudFront Developer Guide](#) for CloudFront API version 2012-07-01.

Additional Documentation

Adobe Documentation

- [Using Adobe Media Server on Amazon Web Services](#)
- [Adobe Cross Domain Policy File Specification](#)
- [Flash Media Live Encoder](#)
- [Flash Media Live Encoder FAQ](#)
- [Video Encoding and Transcoding Recommendations for HTTP Dynamic Streaming on the Adobe Media Server Platform](#)
- [Adobe Media Server Technical Overview](#)

Amazon Web Services Documentation

- [Amazon Elastic Compute Cloud documentation](#)
- [AWS CloudFormation documentation](#)

Live Smooth Streaming Using Amazon CloudFront and IIS Media Services 4.1

Topics

- [Overview of Live Smooth Streaming with Amazon Web Services \(p. 304\)](#)
- [Creating an Amazon Web Services Account \(p. 305\)](#)
- [Creating an Amazon EC2 Key Pair \(p. 305\)](#)
- [Creating an AWS CloudFormation Stack for Live Smooth Streaming \(p. 306\)](#)
- [Verifying that Your Amazon EC2 Windows Server Instance Is Running \(p. 309\)](#)
- [Getting Your Windows Password \(p. 309\)](#)
- [Encoding Your Live Stream \(p. 310\)](#)
- [Viewing Your Live Smooth Stream \(p. 311\)](#)
- [Deleting Your AWS CloudFormation Live Smooth Streaming Stack \(p. 311\)](#)
- [Frequently Asked Questions \(p. 311\)](#)
- [Additional Documentation \(p. 313\)](#)

Overview of Live Smooth Streaming with Amazon Web Services

Smooth Streaming is the Microsoft implementation of adaptive streaming technology, which is a form of web-based media content delivery that uses standard HTTP. An extension of IIS Media Services, Smooth Streaming enables adaptive streaming of live events to Smooth Streaming clients such as Microsoft Silverlight. When you configure Smooth Streaming to use CloudFront, you benefit from the scale of CloudFront's global HTTP network and from latency-based routing of viewers to edge nodes on the network. To learn more about CloudFront, go to the [CloudFront product page](#).

Smooth Streaming content is delivered to clients as a series of MPEG-4 (MP4) fragments that can be cached at the CloudFront edge servers. Smooth Streaming-compatible clients use special heuristics to dynamically monitor current network and local PC conditions, and seamlessly switch the video quality of the Smooth Streaming presentation that the clients receive. As clients play the fragments, network conditions may change (for example, bandwidth may decrease) or video processing may be affected by other applications that are running on the client. Clients can immediately request that the next fragment come from a stream that is encoded at a different bit rate to accommodate the changing conditions. This enables clients to play the media without stuttering, buffering, or freezing. As a result, users experience the highest-quality playback available without interruptions in the stream.

To encode a live broadcast to Smooth Streaming format, you use Microsoft Expression Encoder 4 Pro. To serve the encoded Smooth Stream, you can then use an Amazon EC2 Amazon Machine Image (AMI) that is running Windows IIS Media Services. CloudFront caches the live video and audio content, and viewers connect to the CloudFront edge servers to play the stream using a Smooth Streaming-compatible client such as Microsoft Silverlight. This tutorial walks you through the entire setup process.

Note

Microsoft Expression Encoder 4 Pro with Service Pack 2 is not included in the Amazon EC2 Amazon Machine Image (AMI) that is running Windows IIS Media Services, and it is not a free download. For information about features and pricing, go to the [Expression Encoder 4 Pro](#) page on the Microsoft Store website. You can also use a third-party encoding tool to encode your video for Live Smooth Streaming. For a list of Microsoft partners that provide encoding software, see the Partners tab on the [IIS Media Services](#) page on the Microsoft website.

Note

This tutorial provides an overview of how to integrate CloudFront with Microsoft Live Smooth Streaming running on an Amazon EC2 instance. For more information about how to manage and secure your Amazon EC2 instance, refer to the [Amazon EC2 documentation](#). For more information about Microsoft Live Smooth Streaming options not covered in this tutorial, see [Microsoft Documentation \(p. 313\)](#).

To set up Live Smooth Streaming with Amazon Web Services (AWS), review the system requirements for IIS Smooth Streaming in the [Smooth Streaming Deployment Guide](#). Then perform the procedures in the following sections:

1. [Creating an Amazon Web Services Account \(p. 305\)](#)
2. [Creating an Amazon EC2 Key Pair \(p. 305\)](#)
3. [Creating an AWS CloudFormation Stack for Live Smooth Streaming \(p. 306\)](#)
4. [Verifying that Your Amazon EC2 Windows Server Instance Is Running \(p. 309\)](#)
5. [Getting Your Windows Password \(p. 309\)](#)
6. [Encoding Your Live Stream \(p. 310\)](#)
7. [Viewing Your Live Smooth Stream \(p. 311\)](#)
8. [Deleting Your AWS CloudFormation Live Smooth Streaming Stack \(p. 311\)](#)

For frequently asked questions, see [Frequently Asked Questions \(p. 311\)](#).

For links to additional Microsoft and AWS documentation, see [Additional Documentation \(p. 313\)](#).

Creating an Amazon Web Services Account

If you already have an AWS account, skip to [Creating an Amazon EC2 Key Pair \(p. 305\)](#). If you don't already have an AWS account, use the following procedure to create one.

Note

When you create an account, AWS automatically signs up the account for all services. You are charged only for the services you use.

To create an AWS account

1. Go to <http://aws.amazon.com>, and click **Create an AWS Account**.
2. Follow the on-screen instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Next: [Creating an Amazon EC2 Key Pair \(p. 305\)](#)

Creating an Amazon EC2 Key Pair

If you already have an Amazon EC2 key pair in the Amazon EC2 region in which you want to configure Live Smooth Streaming, skip to [Creating an AWS CloudFormation Stack for Live Smooth Streaming \(p. 306\)](#). If you don't have a key pair in that region, perform the following procedure.

A key pair is a security credential similar to a password. You specify a key pair when you create an AWS CloudFormation stack for live streaming, later in this process. After live streaming is configured, you use the key pair to retrieve the password for your Amazon EC2 Windows Server instance.

To create an Amazon EC2 key pair

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the Region list, click the region in which you want to create the key pair.

You must create the key pair in the same region where you will create your AWS CloudFormation stack for live streaming later in this process. We recommend that you create the key pair and the stack for live streaming in the region that is closest to the location of your live event.

3. In the Navigation pane, click **Key Pairs**.
4. In the Key Pairs pane, click **Create Key Pair**.
5. In the Create Key Pair dialog box, enter a name for the key pair, and make note of the name. You'll enter this value when you create an AWS CloudFormation live-streaming stack, later in the process of setting up live streaming.
6. Click **Create**, and the Opening <key_pair_name>.pem dialog box appears.
7. Save the .pem file to a safe place on your computer.
8. Click **Close** to close the Create Key Pair dialog box.

Next: [Creating an AWS CloudFormation Stack for Live Smooth Streaming \(p. 306\)](#)

Creating an AWS CloudFormation Stack for Live Smooth Streaming

The following procedure uses an AWS CloudFormation template to create a stack that launches the AWS resources required for Live Smooth Streaming, including an Amazon EC2 instance.

Important

You incur hourly charges for an Amazon EC2 instance beginning when you create the AWS CloudFormation stack that deploys the Amazon EC2 instance. Charges continue to accrue until you delete the AWS CloudFormation stack regardless of whether you use the Amazon EC2 instance to stream live video. For more information, see [Pricing](#) on the Amazon Elastic Compute Cloud (Amazon EC2) detail page. When your live event is over, delete the stack that you created for Live Smooth Streaming. This deletes the AWS resources that were created for your live-streaming event, and stops the AWS charges for the resources. For more information, see [Deleting Your AWS CloudFormation Live Smooth Streaming Stack \(p. 311\)](#).

To create an AWS CloudFormation stack for live streaming

1. In the following list, click the Amazon EC2 Region where you want to create the stack. The Create Stack wizard starts, and a region-specific value is automatically entered in the **Provide a Template URL** field.

[US East \(N. Virginia\)](#)

[US West \(Oregon\)](#)

[US West \(N. California\)](#)

[EU \(Ireland\)](#)

[Asia Pacific \(Singapore\)](#)

[Asia Pacific \(Tokyo\)](#)

[South America \(São Paulo\)](#)

2. If you are not already signed in to the AWS Management Console, sign in when prompted.
3. *Optional:* In the Create Stack wizard, change the value of the **Stack Name** field. The stack name must not contain spaces, and it must be unique within your AWS account.

The screenshot shows the 'Create Stack' wizard interface. At the top, there are three tabs: 'SELECT TEMPLATE' (which is highlighted in orange), 'SPECIFY PARAMETERS', and 'REVIEW'. Below the tabs, a descriptive text explains that AWS CloudFormation allows creating a collection of related AWS resources (a stack) by describing requirements in a template. It provides options to choose from sample templates or upload a local file or provide a URL. The 'Stack Name' field is populated with 'CompanyMeetingIS41LiveSmoothStreaming'. Under 'Stack Template Source', the 'Provide a Template URL' option is selected, with the URL 'https://s3-us-west-2.amazonaws.com/cf-templates-mq0zf' entered into the input field. There is also an unchecked checkbox for 'Show Advanced Options'. At the bottom right is a 'Continue' button with a yellow arrow icon.

4. Do not change the **Stack Template Source** option or the value of **Provide a Template URL**.
5. *Optional:* To configure SNS notification, to specify how long you're willing to wait for the stack to be created, and to choose whether to roll back changes if stack creation fails, check the **Show Advanced Options** checkbox, and specify the applicable values.
6. Click **Continue**.

Amazon CloudFront Developer Guide
Creating an AWS CloudFormation Stack for Live Smooth Streaming

Template Description: This template uses Amazon CloudFront and the Windows IIS Media Services AMI to create a CloudFormation stack for Smooth streaming of your live event.

Specify Parameters

Below are the parameters associated with your CloudFormation template. You may review and proceed with the default parameters or make customizations as needed below.

| | |
|---|--------------------------|
| KeyPair | IIS41LiveSmoothStreaming |
| The key pair name for your IIS Media Services EC2 instance | |
| InstanceType | m1.xlarge |
| Type of EC2 instance to launch (default option is m1.large) | |

[Back](#) [Continue >](#)

7. On the Specify Parameters page, in the **KeyPair** field, enter the name of an Amazon EC2 key pair in the region in which you want to create the stack for live streaming. The key pair must be associated with the account that you're currently logged on with. If you created a key pair when you performed the procedure in [Creating an Amazon EC2 Key Pair \(p. 305\)](#), enter the name of that key pair.
8. In the **InstanceType** field, enter an instance type, and click **Continue**. The default value is *m1.xlarge*.

The instance type determines the pricing for your Amazon EC2 instance that is running Windows Server. For more information about Amazon EC2 instance types for Windows, including pricing information, go to [Amazon EC2 Running Microsoft Windows Server & SQL Server](#).

9. Review the settings for the stack. When you're satisfied with the settings, click **Create Stack**.

Your stack may take several minutes to create. To track the progress of the stack creation, select the stack, and click the **Events** tab in the bottom frame. If AWS CloudFormation cannot create the stack, the Events tab lists error messages.

When your stack is ready, in the top frame, the status for the stack changes to **CREATE_COMPLETE**.

Stack Name **Created** **Status** **Description**

CompanyMeetingIIS41LiveSmoothStreaming 2012-03-30T20:28:33Z CREATE_COMPLETE This template uses Amazon CloudFront and the Windows IIS Media Services AMI to create a CloudFormation stack for Smooth streaming of your live event.

1 Stack selected

Stack: CompanyMeetingIIS41LiveSmoothStreaming

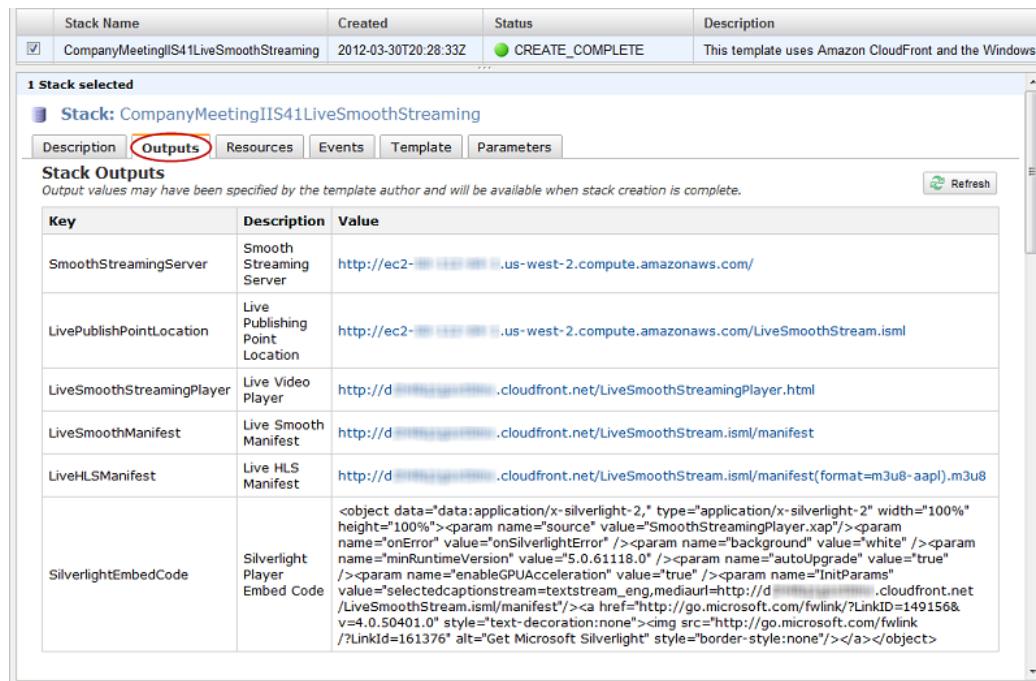
[Description](#) [Outputs](#) [Resources](#) **Events** [Template](#) [Parameters](#)

Stack Events

| Time | Type | Logical ID | Physical ID | Status | Reason |
|----------------------|-------------------------------|--|--|--------------------|----------------|
| 2012-03-30 13:38 PDT | AWS::CloudFormation::Stack | CompanyMeetingIIS41LiveSmoothStreaming | arn:aws:cloudformation:us-west-2::stack/CompanyMeetingIIS41LiveSmoothStreaming | CREATE_COMPLETE | |
| 2012-03-30 13:38 PDT | AWS::CloudFront::Distribution | SmoothStreamingDistribution | [REDACTED] | CREATE_COMPLETE | |
| 2012-03-30 13:29 PDT | AWS::CloudFront::Distribution | SmoothStreamingDistribution | CompanyMeetingIIS41LiveSmoothStreaming-SmoothStreamingDistribution-[REDACTED] | CREATE_IN_PROGRESS | |
| 2012-03-30 13:29 PDT | AWS::EC2::Instance | SmoothStreamingOriginServer | [REDACTED] | CREATE_COMPLETE | |
| 2012-03-30 13:28 PDT | AWS::EC2::Instance | SmoothStreamingOriginServer | CompanyMeetingIIS41LiveSmoothStreaming-OriginServer-[REDACTED] | CREATE_IN_PROGRESS | |
| 2012-03-30 13:28 PDT | AWS::EC2::SecurityGroup | SmoothStreamingServerSecurityGroup | CompanyMeetingIIS41LiveSmoothStreaming-SmoothStreamingServerSecurityGroup-[REDACTED] | CREATE_COMPLETE | |
| 2012-03-30 13:28 PDT | AWS::EC2::SecurityGroup | SmoothStreamingServerSecurityGroup | CompanyMeetingIIS41LiveSmoothStreaming-SmoothStreamingServerSecurityGroup-[REDACTED] | CREATE_IN_PROGRESS | |
| 2012-03-30 13:28 PDT | AWS::CloudFormation::Stack | CompanyMeetingIIS41LiveSmoothStreaming | arn:aws:cloudformation:us-west-2::stack/CompanyMeetingIIS41LiveSmoothStreaming | CREATE_IN_PROGRESS | User Initiated |

When your stack is created, click the **Outputs** tab, which displays the stack creation outputs. You will use these values when you set up Microsoft Expression Encoder later in the process.

Amazon CloudFront Developer Guide
**Verifying that Your Amazon EC2 Windows Server
Instance Is Running**



| Key | Description | Value |
|---------------------------|--------------------------------|---|
| SmoothStreamingServer | Smooth Streaming Server | http://ec2-13-55-141-11.us-west-2.compute.amazonaws.com/ |
| LivePublishPointLocation | Live Publishing Point Location | http://ec2-13-55-141-11.us-west-2.compute.amazonaws.com/LiveSmoothStream.isml |
| LiveSmoothStreamingPlayer | Live Video Player | http://d13-55-141-11.cloudfront.net/LiveSmoothStreamingPlayer.html |
| LiveSmoothManifest | Live Smooth Manifest | http://d13-55-141-11.cloudfront.net/LiveSmoothStream.isml/manifest |
| LiveHLSManifest | Live HLS Manifest | http://d13-55-141-11.cloudfront.net/LiveSmoothStream.isml/manifest(format=m3u8-aapl).m3u8 |
| SilverlightEmbedCode | Silverlight Player Embed Code | <object data="data:application/x-silverlight-2;" type="application/x-silverlight-2" width="100%" height="100%"><param name="source" value="SmoothStreamingPlayer.xap"/><param name="onError" value="onSilverlightError" /><param name="background" value="white" /><param name="minRuntimeVersion" value="5.0.61118.0" /><param name="autoUpgrade" value="true" /><param name="enableGPUAcceleration" value="true" /><param name="InitParams" value="selectedCaptionStream=textstream_eng.mediaurl=http://d13-55-141-11.cloudfront.net/LiveSmoothStream.isml/manifest" /></object> |

Next: [Verifying that Your Amazon EC2 Windows Server Instance Is Running \(p. 309\)](#)

Verifying that Your Amazon EC2 Windows Server Instance Is Running

After AWS CloudFormation creates the stack, perform the following procedure to verify that your Windows IIS Media Services webserver is running on the Amazon EC2 instance that you provisioned via AWS CloudFormation.

To verify that your Windows Server is running

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the top pane, select the stack that you created in [Creating an AWS CloudFormation Stack for Live Smooth Streaming \(p. 306\)](#).
3. In the bottom pane, click the **Outputs** tab.
4. Click on the value of the **SmoothStreamingServer** key, for example, <http://ec2-00-11-22-33.us-west-1.compute.amazonaws.com>.

The Windows IIS Server banner screen appears, indicating that your Windows Server is running.

Next: [Getting Your Windows Password \(p. 309\)](#)

Getting Your Windows Password

To connect to your Amazon EC2 instance running Windows Server 2008 R2 and IIS Media Services, use the following procedure to retrieve the initial password for the Windows Server Administrator account. You only need to retrieve the password once for your Amazon EC2 instance. When you are finished with

this procedure, you'll be able to work with your Amazon EC2 instance as you would any Windows Server computer.

For more information about connecting to an Amazon EC2 instance running Windows, go to [Getting Started with Amazon EC2 Windows Instances](#).

Important

Amazon EC2 can take as long as 30 minutes to retrieve your password from Windows Server.

To get the Windows password for your Amazon EC2 instance

1. Confirm that you can access the Amazon EC2 private key file (the .pem file) that you created in [Creating an Amazon EC2 Key Pair \(p. 305\)](#).
2. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
3. In the **Region** list, click the region in which you created the Amazon EC2 instance for Live Smooth Streaming.
4. In the **Navigation** pane, click **Instances**.
5. In the My Instances pane, right-click the instance for which the value of the **Name** column is **LiveSmoothStreaming**, and click **Get Windows Password**.
6. On the Retrieve Default Windows Administrator Password page, click **Browse**, and browse to the location on your computer where you saved the .pem file.
7. Select the .pem file, and the contents of the file appear in the window.
8. Click **Decrypt Password**.
9. Write down the password. You'll need it to connect to the Amazon EC2 instance.
10. *Optional but recommended:* Log into the Windows Server instance that you just launched, and change the password for the default Windows Server account. The username is Administrator.

You may also want to create another user account and add it to the Administrators group. Another administrator account is a safeguard in case you forget your administrator password or have a problem with the Administrator account.

Note

For information about how to update the Amazon EC2 Security Group settings for your Windows server so you can access the server using port 3389, see [How can I enable access to the Windows server? \(p. 312\)](#). For information about how to log on to the instance using the Administrator account, see [How can I securely connect to my Amazon EC2 instance running Windows IIS Media Services? \(p. 313\)](#).

Next: [Encoding Your Live Stream \(p. 310\)](#)

Encoding Your Live Stream

You're now ready to publish your live stream to the Live Smooth Streaming publishing point on your Amazon EC2 instance running Windows Server and Windows IIS Media Services. Microsoft has stopped selling Expression Encoder 4 Pro. For a list of Microsoft partners that provide third-party encoding tools that you can use to encode your video for Live Smooth Streaming, see the **Partners** section on the [IIS Media Services](#) page on the Microsoft website.

Next: [Viewing Your Live Smooth Stream \(p. 311\)](#)

Viewing Your Live Smooth Stream

Perform the following procedure to view your live smooth stream using CloudFront. You can also embed the Microsoft Silverlight player code in your own web page.

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Select the stack for live streaming.
3. In the bottom pane of the AWS CloudFormation console, click the **Outputs** tab.
4. Click the value of the **LiveSmoothStreamingPlayer** key, for example, <http://d123.cloudfront.net/LiveSmoothStreamingPlayer.html>.
5. To embed the Silverlight player code into your web page, on the **Outputs** tab, copy the value of the **SilverlightEmbeddedCode** key.

Note

Microsoft recommends that viewers have the latest version of Microsoft Silverlight installed for the best playback experience.

6. To view your live stream on an Apple device such as an iPad or an iPhone, display the AWS CloudFormation console from a compatible Apple device, and click the value of the **LiveHLSManifest** key. The manifest URL looks like [http://d123.cloudfront.net/LiveSmoothStream.isml/manifest\(format=m3u8-aapl\).m3u8](http://d123.cloudfront.net/LiveSmoothStream.isml/manifest(format=m3u8-aapl).m3u8).

For information about where to use the URL to serve various iOS devices, QuickTime, and Safari, go to [HTTP Live Streaming Overview](#) in the iOS Developer Library.

Next: [Deleting Your AWS CloudFormation Live Smooth Streaming Stack \(p. 311\)](#)

Deleting Your AWS CloudFormation Live Smooth Streaming Stack

When your live event is over, delete the stack that you created for Live Smooth Streaming. This deletes the AWS resources that were created for your live event, and stops the AWS charges for those resources.

To delete an AWS CloudFormation stack for live streaming

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Check the checkbox for the stack, and click **Delete Stack**.
3. Click **Yes, Delete** to confirm.
4. To track the progress of the stack deletion, check the checkbox for the stack, and click the **Events** tab in the bottom frame.

Frequently Asked Questions

- What is the price for Live Smooth Streaming using CloudFront? (p. 312)
- Can I deliver my live streaming video to both Smooth Streaming clients and Apple devices? (p. 312)
- How can I set-up a CNAME alias for my Amazon EC2 instance or my CloudFront distribution? (p. 312)
- How can I enable access to the Windows server? (p. 312)
- How can I securely connect to my Amazon EC2 instance running Windows IIS Media Services? (p. 313)
- How can I restrict access to my Live Smooth Streaming content from another domain? (p. 313)

What is the price for Live Smooth Streaming using CloudFront?

To Smooth Stream your live event, you pay only for the AWS resources you consume:

- For pricing information about Amazon EC2 instances running Windows Server, see [Pricing](#) on the [Amazon EC2 Running Microsoft Windows Server & SQL Server](#) page.
- For pricing information about CloudFront, see [Amazon CloudFront Pricing](#).

There is no charge for using AWS CloudFormation.

Can I deliver my live streaming video to both Smooth Streaming clients and Apple devices?

Yes. You can use Microsoft Expression Encoder 4 Pro to encode your live video for both Smooth Streaming clients (for example, Microsoft Silverlight) and Apple devices (for example, iPad and iPhone). After your AWS CloudFormation stack is launched, you will find the manifest file URLs both for Live Smooth Streaming (.isml) and for Apple HLS (.m3u8) on the **Outputs** tab of your AWS CloudFormation template.

How can I set-up a CNAME alias for my Amazon EC2 instance or my CloudFront distribution?

Your Amazon EC2 Windows Server instance comes with an internal and an external DNS name. Amazon EC2 does not provide access to modify these DNS settings. If you want to map an existing domain name to your Amazon EC2 instance running Windows Server, use a DNS service provider such as [Amazon Route 53](#). When using your own domain name, we recommend that you map to the instance's external DNS name using a CNAME, not by using an A record that points to the instance's IP address.

To map your own domain name to your CloudFront distribution, see [Using Alternate Domain Names \(CNAMEs\)](#) (p. 50).

How can I enable access to the Windows server?

To enable access to port 3389 on your Windows server via selected IP addresses

By default, the Amazon EC2 security group for your Windows server instance does not have port 3389 enabled; this is the port you use to administer the Windows server. If you want to log on to your Windows server instance, perform the following procedure to enable access via port 3389.

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the **Region** list, click the Amazon EC2 region in which you used AWS CloudFormation to create your Amazon EC2 instance.
3. In the **Navigation** pane, click **Security Groups**.
4. In the **Security Groups** pane, click the row for which the value of the **Name** column begins with the name of the AWS CloudFormation stack that you created in [Creating an AWS CloudFormation Stack for Live Smooth Streaming](#) (p. 306).
5. In the bottom pane, click the **Inbound** tab.
6. To enable access to your Windows server and specify the client IP addresses that can access the server:
 - a. In the **Create a new rule** list, do not change the default value, **Custom TCP rule**.
 - b. In the **Port range** field, enter **3389**.

- c. In the **Source** field, enter an IP address or range, or enter the name of another security group. For more information, click **Help**.
- d. Click **Add Rule**.
- e. To create additional rules, repeat Steps a through d.
- f. Click **Apply Rule Changes**.

How can I securely connect to my Amazon EC2 instance running Windows IIS Media Services?

To connect to your Windows server instance, you must retrieve the initial password for the Administrator account and then use it with Windows Remote Desktop. You'll also need the contents of the private key file that you created, for example, <keypairname.pem>.pem. For more information, go to [Getting Started with Amazon EC2 Windows Instances](#).

How can I restrict access to my Live Smooth Streaming content from another domain?

Microsoft Silverlight includes support for cross-domain connectivity, which allows the Silverlight player to access content from locations other than the domain where the Smooth Streaming content originates. The security policy system in Silverlight requires that a Silverlight policy file named ClientAccessPolicy.xml be downloaded from a target domain before a network connection is allowed to access a network resource under that target domain. A default policy file is already included at the root of the default website on your Windows server running on Amazon EC2. To restrict cross-domain access, log on to your Windows server and update the ClientAccessPolicy.xml file.

Additional Documentation

Microsoft Documentation

- [IIS Smooth Streaming Deployment Guide](#)
- [IIS Media Services 4.1 Readme](#)
- [IIS Smooth Streaming Management REST Services](#)
- [Configuring Authentication in IIS 7](#)
- [Microsoft Expression Encoder blog](#)
- [Managing live publishing points from Microsoft Expression Encoder 4 Pro SP2](#)
- [Live IIS Smooth Streaming in Expression Encoder 4 Pro](#)
- [Apple HTTP Live Streaming with IIS Media Services](#)

Amazon Web Services Documentation

- [Amazon EC2 Running Microsoft Windows Server & SQL Server](#)
- [Amazon Elastic Compute Cloud Microsoft Windows Guide](#)
- [Amazon CloudFront](#)
- [AWS CloudFormation](#)

Live HTTP Streaming Using Wowza Streaming Engine 4.2

You can use Wowza Streaming Engine 4.2 to create live streaming sessions for global delivery using CloudFront. Wowza Streaming Engine 4.2 supports the following HTTP based streaming protocols:

- HLS (HTTP Live Streaming)
- HDS (HTTP Dynamic Streaming)
- Smooth Streaming
- MPEG DASH

When a user streams a video using one of the above protocols, the video is broken into smaller chunks that are cached in the CloudFront network for improved performance and scalability.

This tutorial explains how to integrate CloudFront with Wowza Streaming Engine 4.2 running on an Amazon EC2 instance. For more information about how to manage and secure your Amazon EC2 instance, refer to the [Amazon EC2 documentation](#). For more information about Wowza Streaming Engine options not covered in this tutorial, see the [Wowza documentation](#).

Topics

- [Creating an Amazon Web Services Account \(p. 314\)](#)
- [Creating an Amazon EC2 Key Pair \(p. 315\)](#)
- [Getting a License for Wowza Streaming Engine 4.2 \(p. 315\)](#)
- [Subscribing to Wowza Streaming Engine 4.2 through AWS Marketplace \(p. 315\)](#)
- [Creating an AWS CloudFormation Stack for Live Streaming \(p. 316\)](#)
- [Verifying that Wowza Streaming Engine 4.2 Is Running \(p. 318\)](#)
- [Setting Up an Encoder to Publish a Live Stream \(p. 318\)](#)
- [Playing the Live Stream in a Web Application \(p. 319\)](#)
- [Deleting an AWS CloudFormation Stack for Live Streaming \(p. 321\)](#)
- [Frequently Asked Questions \(p. 321\)](#)
- [Additional Documentation \(p. 322\)](#)

Creating an Amazon Web Services Account

If you already have an AWS account, skip to [Creating an Amazon EC2 Key Pair \(p. 315\)](#). If you don't already have an AWS account, use the following procedure to create one.

To create an AWS account

1. Open <http://aws.amazon.com/>, and then choose **Create an AWS Account**.
2. Follow the online instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Next: [Creating an Amazon EC2 Key Pair \(p. 315\)](#)

Creating an Amazon EC2 Key Pair

If you already have an Amazon EC2 key pair for the Amazon EC2 region in which you want to configure live streaming, skip to [Getting a License for Wowza Streaming Engine 4.2 \(p. 315\)](#). If you don't have a key pair in that region, follow the steps below.

A key pair is a security credential similar to a password and is specific to an AWS region. You need to specify a key pair when you create an AWS CloudFormation stack for live streaming, later in this process. After live streaming is configured, you use the key pair to securely connect to your Amazon EC2 instance.

To create an Amazon EC2 key pair

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the region selector, choose the region in which you want to create the key pair.

You must create the key pair in the same region where you will create your AWS CloudFormation stack for live streaming later in this process. We recommend that you create the key pair and the stack for live streaming in the region that is closest to the location from which the live stream will be published.

3. In the left navigation pane, choose **Key Pairs**.
4. In the key pairs pane, choose **Create Key Pair**.
5. In the **Create Key Pair** dialog box, enter a name for the key pair, and make note of the name. You'll need it later when you create an AWS CloudFormation live-streaming stack.
6. Choose **Create**, and, when prompted, save the `.pem` file to a safe place on your computer. Note that you will not be able re-download this file.
7. Choose **Close** to close the **Create Key Pair** dialog box.

Next: [Getting a License for Wowza Streaming Engine 4.2 \(p. 315\)](#)

Getting a License for Wowza Streaming Engine 4.2

You need a license for Wowza Streaming Engine 4.2 to configure live streaming. You have two options:

- If you already have a license, you can use that license to configure live streaming. Go to the next procedure.
- To buy a license by using your AWS account, go to the [Pricing](#) page on the Wowza website, and purchase the Wowza Streaming Engine license that works best for you.

Next: [Subscribing to Wowza Streaming Engine 4.2 through AWS Marketplace \(p. 315\)](#)

Subscribing to Wowza Streaming Engine 4.2 through AWS Marketplace

The next step is to subscribe to Wowza Streaming Engine 4.2 in AWS Marketplace.

To order Wowza Streaming Engine for Amazon Web Services

1. Go to the [Amazon Web Services](#) page, and sign in using your Amazon.com account or create a new account.

2. If you're using your own license, go to <https://aws.amazon.com/marketplace/pp/B013FEULQA>. Review the details, and choose **Continue**.
If you're buying a license by using your AWS account, go to <https://aws.amazon.com/marketplace/pp/B012BW3WB8>. Review the details, and choose **Continue**.
3. Choose the **Manual Launch** tab.
4. Review the pricing information, and choose **Accept Terms**.

Important

Don't use the buttons on this page to launch Wowza.

Next: [Creating an AWS CloudFormation Stack for Live Streaming \(p. 316\)](#)

Creating an AWS CloudFormation Stack for Live Streaming

The following procedure uses an AWS CloudFormation template to create a stack that launches the AWS resources required by live streaming, including an Amazon EC2 instance.

Important

You begin to incur hourly charges for an Amazon EC2 instance when you create the AWS CloudFormation stack that deploys that instance. Charges continue to accrue until you delete the AWS CloudFormation stack regardless of whether you use the Amazon EC2 instance to stream live video. When your live event is over, delete the stack that you created for live streaming. This deletes the AWS resources that were created for your live-streaming event, and stops the AWS charges for the resources. For more information, see [Deleting an AWS CloudFormation Stack for Live Streaming \(p. 321\)](#).

To create an AWS CloudFormation stack for live streaming

1. To start the wizard that creates a AWS CloudFormation stack, choose the applicable link:

If you have your own Wowza license, choose the Amazon EC2 region where you want AWS CloudFormation to launch an Amazon EC2 instance:

- [Create a stack in US East \(N. Virginia\)](#)
- [Create a stack in US West \(Oregon\)](#)
- [Create a stack in US West \(N. California\)](#)
- [Create a stack in EU \(Ireland\)](#)
- [Create a stack in EU \(Frankfurt\)](#)
- [Create a stack in Asia Pacific \(Singapore\)](#)
- [Create a stack in Asia Pacific \(Sydney\)](#)
- [Create a stack in Asia Pacific \(Tokyo\)](#)
- [Create a stack in South America \(São Paulo\)](#)

If you want to charge a Wowza license to your AWS account, choose the Amazon EC2 region where you want AWS CloudFormation to launch an Amazon EC2 instance:

- [Create a stack in US East \(N. Virginia\)](#)
- [Create a stack in US West \(Oregon\)](#)
- [Create a stack in US West \(N. California\)](#)
- [Create a stack in EU \(Ireland\)](#)
- [Create a stack in EU \(Frankfurt\)](#)

- [Create a stack in Asia Pacific \(Singapore\)](#)
 - [Create a stack in Asia Pacific \(Sydney\)](#)
 - [Create a stack in Asia Pacific \(Tokyo\)](#)
 - [Create a stack in South America \(São Paulo\)](#)
2. If you are not already signed in to the AWS Management Console, sign in when prompted. The wizard starts, and the selected URL automatically appears under **Provide an S3 URL to template**.
3. (Optional) In the **Create a New Stack** wizard, you can change the stack name to something appropriate for your live-streaming event. The stack name must not contain spaces and must be unique within your AWS account.
- Do not change the **Template** option or the address in **Provide an S3 URL to template**.
4. Choose **Next Step**.
5. On the Specify Parameters page, for **ApplicationName**, enter a short name (without spaces) for your Wowza application, or keep the default.
6. For **InstanceType**, enter an instance type, which determines pricing for your Wowza instance. For more information about Amazon EC2 instance types, see [Available Instance Types](#).
- For information about pricing, see [Amazon EC2 Pricing](#).
7. For **KeyPair**, enter the name of an Amazon EC2 key pair for the region in which you want to create the live streaming stack. The key pair must be associated with the account that you're currently logged on with. If you created a key pair when you performed the procedure in [Creating an Amazon EC2 Key Pair \(p. 315\)](#), enter that name here.
8. For **StartupPackageURL**, enter a URL that points to a startup package to configure the Wowza Streaming Engine to your needs, or keep the default.
9. For **StreamName**, enter a short name (without spaces) for your live stream, or keep the default.
10. Enter your license key in the **WowzaLicenseKey** field. This is either the key for a license that you already owned or a key that you got when you performed the procedure in the [Getting a License for Wowza Streaming Engine 4.2 \(p. 315\)](#) topic.
- If you purchased AddOns, you can include additional license keys by separating the key values with a pipe (|) character.
11. Choose **Next Step**.
12. (Optional) On the Options page, add the key-value pairs for any tags you plan to use. For more information about using tags, see [Adding Tags to Your AWS CloudFormation Stack](#).
13. (Optional) To configure SNS notification, to specify how long you're willing to wait for the stack to be created, to choose whether to roll back changes if stack creation fails, and to enter a stack policy, choose **Advanced**, and adjust settings as desired.
14. Choose **Next Step**
15. Review the settings for the stack, and then choose **Create**. AWS CloudFormation creates the stack.

Creating your stack creation might take several minutes. To track the progress of stack creation, select the stack, and then choose the **Events** tab. If AWS CloudFormation cannot create the stack, the **Events** tab lists error messages.

When your stack is ready, in the list of stacks, the status for the stack changes to **CREATE_COMPLETE**.

When your stack is created, choose the **Outputs** tab, which displays the stack creation outputs. You will use these values when you set up the encoder later in the process.

Next: [Verifying that Wowza Streaming Engine 4.2 Is Running \(p. 318\)](#)

Verifying that Wowza Streaming Engine 4.2 Is Running

After AWS CloudFormation creates the stack, perform the following steps to verify that Wowza Streaming Engine 4.2 is running on the Amazon EC2 instance that you provisioned through AWS CloudFormation.

To verify that Wowza Streaming Engine 4.2 is running

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the region selector, choose the region in which you created the AWS CloudFormation stack.
3. In the list of stacks, select the stack that you created in [Creating an AWS CloudFormation Stack for Live Streaming \(p. 316\)](#).
4. Choose the **Outputs** tab.
5. On the **Outputs** tab, get the value of the **WowzaServerLoginInfo** key, which you'll use for login credentials in the next step.
6. Choose the URL in the **WowzaEngineManagerURL** key, for example, <http://ec2-xx-xx-xxx-xxx.compute-1.amazonaws.com:8088/engineManager>. When you're prompted for login credentials, use the value of the **WowzaServerLoginInfo** key that you got in step 5.

Important

This URL uses port 8088 to connect to the Amazon EC2 instance that is running Wowza Streaming Engine. Depending on your firewall settings, you might not be able to connect to the Amazon EC2 instance. If you have trouble, contact your network administrator.

Next: [Setting Up an Encoder to Publish a Live Stream \(p. 318\)](#)

Setting Up an Encoder to Publish a Live Stream

You need to encode the live stream captured by your device before you send it to Wowza Streaming Engine 4.2. You can encode the live stream by using either the Wowza GoCoder app for iOS-based devices or encoders that support RTMP encoding, such as Telestream Wirecast.

The steps for publishing a stream from your encoder to Wowza Streaming Engine vary with your choice of encoder. For more information about how to configure your encoder, go to [Specific Encoding Technologies](#) on the Wowza website or review the documentation for your encoder.

Encode Apple HLS streams using the following formats:

- **Video:**
 - **Apple iPhone, iPod, and iPod touch** – H.264 Baseline Profile Level 3.0. Don't use B-frames when targeting iPhone and iPod devices.
 - **Apple iPad** – H.264 Main Profile Level 3.1
- **Audio:** AAC-LC up to 48 kHz, stereo audio.

Smooth Streams must have both audio and video. The key frame frequency must be between 1 and 4 seconds. We recommend a key frame frequency of two seconds.

Wowza Gocoder

To configure Wowza GoCoder to publish a live stream, perform the following steps.

Note

Wowza GoCoder is available for purchase from the Apple AppStore.

1. Go to the Wowza tutorial [How to use Wowza GoCoder video broadcasting iOS app with Wowza Streaming Engine](#).
2. Follow the procedure in the Configure Wowza GoCoder App section of the tutorial. Specify the following values for **Host** settings:
 - a. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 - b. On the AWS CloudFormation console, choose the **Outputs** tab.
 - c. Copy the value of the **WowzaEngineDomainName** key, for example, **ec2-xx-xx-xx-xx.compute-1.amazonaws.com**.
 - d. For **Server**, paste the value that you just copied.
 - e. For **Port**, enter **1935**.
3. Specify the following values for **Application** settings:
 - a. For **Application**, enter the application name that you specified when you created the stack, for example, **livecf**.
 - b. On the **Outputs** tab of the AWS CloudFormation console, copy the value of the **PublishStreamName** key, for example, **myStream**.
 - c. For **StreamName**, paste the value that you just copied in the previous step.
4. Change other values as applicable.

RTMP encoder

RTMP encoders typically use the following settings:

Publish URL

This is the value of the AWS CloudFormation **PublishRTMPURL** key, for example, **rtmp://ec2-xx-xx-xx-xx.compute-1.amazonaws.com/livecf**.

Stream Name

This is the value of the AWS CloudFormation **PublishStreamName** key, for example, **myStream**.

Login Credentials

If you are prompted for login credentials, use the values from the AWS CloudFormation **WowzaServerLoginInfo** key, for example, **username=wowza, password=i-1234a567**.

Next: [Playing the Live Stream in a Web Application \(p. 319\)](#).

Playing the Live Stream in a Web Application

Wowza Media Services provides online example player web pages that you can use to play the live stream from your Wowza Streaming Engine distribution. These players can help you verify that your streaming stack has been set up correctly. You can use the same streaming manifest URLs for other players that support the streaming protocol that you want to use.

Perform the applicable procedure to get the embed code that you will include in your web page for the live stream.

Note

Wait at least 30 seconds after you perform the applicable procedure in [Setting Up an Encoder to Publish a Live Stream \(p. 318\)](#) before following the steps below to play the stream.

- To play your live HDS stream on Adobe Flash Player via CloudFront (p. 320)
- To play your live HLS stream on an Apple or other device via CloudFront (p. 320)
- To play your Live Smooth Stream via CloudFront (p. 320)

To play your live HDS stream on Adobe Flash Player via CloudFront

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Select the stack for live HTTP streaming.
3. On the AWS CloudFormation console, choose the **Outputs** tab.
4. Copy the value of the **PlaybackHDSURL** key, for example, <http://d111111abcdef8.cloudfront.net/livecf/myStream/manifest.f4m>.
5. Go to the [Flash HTTP Player example web page](#) on the Wowza website, paste the URL that you copied in the preceding step into the **Stream** field, and choose **Connect**.

To play your live HLS stream on an Apple or other device via CloudFront

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Select the stack for live streaming.
3. In the AWS CloudFormation console, choose the **Outputs** tab.
4. Copy the value of the **PlaybackHLSURL** key, for example, <http://d111111abcdef8.cloudfront.net/livecf/myStream/playlist.m3u8>.
5. Using one of the following applications, go to the [iOS/Mac OS X example web page](#) on the Wowza website, paste the URL that you copied in the preceding step into the **Stream** field, and then choose **Connect**:
 - Safari web browser on a computer running Mac OS X Snow Leopard (version 10.6) or later
 - QuickTime Player 10.x or later on a computer running Mac OS X Snow Leopard (version 10.6) or later
 - Safari web browser on an Apple iOS device

To play your Live Smooth Stream via CloudFront

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Select the stack for live streaming.
3. In the AWS CloudFormation console, choose the **Outputs** tab.
4. Copy the value of the **PlaybackSmoothURL** key, for example, <http://d111111abcdef8.cloudfront.net/livecf/myStream/Manifest>.
5. Go to the [Silverlight Player example web page](#) on the Wowza website, paste the URL that you copied in the previous step into the **Stream** field, and then choose **Connect**.

Next: [Deleting an AWS CloudFormation Stack for Live Streaming \(p. 321\)](#).

Deleting an AWS CloudFormation Stack for Live Streaming

When your live event is over, delete the stack that you created for live streaming. This deletes the AWS resources that were created for your live-streaming event and stops the on-demand charges for the resources.

To delete an AWS CloudFormation stack for live streaming

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the upper right corner, choose the region in which you created your stack.
3. Select the stack, and then choose **Delete Stack**.
4. Choose **Yes, Delete** to confirm.
5. To track the progress of the stack deletion, select the stack, and then choose the **Events** tab.

Frequently Asked Questions

- What is the price for live HTTP streaming using CloudFront and Wowza Streaming Engine 4.2? (p. 321)
- How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Wowza Streaming Engine 4.2? (p. 321)
- How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution? (p. 322)
- Can I stream my live event to Flash Player–compatible devices, Apple devices, and Smooth Streaming players at the same time? (p. 322)
- Does Wowza Streaming Engine 4.2 support HTML5? (p. 322)
- Can I serve private live streams using Wowza and CloudFront? (p. 322)

What is the price for live HTTP streaming using CloudFront and Wowza Streaming Engine 4.2?

Charges for live HTTP streaming using CloudFront and Wowza Streaming Engine 4.2 include:

- **Wowza Streaming Engine software and AddOns:** For more information, see [Licenses Built For You](#) on the Wowza website.
- **Amazon EC2:** For more information, see the [Linux](#) tab in the [On-Demand Instances Pricing](#) table.
- **CloudFront:** For more information, see [Amazon CloudFront Pricing](#).

There is no charge for using AWS CloudFormation.

How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Wowza Streaming Engine 4.2?

You can use SSH to connect to your Amazon EC2 instance in just a few steps.

To use SSH to connect to your Amazon EC2 instance that is running Wowza Streaming Engine 4.2

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the left navigation, choose **Instances**.

3. Right-click the correct instance, and choose **Connect** to view instructions on how to use SSH to connect to your Amazon EC2 instance. The username is **ec2-user**.

How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution?

Your Amazon EC2 instance running Wowza Streaming Engine 4.2 comes with an internal and an external DNS name. Amazon EC2 does not provide access to modify these DNS settings. If you want to map an existing domain name to your Amazon EC2 instance running Wowza Streaming Engine, use a DNS service provider such as [Amazon Route 53](#). When using your own domain name, we recommend that you map to the instance's external DNS name using a CNAME, not by using an A record that points to the instance's IP address.

To map your own domain name to your CloudFront distribution, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Can I stream my live event to Flash Player–compatible devices, Apple devices, and Smooth Streaming players at the same time?

Yes, Wowza Streaming Engine 4.2 enables the delivery of live streams in Adobe HTTP Dynamic Streaming (Adobe HDS), Apple HTTP Live Streaming (Apple HLS), and Microsoft Smooth Streaming formats simultaneously, which enables playing on Adobe Flash Player applications, Apple iOS devices, and Smooth Streaming players, respectively.

Does Wowza Streaming Engine 4.2 support HTML5?

Yes, Wowza Streaming Engine can deliver content to HTML5 in the following configurations:

- You can use the Apple HLS streaming format on Apple iOS devices.
- You can use the Smooth Streaming format on Windows 8 devices. For more information, go to [Walkthrough: Building Your First HTML5 Smooth Streaming Player](#) on the MSDN website.
- For other browsers supporting HTML5, you can use Wowza Streaming Engine to deliver video via progressive download.

Can I serve private live streams using Wowza and CloudFront?

At this time, live streams cannot be delivered securely using CloudFront signed URLs. However, progressively downloaded media can be delivered privately by using signed URLs. For more information, see [Serving Private Content through CloudFront \(p. 162\)](#).

Additional Documentation

The following resources might assist you as you work with Wowza.

Wowza Documentation

The Wowza website includes articles, documentation and pricing information for using Wowza live streams with Amazon Web Services:

- [Wowza for Amazon EC2 Articles](#)
- [Wowza Streaming Engine User's Guide](#)
- [Wowza on Amazon Web Services](#)

Amazon Web Services Documentation

The following resources include user guides and reference works for Amazon Web Services.

- [Amazon Elastic Compute Cloud documentation](#)
- [AWS CloudFormation documentation](#)

Live HTTP Streaming Using CloudFront and Any HTTP Origin

With Amazon CloudFront live streaming, you can use any live encoder, such as Elemental Live, that outputs HTTP-based streams to stream live performances, webinars, and other events. This tutorial walks you through the process of configuring live streaming.

Note

This tutorial assumes that you have already set up your live encoder.

Topics

- [Creating a New CloudFront Distribution for Live Streaming \(p. 324\)](#)
- [Configuring Web Players to Play the Live Stream \(p. 325\)](#)
- [\(Optional\) Deleting an AWS CloudFormation Stack for Live Streaming \(p. 325\)](#)

Creating a New CloudFront Distribution for Live Streaming

The following procedure uses an AWS CloudFormation template to create a new CloudFront distribution that you will use for your live stream.

To create a new CloudFront distribution for live streaming

1. Go to the [Amazon Web Services](#) page, and sign in using your Amazon.com account or create a new account.
2. To start the wizard that creates a new CloudFront distribution, choose the following link:
[Create a CloudFront distribution for live HTTP streaming](#)
3. On the **Select Template** page, choose **Next**.
4. On the **Specify Details** page, type the following values:

Stack name

Type a descriptive name for your live streaming stack, or accept the default name.

CustomOriginDNSName

Type the DNS name of the custom origin that CloudFront will get the live feed from.

CustomOriginHTTPPort

Type the HTTP TCP port that you want CloudFront to use to communicate with your custom origin.

DistributionComment

Type a comment to help you identify your distribution, which is useful if you manage multiple distributions. The value that you type here appears in the CloudFront console.

5. Choose **Next**.
6. (Optional) On the **Options** page, add the key-value pairs for any tags you plan to use. In addition, to configure SNS notification, to specify how long you're willing to wait for the stack to be created, to choose whether to roll back changes if stack creation fails, and to enter a stack policy, choose **Advanced**, and adjust settings as desired. For more information, see [Setting AWS CloudFormation Stack Options](#).
7. Choose **Next**.
8. Review the settings for the stack, and then choose **Create**. AWS CloudFormation creates the stack.

Creating your stack creation might take several minutes. To track the progress of stack creation, select the stack, and then choose the **Events** tab. If AWS CloudFormation cannot create the stack, the **Events** tab lists error messages.

When your stack is ready, in the list of stacks, the status for the stack changes to **CREATE_COMPLETE**.

9. When your stack is created, choose the **Outputs** tab, which will display the CloudFront domain name. You'll need this value when you set up the live stream playback in your web player.

Configuring Web Players to Play the Live Stream

To play the live stream, embed the manifest URL in the players that your users will play your live stream with. For example, to play a live stream for which the manifest file is **myStream/playlist.m3u8** and the CloudFront distribution is **d111111abcdef8.cloudfront.net**, you embed the following URL in players:

http://d111111abcdef8.cloudfront.net/myStream/playlist.m3u8

(Optional) Deleting an AWS CloudFormation Stack for Live Streaming

When your live event is over, delete the stack that you created for live streaming. This deletes the CloudFront distribution that you created for your live-streaming event.

Note

When you stop streaming, you also stop incurring CloudFront charges for this distribution. There are no charges for the AWS CloudFormation stack.

To delete an AWS CloudFormation stack for live streaming

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the upper-right corner, choose the region in which you created your stack.
3. Select the stack, and then choose **Delete Stack**.
4. Choose **Yes, Delete** to confirm.
5. To track the progress of the stack deletion, select the stack, and then choose the **Events** tab.

On-Demand Media Streaming with Unified Streaming

When you use Amazon CloudFront to deliver on-demand streaming over HTTP, you can transcode your content yourself into multiple bitrates and formats and use CloudFront to distribute the transcoded content. Alternatively, you can use CloudFront with Unified Streaming, which performs the transcoding step automatically when a user requests your content. Here's how you can use CloudFront and Unified Streaming together:

1. You use a AWS CloudFormation stack to configure the applicable AWS resources for you, including an Amazon EC2 instance running Unified Streaming Platform, an Amazon S3 bucket, and a CloudFront distribution.
2. You upload your video files into the Amazon S3 bucket in MP4 format.
3. You add the applicable links to your website or web application. The links access your content by using CloudFront URLs. (You can also route DNS requests for your own domain name to CloudFront.)

4. When a user accesses your content, the request is forwarded to a CloudFront edge location.
5. The CloudFront edge location forwards the requests to Unified Streaming Platform.
6. Based on the value of the `User-Agent` header, Unified Streaming Platform determines the format that the user's viewer requires, transcodes your content into that format, and returns the transcoded content to CloudFront.
7. CloudFront returns the transcoded content to the viewer and caches the files in the edge location. The next time a user requests your content in the same format from the same edge cache, CloudFront responds with files that are already in the cache.

Unified Streaming Platform supports the following HTTP-based dynamic streaming protocols:

- Adobe HTTP Dynamic Streaming (Adobe HDS)
- Apple HTTP Live Streaming (Apple HLS)
- Microsoft Smooth Streaming
- MPEG-DASH

In this tutorial, you use an AWS CloudFormation stack to create an Amazon S3 bucket for your media files, an Amazon EC2 instance running Unified Streaming media server software, and a CloudFront distribution. Note that this tutorial describes only one of many ways that you can configure AWS resources for on-demand streaming with Unified Streaming.

Note

For information about how to manage and secure your Amazon EC2 instance, see the [Amazon EC2 documentation](#).

For a list of supported platforms, clients, codecs, DRM formats, and other specifications for Unified Streaming, see the [Unified Streaming Platform fact sheet](#). For links to additional Unified Streaming and Amazon Web Services (AWS) documentation, see [Additional Documentation \(p. 336\)](#).

Topics

- [Creating an Amazon Web Services Account \(p. 326\)](#)
- [Creating an Amazon EC2 Key Pair \(p. 327\)](#)
- [Subscribing to Unified Streaming \(p. 327\)](#)
- [Creating an AWS CloudFormation Stack for On-Demand Streaming \(p. 328\)](#)
- [Verifying that Unified Streaming Server Is Running \(p. 330\)](#)
- [Uploading Your Media Files to Amazon S3 \(p. 330\)](#)
- [Playing the On-Demand Stream In a Test Web Application \(p. 331\)](#)
- [Deleting the AWS CloudFormation Stack and Amazon S3 Bucket for On-Demand Streaming \(p. 333\)](#)
- [Frequently Asked Questions \(p. 334\)](#)
- [Additional Documentation \(p. 336\)](#)

Creating an Amazon Web Services Account

If you already have an AWS account, skip to [Creating an Amazon EC2 Key Pair \(p. 327\)](#). If you don't already have an AWS account, use the following procedure to create one.

Note

When you create an account, AWS automatically signs up the account for all services. You are charged only for the services you use.

To create an AWS account

1. Go to <http://aws.amazon.com>, and choose **Sign In to the Console**.
2. Follow the on-screen instructions.

Part of the sign-up procedure involves receiving a phone call and entering a PIN using the phone keypad.

Next: [Creating an Amazon EC2 Key Pair \(p. 327\)](#)

Creating an Amazon EC2 Key Pair

If you already have an Amazon EC2 key pair in the Amazon EC2 region in which you want to create an AWS CloudFormation stack for Unified Streaming, skip to [Subscribing to Unified Streaming \(p. 327\)](#). If you don't have a key pair in that region, use the following procedure to create one.

A key pair is a security credential similar to a password. You specify a key pair when you create an AWS CloudFormation stack for on-demand streaming, later in this process. After on-demand streaming is configured, you use the key pair to securely connect to your Amazon EC2 instance.

To create an Amazon EC2 key pair

1. Sign in to the AWS Management Console and open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the **Region** list, choose the region in which you want to create the key pair.

You must create the key pair in the same region in which you will create your AWS CloudFormation stack for on-demand streaming later in this process. We recommend that you create the key pair and the stack for on-demand streaming in the region that is closest to the users who will be doing the streaming.
3. In the navigation pane, choose **Key Pairs**.
4. In the **Key Pairs** pane, choose **Create Key Pair**.
5. In the **Create Key Pair** dialog box, enter a name for the key pair such as **on-demand-streaming**, and make note of the name. You'll enter this value when you create an AWS CloudFormation stack for on-demand streaming, later in the process.
6. Click **Create**.
7. In the Opening <key_pair_name>.pem dialog box, save the .pem file to a safe place on your computer.

Important

This is the only opportunity you'll have to download and save your private key.

8. Click **Close** to close the Create Key Pair dialog box.

Next: [Subscribing to Unified Streaming \(p. 327\)](#)

Subscribing to Unified Streaming

Perform the following procedure to subscribe to Unified Streaming for Amazon Web Services through AWS Marketplace.

Important

You can subscribe an AWS account to Unified Streaming only once. If your AWS account already has a Unified Streaming subscription, use that subscription to configure on-demand streaming.

The Unified Streaming subscription is free. You pay only for hourly usage and for data transfer. You can view a detailed price list as part of the following procedure.

To order Unified Streaming for Amazon Web Services

1. Go to the [Unified Streaming \(USP\)](#) page on the AWS Marketplace website.
2. Review product information and choose **Continue**.
3. Click the **Manual Launch with EC2 Console, APIs or CLI** tab.
4. Review the pricing information, and choose **Accept Terms**.

Important

Don't use the buttons on this page to launch Unified Streaming. In the next procedure, you create an AWS CloudFormation stack that launches an Amazon EC2 instance and installs Unified Streaming.

Next: [Creating an AWS CloudFormation Stack for On-Demand Streaming \(p. 328\)](#)

Creating an AWS CloudFormation Stack for On-Demand Streaming

You use an AWS CloudFormation template to create a stack that creates the AWS resources required by on-demand streaming. These resources include an Amazon EC2 instance, an Amazon S3 bucket, and a CloudFront distribution. (You can optionally use an existing bucket.)

Important

You incur charges for your AWS resources beginning when you create the AWS CloudFormation stack:

- Hourly charges for the Amazon EC2 instances and the load balancer and monthly charges for CloudWatch continue to accrue until you delete the AWS CloudFormation stack regardless of whether you use the resources to stream video.
- Usage charges for Amazon S3 and CloudFront depend on how much you use the resources.

When you no longer want to use the resources that the AWS CloudFormation stack creates, delete the stack. This deletes the AWS resources that the stack created, and stops the AWS charges for the resources. (Deleting the stack does not delete the Amazon S3 bucket because the bucket might contain your media files.)

For more information about pricing for AWS resources, see [AWS Service Pricing Overview](#). For more information about how to delete an AWS CloudFormation stack, see [Deleting the AWS CloudFormation Stack and Amazon S3 Bucket for On-Demand Streaming \(p. 333\)](#). For more information about AWS CloudFormation, see [AWS CloudFormation Documentation](#).

To create an AWS CloudFormation stack for on-demand streaming

1. To start the Create Stack wizard, choose the link that corresponds with the applicable Amazon EC2 region. Click a link in the first group or the second group depending on whether you want AWS CloudFormation to create an Amazon S3 bucket for you in addition to creating an Amazon EC2 instance and a CloudFront distribution:
 - If you choose a link in the first group, AWS CloudFormation creates an Amazon EC2 instance and an Amazon S3 bucket in the corresponding region. (CloudFront distributions aren't associated with a specific region.)
 - If you choose a link in the second group, AWS CloudFormation creates an Amazon EC2 instance and prompts you to specify the Amazon S3 bucket that you want to use. We recommend that you choose a region in which you already have an Amazon S3 bucket so you aren't charged for transferring data between regions.

Create all required resources, including a new Amazon S3 bucket for media upload and storage

- [Create a stack in US East \(N. Virginia\)](#)
- [Create a stack in US West \(Oregon\)](#)
- [Create a stack in US West \(N. California\)](#)
- [Create a stack in EU \(Ireland\)](#)
- [Create a stack in EU \(Frankfurt\)](#)
- [Create a stack in Asia Pacific \(Singapore\)](#)
- [Create a stack in Asia Pacific \(Tokyo\)](#)
- [Create a stack in Asia Pacific \(Sydney\)](#)
- [Create a stack in South America \(São Paulo\)](#)

Create an Amazon EC2 instance and a CloudFront distribution but use an existing Amazon S3 bucket for media upload and storage

- [Create a stack in US East \(N. Virginia\)](#)
- [Create a stack in US West \(Oregon\)](#)
- [Create a stack in US West \(N. California\)](#)
- [Create a stack in EU \(Ireland\)](#)
- [Create a stack in EU \(Frankfurt\)](#)
- [Create a stack in Asia Pacific \(Singapore\)](#)
- [Create a stack in Asia Pacific \(Tokyo\)](#)
- [Create a stack in Asia Pacific \(Sydney\)](#)
- [Create a stack in South America \(São Paulo\)](#)

The wizard starts and the applicable URL automatically appears in the **Provide an S3 URL to template** field.

2. If you aren't already signed in to the AWS Management Console, sign in when prompted.
3. (Optional) Change the **Stack Name**. The stack name must not contain spaces, and it must be unique within your AWS account.

Do not change the **Template** option or the address in **Provide an S3 URL to template**.

4. Click **Next**.
5. For **Amazon EC2KeyPair**, enter the name of an Amazon EC2 key pair in the same region that you chose in Step 1. The key pair must be associated with the account that you're currently signed in with. If you created a key pair when you performed the procedure in [Creating an Amazon EC2 Key Pair \(p. 327\)](#), enter the name of that key pair.
6. If you chose a link to use an existing Amazon S3 bucket in step 1, enter the name of the bucket in the **AmazonS3BucketName** field.
7. For **InstanceType**, enter an instance type, which determines pricing for your Amazon EC2 instance. For more information about Amazon EC2 instance types, see [Available Instance Types](#) in the *Amazon EC2 User Guide for Linux Instances*.

For information about pricing, see the [Unified Streaming \(USP\)](#) page on the AWS Marketplace website.

8. Click **Next**.
9. (Optional) On the **Options** page, add one or more tags. The tags that you specify are applied to the Amazon EC2 instance and the Amazon S3 bucket that AWS CloudFormation creates. However, the tags are not applied to the CF distribution that AWS CloudFormation creates; AWS CloudFormation does not support adding tags to CloudFront distributions.

10. (Optional) To configure SNS notification, to specify how long you're willing to wait for the stack to be created, to choose whether to roll back changes if stack creation fails, and to enter a stack policy, choose **Advanced**, and adjust settings as desired.
11. Click **Next**.
12. Review the settings for the stack. When you're satisfied with the settings, choose **Create**, and AWS CloudFormation creates the stack.

Creating your stack might take several minutes. To track the progress of the stack creation, select the stack, and choose the **Events** tab in the bottom frame. If AWS CloudFormation cannot create the stack, the Events tab lists error messages.

When your stack is ready, the status for the stack changes to **CREATE_COMPLETE**.

Next: [Verifying that Unified Streaming Server Is Running \(p. 330\)](#)

Verifying that Unified Streaming Server Is Running

After AWS CloudFormation creates the stack, perform the following procedure to verify that Unified Streaming Server is running on the Amazon EC2 instance you provisioned by using AWS CloudFormation.

To verify that Unified Streaming Server is running

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the region selector, choose the region in which you created the AWS CloudFormation stack.
3. In the list of stacks, select the stack that you created in [Creating an AWS CloudFormation Stack for On-Demand Streaming \(p. 328\)](#).
4. Click the **Outputs** tab.
5. Copy the URL in the **UnifiedServer** key, for example, <http://ec2-01-2-34-567.compute-1.amazonaws.com/>.
6. Paste the URL into the address bar in a web browser, and press **Enter**.
7. On the Unified Streaming home page, choose the player links to verify that they play on your computer or device.

If the Unified Streaming home page doesn't appear, return to [On-Demand Media Streaming with Unified Streaming \(p. 325\)](#), and verify that the values that you specified in the first four tasks are correct.

Next: [Uploading Your Media Files to Amazon S3 \(p. 330\)](#)

Uploading Your Media Files to Amazon S3

You use the Amazon S3 bucket that you specified in the AWS CloudFormation stack (or that you had AWS CloudFormation create for you) to store your media content. These files must be publicly readable so that the Unified Streaming server can deliver them to players through CloudFront.

To upload media files to your Amazon S3 bucket

1. Review the [Unified Streaming fact sheet](#) and confirm that your media is encoded in a format that Unified Streaming supports.
2. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
3. Choose the stack that you created in [Creating an AWS CloudFormation Stack for On-Demand Streaming \(p. 328\)](#).

4. Choose the **Outputs** tab.
5. Make note of the value of the **S3BucketName** key. This is the Amazon S3 bucket that you'll upload your media files to.
6. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
7. In the list of buckets on the left, choose the name of the bucket that you made note of in step 5.
8. Choose **Upload**.
9. In the **Upload - Select Files and Folders** dialog box, choose **Add Files**.
10. Choose the files to upload.
11. Choose **Set Details**.
12. Choose **Set Permissions**.
13. Choose **Make everything public**, and choose **Start Upload**.

Next: [Playing the On-Demand Stream In a Test Web Application \(p. 331\)](#)

Playing the On-Demand Stream In a Test Web Application

To confirm that on-demand streaming is working, you play the stream in a test web application. When AWS CloudFormation created an Amazon EC2 instance, it also installed sample video files and two sample players:

- Silverlight – for streaming videos using the Microsoft Smooth Streaming protocol
- OSMF 2.0 – for streaming videos in Adobe Flash using the Adobe HTTP Dynamic Streaming (Adobe HDS) protocol

The following procedures explain how to play the on-demand stream using different protocols:

- [To play a video using the Microsoft Smooth Streaming protocol \(p. 331\)](#)
- [To play a video using the Apple HTTP Live Streaming \(HLS\) protocol \(p. 332\)](#)
- [To play a video using the Adobe HTTP Dynamic Streaming \(HDS\) protocol \(p. 332\)](#)
- [To play a video using the MPEG-DASH protocol \(p. 333\)](#)

To play a video using the Microsoft Smooth Streaming protocol

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the list of AWS CloudFormation stacks, choose the stack for on-demand HTTP streaming.
3. In the bottom pane of the AWS CloudFormation console, choose the **Outputs** tab.
4. On the **Outputs** tab, copy the URL in the **OriginS3** field. This is the URL for the Microsoft Smooth Streaming example web page on your Unified Streaming server.
5. Paste the URL into a browser and go to the website.
6. Copy the value of the **SmoothManifest** key, and paste it into URL field on the example web page.
In the following example URL, note that
`media-file-path-excluding-bucket-name-but-including-media-file-name` is literal text that you'll replace in the next step:

~~<http://d11111111111111111111111111111111.cloudfront.net/nfiftpathexclbutinclmediafilenametest.m3u8>~~

7. In the example web page, replace
`media-file-path-excluding-bucket-name-but-including-media-file-name` with the correct path of the video in Amazon S3 that you want to play. For example, if your media file name is `nasa_msl_launch.mp4`, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/nasa_msl_launch.mp4/manifest`

If the video is in the folder `space-videos` in your Amazon S3 bucket, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/space-videos/nasa_msl_launch.mp4/manifest`

To play a video using the Apple HTTP Live Streaming (HLS) protocol

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the list of AWS CloudFormation stacks, choose the stack for on-demand HTTP streaming.
3. In the bottom pane of the AWS CloudFormation console, choose the **Outputs** tab.
4. Open a Safari web browser on an Apple iOS device, or open the Safari web browser or QuickTime Player 10.x on a computer running Mac OS X Snow Leopard (version 10.6) or later.
5. Copy the value of the **SmoothManifest** key, and paste it into URL field in the Safari browser or QuickTime Player. In the following example URL, note that `media-file-path-excluding-bucket-name-but-including-media-file-name` is literal text that you'll replace in the next step:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/mediafilepathexcludingbucketnameincludingmediilename/manifest`

6. In the URL field, replace `media-file-path-excluding-bucket-name-but-including-media-file-name` with the correct path of the video in Amazon S3 that you want to play. For example, if your media file name is `nasa_msl_launch.mp4`, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/nasa_msl_launch.mp4/manifest`

If the video is in the folder `space-videos` in your Amazon S3 bucket, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/space-videos/nasa_msl_launch.mp4/manifest`

To play a video using the Adobe HTTP Dynamic Streaming (HDS) protocol

1. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. In the list of AWS CloudFormation stacks, choose the stack for on-demand HTTP streaming.
3. In the bottom pane of the AWS CloudFormation console, choose the **Outputs** tab.
4. On the **Outputs** tab, copy the URL in the **OriginS3** field. This is the URL for the Flash TTP Player example web page on your Unified Streaming server.
5. Paste the URL into a browser and go to the website.
6. Copy the value of the **HDSManifest** key, and paste it into URL field on the example web page. In the following example URL, note that `media-file-path-excluding-bucket-name-but-including-media-file-name` is literal text that you'll replace in the next step:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/mediafilepathexcludingbucketnameincludingmediilename/manifest`

7. In the URL field, replace `media-file-path-excluding-bucket-name-but-including-media-file-name` with the correct path of the video in Amazon S3 that you want to play. For example, if your media file name is `nasa_msl_launch.mp4`, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/nasa_msl_launch.mp4/manifest`

If the video is in the folder `space-videos` in your Amazon S3 bucket, then the URL is the following:

`http://d11111abcdef8.cloudfront.net/unifiedhttpstreaming-unifiedvod$bucket-123abc4/space-videos/nasa_msl_launch.mp4/manifest`

To play a video using the MPEG-DASH protocol

1. Browse to <http://dashif.org/reference/players/javascript/index.html>, which is a list of available versions of an MPEG-DASH test client.
2. Choose the latest version of the Dash client.
3. On the **Reference Client** *version number* page, in the **Stream** list, choose a streaming format.
4. Open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
5. In the list of AWS CloudFormation stacks, choose the stack for on-demand HTTP streaming.
6. In the bottom pane of the AWS CloudFormation console, choose the **Outputs** tab.
7. Copy the value of the **MPEGDASHManifest** key, and paste it into **manifest** field on the **Reference Client** page. In the following example URL, note that

`media-file-path-excluding-bucket-name-but-including-media-file-name` is literal text that you'll replace in the next step:

`http://d11111abcd8.cloudfront.net/unifiedhttpstreaming/unifiedvod/bucket-123abc4/mediafilepathexcludingbucketnamebutincludingmediilename/manifest`

8. In the **manifest** field, replace `media-file-path-excluding-bucket-name-but-including-media-file-name` with the correct path of the video in Amazon S3 that you want to play. For example, if your media file name is `nasa_msl_launch.mp4`, then the URL is the following:

`http://d11111abcd8.cloudfront.net/unifiedhttpstreaming/unifiedvod/bucket-123abc4/nasa_msl_launch.mp4/manifest`

If the video is in the folder `space-videos` in your Amazon S3 bucket, then the URL is the following:

`http://d11111abcd8.cloudfront.net/unifiedhttpstreaming/unifiedvod/bucket-123abc4/space-videos/nasa_msl_launch.mp4/manifest`

Next: [Deleting the AWS CloudFormation Stack and Amazon S3 Bucket for On-Demand Streaming \(p. 333\)](#)

Deleting the AWS CloudFormation Stack and Amazon S3 Bucket for On-Demand Streaming

When you no longer want to use this setup for on-demand HTTP streaming, delete the AWS CloudFormation stack. This deletes most of the AWS resources that AWS CloudFormation created, and stops most of the AWS charges for the resources. In addition, if you no longer want the Amazon S3 bucket that you were using for your media files, delete the bucket manually. AWS CloudFormation doesn't delete the bucket automatically in case you need the media files in the bucket. Deleting the bucket stops the rest of the AWS charges for the resources.

To delete an AWS CloudFormation stack and an Amazon S3 bucket for on-demand streaming

1. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
2. Find the AWS CloudFormation stack that you created for on-demand streaming, and make note of the creation time. This will help you identify the Amazon EBS volume that you'll delete later in this procedure.
3. Select the stack that you want to delete, and choose **Delete Stack**.
4. Click **Yes, Delete** to confirm.
5. To track the progress of the stack deletion, select the stack, and choose the **Events** tab in the bottom frame.
6. Navigate to the Amazon S3 console.
7. Choose the name of the bucket.
8. On the **All Buckets / *bucket name*** page, delete your files.

9. Choose **All Buckets**.
10. Choose the row for the bucket but don't choose the bucket name.
11. On the **Actions** menu, choose **Delete**.

Frequently Asked Questions

- What is the price for on-demand HTTP streaming using CloudFront and Unified Streaming? (p. 334)
- How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Unified Streaming? (p. 334)
- How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution? (p. 335)
- Can I stream my media in multiple formats to a variety of devices simultaneously? (p. 336)
- How can I secure my content? (p. 336)

What is the price for on-demand HTTP streaming using CloudFront and Unified Streaming?

When you use Unified Streaming with CloudFront, you incur the following charges:

- **Unified Streaming on Amazon EC2** – See [Unified Streaming on AWS Marketplace](#).
- **CloudFront** – See [Amazon CloudFront Pricing](#).
- **Amazon S3** – See [Amazon Simple Storage Service Pricing](#).

There is no charge for using AWS CloudFormation.

How can I use Secure Shell (SSH) to connect to my Amazon EC2 instance that is running Unified Streaming?

Note

By default, the SSH port for the Amazon EC2 instance (port 22) is disabled for security reasons. The following procedure explains how to enable the SSH port and how to use SSH to connect to your Amazon EC2 instance.

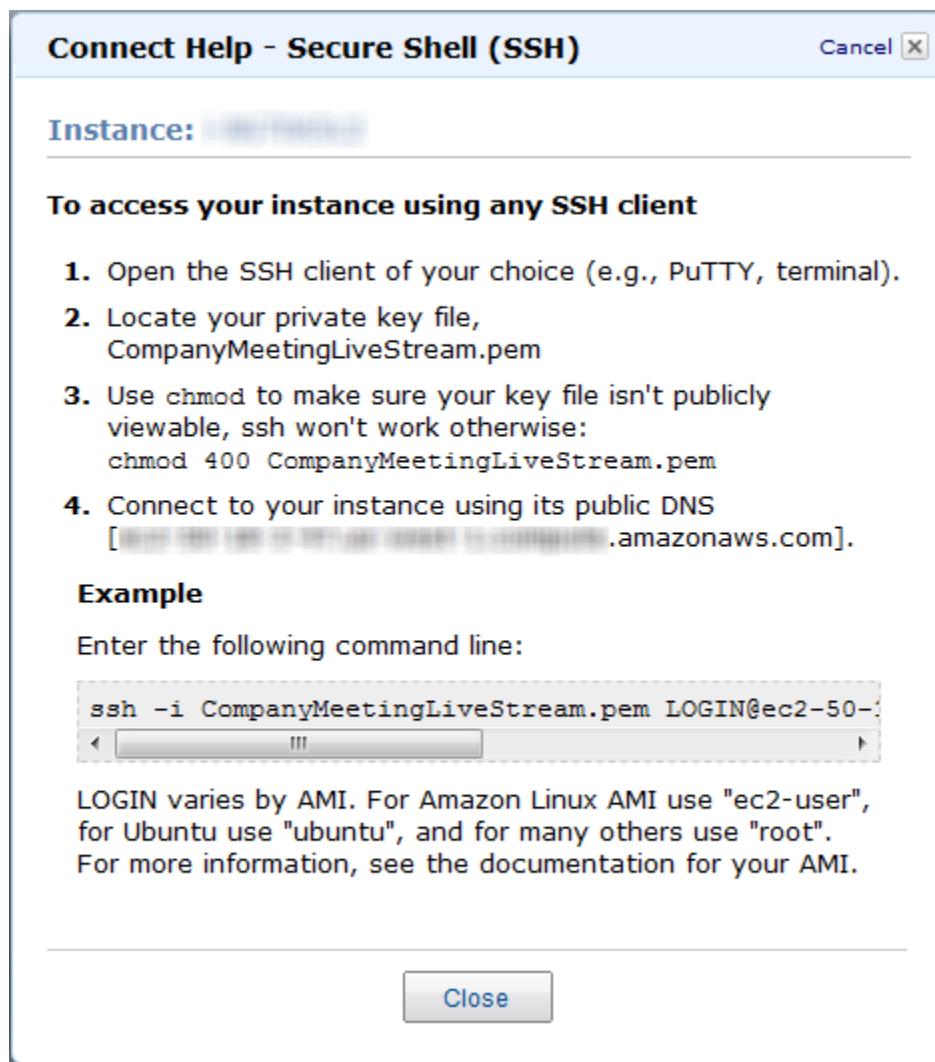
To enable access to port 22 on your Amazon EC2 instance that is running Unified Streaming

1. Get the name of the Amazon EC2 security group that is associated with your Amazon EC2 instance:
 - a. Sign in to the AWS Management Console and open the AWS CloudFormation console at <https://console.aws.amazon.com/cloudformation/>.
 - b. In the Region list, select the region in which you created your Amazon EC2 instance.
 - c. Click the row for your AWS CloudFormation stack.
 - d. In the bottom pane, choose the **Resources** tab.
 - e. In the left column of the **Stack Resources** table, find the row for which the value is `AMSOiginServerSecurityGroup`.
 - f. For that row, write down the value of the **Physical ID** column.
2. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
3. In the navigation pane, choose **Security Groups**.
4. On the Security Groups page, select the row in which the **Name** column matches the physical ID that you got in Step 1f.

5. In the bottom pane, choose the **Inbound** tab.
6. For **Create a new rule**, select **SSH**.
7. Click **Add Rule**.
8. Click **Apply Rule Changes**.

To use SSH to connect to your Amazon EC2 instance that is running Unified Streaming

1. Open the Amazon EC2 console at <https://console.aws.amazon.com/ec2/>.
2. In the navigation pane, choose **Instances**.
3. Right-click the correct instance, and choose **Connect** to view instructions on how to use SSH to connect to your Amazon EC2 instance. The user name is **ubuntu**.



How can I create a CNAME alias for my Amazon EC2 instance or for my CloudFront distribution?

Your Amazon EC2 instance running Unified Streaming has an internal and an external DNS name. Amazon EC2 does not provide access to modify these DNS settings. If you want to map an existing

domain name to your Amazon EC2 instance that is running Unified Streaming, use a DNS service provider such as [Amazon Route 53](#). When using your own domain name, we recommend that you create a CNAME resource record set that maps your domain name to the external DNS name for your Amazon EC2 instance. Alternatively, if you associated an Elastic IP address with your Amazon EC2 instance, you can create an A record that points to the Elastic IP address.

For information about using your own domain name with your CloudFront distribution, see [Using Alternate Domain Names \(CNAMEs\) \(p. 50\)](#).

Can I stream my media in multiple formats to a variety of devices simultaneously?

Yes. Unified Streaming supports streaming content to a wide array of devices using the following protocols:

- Adobe HTTP Dynamic Streaming (Adobe HDS)
- Apple HTTP Live Streaming (Apple HLS)
- Microsoft Smooth Streaming
- MPEG-DASH

How can I secure my content?

Unified Streaming supports several DRM, encryption (AES), and token-based protection schemes. For information about DRM, see [Unified Origin \(DRM\)](#) on the Unified Streaming website. For specific tutorials on individual technologies, see the following pages on the Unified Streaming website:

- [Adobe Access](#)
- [BuyDRM PlayReady](#)
- [EZDRM PlayReady](#)
- [HTTP Live Streaming with AES](#)

For token-based access strategies, see the following pages on the Unified Streaming website:

- [Securing your video presentations with Nginx' HttpSecureLinkModule](#)
- [Securing your video presentations with Apache's mod_auth_token](#)

Additional Documentation

Unified Streaming Documentation and Other Resources

The Unified Streaming site includes numerous resources, including tutorials that explain how to configure Unified Streaming as well as in-depth documentation of options.

- [Documentation](#)
- [Tutorials](#)
- [Frequently Asked Questions](#)

Amazon Web Services Documentation

The following links take you to documentation for the AWS services used in this tutorial:

- [AWS CloudFormation documentation](#)

- [Amazon Elastic Compute Cloud documentation](#)
- [Amazon Simple Storage Service documentation](#)

On-Demand Video Streaming Using CloudFront and Adobe Flash Player

When you stream media files using CloudFront, you provide both your media file and the media player with which you want end users to play the media file. To use Adobe Flash Player to stream media files with CloudFront, perform the procedures in the following topics:

1. [Creating an Amazon S3 Bucket \(p. 338\)](#)
2. [Creating CloudFront Web and RTMP Distributions \(p. 338\)](#)
3. [Creating a Flash Project Using Adobe Flash Builder \(p. 340\)](#)
4. [Uploading Media and Flash Builder Files to an Amazon S3 Bucket \(p. 341\)](#)
5. [Playing the Media File \(p. 342\)](#)

This tutorial uses Adobe Flash Builder version 4.6 to generate the files necessary to stream a video using Adobe Flash Player. For more information about Flash Builder, go to the [Flash Builder](#) page on the Adobe website. For information about downloading a free trial version of Adobe Flash Builder, go to the [Downloads/Adobe Flash Builder 4.6](#) page.

For a list of the codecs that Flash Player supports, go to the [Supported codecs | Flash Player](#) page on the Adobe website.

For more information about streaming media using CloudFront, see [Working with RTMP Distributions \(p. 87\)](#).

Creating an Amazon S3 Bucket

You can upload your media files and your media player files to the same Amazon S3 bucket or to separate buckets. For this tutorial, you'll create one bucket for both a media file and the Flash Player media player files. You'll upload the files later in the process, after you create the Adobe Flash Player files.

To create an Amazon S3 bucket

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In the Amazon S3 console, choose **Create Bucket**.
3. In the **Create Bucket** dialog, enter a bucket name.

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

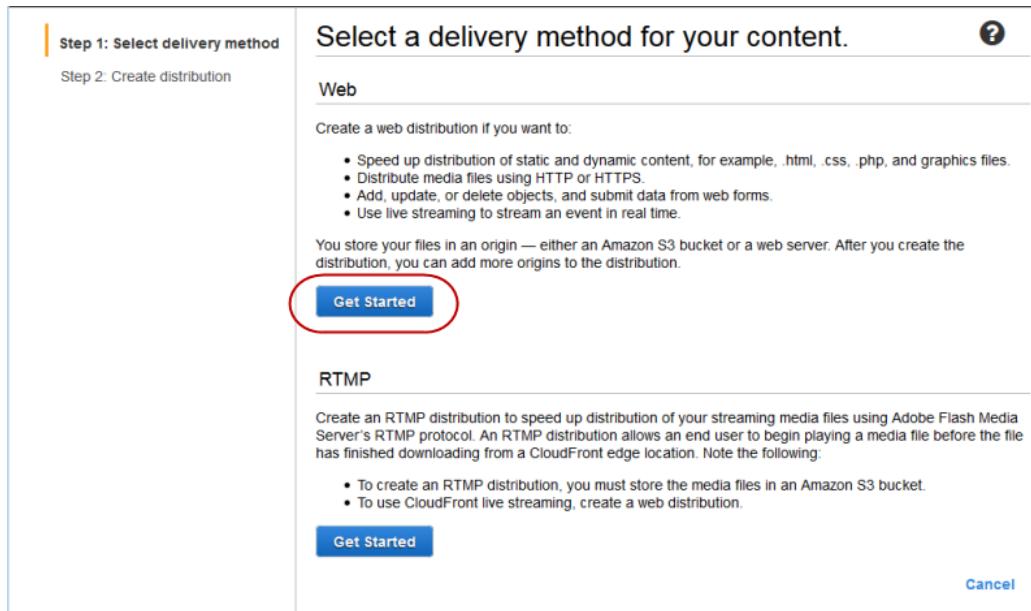
4. Select a region for your bucket. By default, Amazon S3 creates buckets in the US Standard region. We recommend that you choose a region close to you to optimize latency, minimize costs, or to address regulatory requirements.
5. Choose **Create**.

Creating CloudFront Web and RTMP Distributions

To configure CloudFront to stream a media file, you need a CloudFront RTMP distribution. For this tutorial, you'll also create a CloudFront web distribution to access the .html file that Adobe Flash Builder creates. Perform the following two procedures.

To create a CloudFront web distribution

1. Open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose **Create Distribution**.
3. On the first page of the **Create Distribution Wizard**, in the **Web** section, choose **Get Started**.



4. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To create an Amazon S3 bucket \(p. 338\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
5. Accept the default values for the remaining fields, and choose **Create Distribution**.
6. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. (It also appears on the **General** tab for a selected distribution.)

To create a CloudFront RTMP distribution

1. In the CloudFront console, choose **Create Distribution**.
2. In the **Create Distribution Wizard**, in the **RTMP** section, choose **Get Started**.
3. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To create an Amazon S3 bucket \(p. 338\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
4. Accept the default values for the remaining fields on the **Create Distribution** page, and choose **Create Distribution**.
5. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. The domain name also appears on the **General** tab for a selected distribution.

Creating a Flash Project Using Adobe Flash Builder

You can use Adobe Flash Builder to automatically create a Flash project, which contains all of the files necessary to play a media file using Adobe Flash.

To create a Flash project using Adobe Flash Builder

1. Start Adobe Flash Builder.
 2. On the Flash Builder **File** menu, choose **New > Flex Project**.
 3. Enter the following values:
 - **Project name:** Enter a name for your project, for example, **CloudFrontStreaming**.
 - **Folder:** Specify where you want Flash Builder to save the files for this project. If you don't want to use the default location, uncheck the **Use default location** checkbox, and choose another location.

Make note of the location; you'll need it later in the process.

 - **Application type:** Accept the default value, **Web**.
 - **Flex SDK version:** Accept the default value, **Use default SDK**.
 4. To create the project, choose **Finish**.
- After Flash Builder creates the project, a new tab that has the name of your project appears in the Flash Builder user interface. The **Source** button on the **<project-name>** tab is selected, and the **Source** page contains several lines of XML code.
5. Delete the default XML code on the **Source** page.
 6. Copy the following XML code, and paste it into the blank **Source** page in Adobe Flash Builder.

```
<?xml version="1.0" encoding="utf-8"?>
<s:Application xmlns:fx="http://ns.adobe.com/mxml/2009"
    xmlns:s="library://ns.adobe.com/flex/spark"
    xmlns:mx="library://ns.adobe.com/flex/mx" minWidth="955" minHeight="600">
    <fx:Declarations>
        <!-- Place non-visual elements here, for example, services and value objects -->
    </fx:Declarations>
    <fx:Script>
        <![CDATA[
            import mx.events.FlexEvent;
            import org.osmf.net.StreamingURLResource; import org.osmf.net.FMSURL;

            protected function vp_preinitializeHandler(event:FlexEvent): void
            {
                var myURL:StreamingURLResource = new StreamingURLResource("rtmp://RTMP-DISTRIBUTION-DOMAIN-NAME/cfx/st/mp4:VIDEO-FILE-NAME-WITHOUT-EXTENSION");

                myURL.urlIncludesFMSApplicationInstance = true;
                myVideoPlayer.source = myURL;
            }
        ]]>
    </fx:Script>
    <s:VideoPlayer id="myVideoPlayer" autoPlay="true" preinitialize="vp_prein
```

```
    initializeHandler(event)" x="32" y="52" />
</s:Application>
```

7. In the XML code that you pasted into the **Source** page, replace the following values:
 - Replace **RTMP-DISTRIBUTION-DOMAIN-NAME** with the CloudFront domain name for your RTMP distribution, for example, `s5c39gqb8ow64r.cloudfront.net`.
 - Replace **VIDEO-FILE-NAME-WITHOUT-EXTENSION** with the name of your video file, but exclude the filename extension. For example, if the name of your video is `my-vacation.mp4`, enter only `my-vacation`.
8. Save your changes.
9. On the Flash Builder **Project** menu, choose **Export Release Build**.
10. In the **Export Release Build** dialog box, accept all default values, and choose **Finish**.

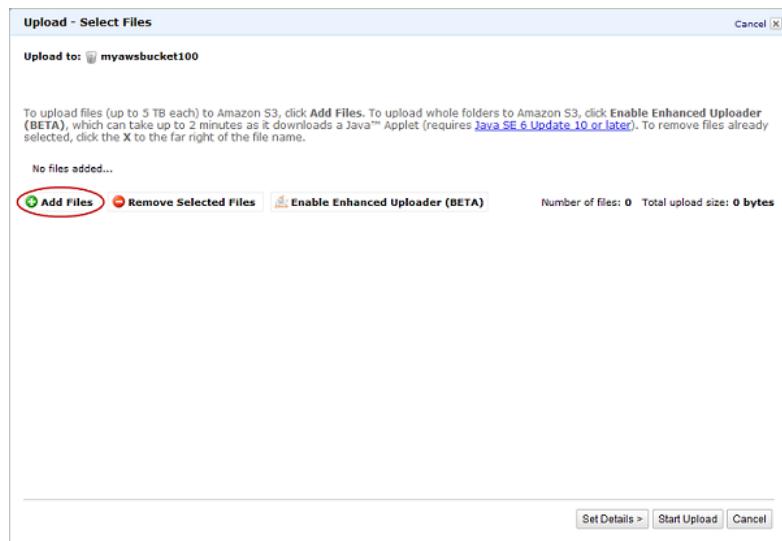
Flash Builder creates the files for your project and saves them in the location that you specified in Step 3.

Uploading Media and Flash Builder Files to an Amazon S3 Bucket

When you use Adobe Flash Builder to generate the files for streaming media files, you upload media files and Flash Builder files to the same Amazon S3 bucket.

To upload your media and Flash Builder files to an Amazon S3 bucket

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In the **Buckets** pane, select your bucket, and choose **Upload**.
3. On the **Upload - Select Files** page, choose **Add Files**, and add the following files:
 - Your media file
 - The files that Flash Builder generated when you performed the procedure [To create a Flash project using Adobe Flash Builder \(p. 340\)](#). Upload only the files in the `bin-release` directory. You can exclude the files in the `bin-release/history` subdirectory.



4. Grant public read permissions for the files that you added in the previous step.
 - a. Choose **Set Details**.
 - b. On the **Set Details** page, choose **Set Permissions**.
 - c. On the **Set Permissions** page, choose **Make everything public**.
5. Choose **Start Upload**.

Playing the Media File

To play the media file, you display the HTML file that Flash Builder created for your project and that you uploaded to your Amazon S3 bucket.

To play the media file

1. Enter the CloudFront URL of the HTML file that Flash Builder created for your project by concatenating the following values:

`http://domain-name-for-your-CloudFront-distribution/HTML-file-name`

For example:

`http://d111111abcdef8.cloudfront.net/CloudFrontStreaming.html`

2. In the video player, choose the arrow button.

The video should begin to play.

On-Demand Video Streaming Using CloudFront and Flowplayer for Adobe Flash

When you stream media files using CloudFront, you provide both your media file and the media player with which you want end users to play the media file. To use the Flowplayer for Adobe Flash media player to stream media files with CloudFront, perform the procedures in the following topics:

1. [Uploading Media and Flowplayer Files to an Amazon S3 Bucket \(p. 343\)](#)
2. [Creating CloudFront Web and RTMP Distributions \(p. 344\)](#)
3. [Embedding Video in an HTML Page \(p. 345\)](#)

Note

To stream video using CloudFront and Flowplayer for Adobe Flash, your users must enable Javascript in their browsers.

This tutorial is based on version 3.2.12 of Flowplayer for Adobe Flash. For more information about Flowplayer Flash, go to the [Flowplayer Flash](#) website. For a list of the video formats that Flowplayer Flash supports, go to [Video formats](#) in the Flowplayer developer documentation about the Flowplayer development environment.

Note

Flowplayer has released an HTML 5 version of their media player. The following procedures only work with Flowplayer Flash, not with Flowplayer HTML5.

For more information about streaming media using CloudFront, see [Working with RTMP Distributions \(p. 87\)](#).

Uploading Media and Flowplayer Files to an Amazon S3 Bucket

You can upload your media files and your media player files to the same Amazon S3 bucket or to separate buckets. For this tutorial, you'll upload an .mp4 media file and the Flowplayer media player files to the same bucket.

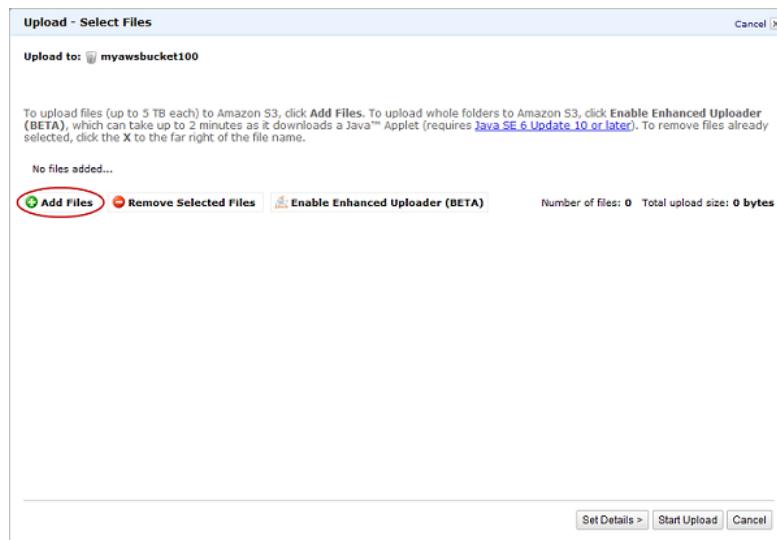
To upload media and Flowplayer files to an Amazon S3 bucket

1. Download the following files from the [Flowplayer](#) website:
 - The Flowplayer media player. After you download Flowplayer, extract the contents of the .zip file.
 - flowplayer.rtmp-3.2.10.swf. This is a plugin that allows Flowplayer to stream video using the RTMP protocol. The file is available on the [RTMP](#) page on the Flowplayer website.
2. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
3. In the Amazon S3 console, choose **Create Bucket**.
4. In the **Create Bucket** dialog, enter a bucket name.

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

5. Select a region for your bucket. By default, Amazon S3 creates buckets in the US Standard region. We recommend that you choose a region close to you to optimize latency, minimize costs, or to address regulatory requirements.
6. Choose **Create**.
7. Select your bucket in the **Buckets** pane, and choose **Upload**.
8. On the **Upload - Select Files** page, choose **Add Files**, and add the following files (the Flowplayer version numbers in your files may be different):
 - flowplayer.controls-3.2.12.swf
 - flowplayer-3.2.11.min.js
 - flowplayer-3.2.12.swf
 - flowplayer.rtmp-3.2.10.swf
 - Your media file in .mp4 format



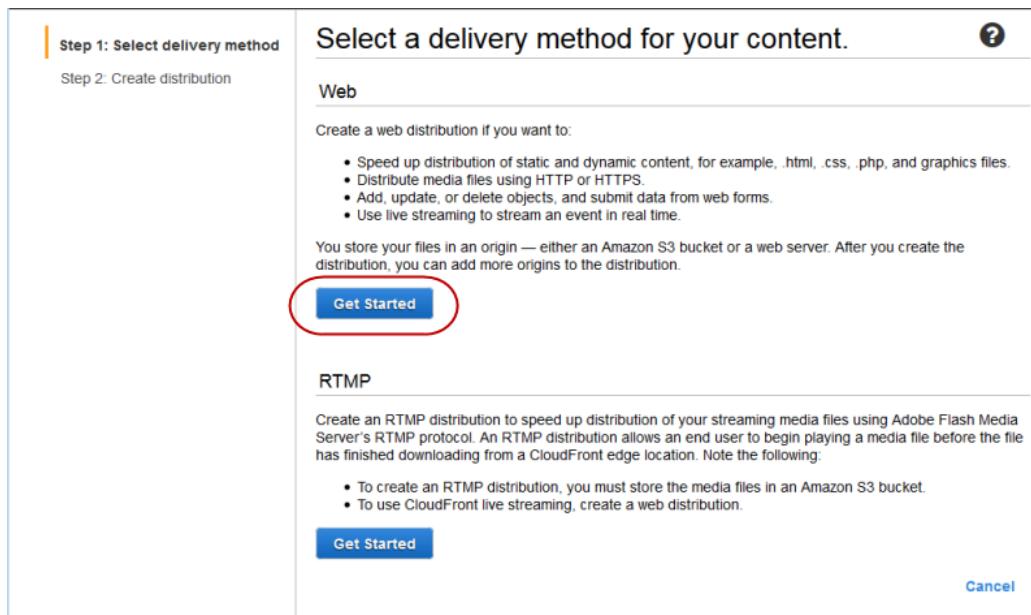
9. Grant public read permissions for the files that you added in the previous step.
 - a. Choose **Set Details**.
 - b. On the **Set Details** page, choose **Set Permissions**.
 - c. On the **Set Permissions** page, choose **Make everything public**.
10. Choose **Start Upload**.

Creating CloudFront Web and RTMP Distributions

To configure CloudFront to stream a media file, you need a CloudFront web distribution for the Flowplayer files and an RTMP distribution for the media file. Perform the following two procedures to create a web distribution and an RTMP distribution.

To create a CloudFront web distribution for your Flowplayer files

1. Open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose **Create Distribution**.
3. On the first page of the **Create Distribution Wizard**, in the **Web** section, choose **Get Started**.



4. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To upload media and Flowplayer files to an Amazon S3 bucket \(p. 343\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
5. Accept the default values for the remaining fields, and choose **Create Distribution**.
6. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. (It also appears on the **General** tab for a selected distribution.)

To create a CloudFront RTMP distribution for your media file

1. In the CloudFront console, choose **Create Distribution**.
2. In the **Create Distribution Wizard**, in the **RTMP** section, choose **Get Started**.
3. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To upload media and Flowplayer files to an Amazon S3 bucket \(p. 343\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
4. Accept the default values for the remaining fields on the **Create Distribution** page, and choose **Create Distribution**.
5. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. The domain name also appears on the **General** tab for a selected distribution.

Embedding Video in an HTML Page

The following sample HTML file shows you how to stream a video using the web and RTMP distributions that you created in [Creating CloudFront Web and RTMP Distributions \(p. 344\)](#). To use this sample to stream your video, perform the following steps:

1. Copy the HTML code below, and paste it into a text editor.
2. Review the comments in the HTML file, and replace the following placeholders with the applicable values:
 - WEB-DISTRIBUTION-DOMAIN-NAME
 - VIDEO-FILE-NAME
 - RTMP-DISTRIBUTION-DOMAIN-NAME
3. Save the file with a .html filename extension, for example, flowplayer-example.html.
4. Open the .html file in a web browser, and play your video.

```
<HTML>
<HEAD>
<TITLE>Amazon CloudFront Streaming with Flowplayer</TITLE>
</HEAD>

<BODY>

<H1>This video is streamed by CloudFront and played in Flowplayer.</H1>

<!-- This HTML file plays an MP4 media file using Flowplayer.

Replace all instances of WEB-DISTRIBUTION-DOMAIN-NAME with the
domain name of your CloudFront web distribution, for example,
d11111abcdef8.cloudfront.net (begins with "d").

Update the version number that appears in the flowplayer-<b>version</b> filenames
with the version number of the files that you downloaded from the Flowplayer
website.
The files may not have the same version number.

Ensure that URLs don't contain any spaces.
-->

<!-- Call the Flowplayer JavaScript file. -->
<script src="http://WEB-DISTRIBUTION-DOMAIN-NAME/flowplayer-
3.2.11.min.js"></script>

<!-- Style section. Specify the attributes of the player
such as height, width, color, and so on.
-->
<style>
a.rtmp {
    display:block;
    width:720px;
    height:480px;
    margin:25px 0;
    text-align:center;
    background-color:black;
}
</style>

<!-- Replace VIDEO-FILE-NAME with the name of your .mp4 video file,
excluding the .mp4 filename extension. For example, if you uploaded a file
called my-vacation-video.mp4, enter my-vacation-video.
```

```
If you're streaming an .flv file, use the following format:  
<a class="rtmp" href="VIDEO-FILE-NAME" />  
-->  
<a class="rtmp" href="mp4:VIDEO-FILE-NAME" />  
  
<script type="text/javascript">  
$f("a.rtmp", "http://WEB-DISTRIBUTION-DOMAIN-NAME/flowplayer-3.2.12.swf", {  
    // Configure Flowplayer to use the RTMP plugin for streaming.  
    clip: {  
        provider: 'rtmp'  
    },  
  
    // Specify the location of the RTMP plugin.  
    plugins: {  
        rtmp: {  
            url: 'http://WEB-DISTRIBUTION-DOMAIN-NAME/flowplayer.rtmp-3.2.10.swf',  
  
                // Replace RTMP-DISTRIBUTION-DOMAIN-NAME with the domain name of your  
                // CloudFront RTMP distribution, for example, s5c39gqb8ow64r.cloud  
                front.net.  
                netConnectionUrl: 'rtmp://RTMP-DISTRIBUTION-DOMAIN-NAME/cfx/st'  
        }  
    }  
});  
</script>  
  
</BODY>  
</HTML>
```

On-Demand Video Streaming Using CloudFront and JW Player

When you stream media files using CloudFront, you provide both your media file and the media player with which you want end users to play the media file. To use the JW Player media player to stream media files with CloudFront, perform the procedures in the following topics:

1. [Uploading Media and JW Player Files to an Amazon S3 Bucket \(p. 348\)](#)
2. [Creating CloudFront Web and RTMP Distributions \(p. 349\)](#)
3. [Embedding Video in a Web Page \(p. 350\)](#)
4. [Uploading the HTML File and Playing the Video \(p. 352\)](#)

This tutorial is based on the free edition of JW Player version 7.3. For more information about JW Player, go to the [JW Player](#) website.

For more information about streaming media using CloudFront, see [Working with RTMP Distributions \(p. 87\)](#).

Uploading Media and JW Player Files to an Amazon S3 Bucket

You can upload your media files and your media player files to the same Amazon S3 bucket or to separate buckets. For this tutorial, you'll upload an .mp4 or .flv media file and the JW Player media player files to the same bucket.

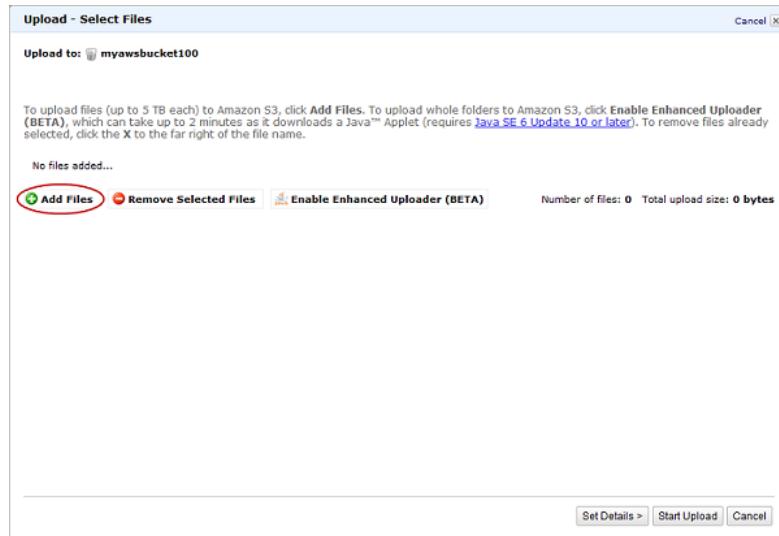
To upload media and JW Player files to an Amazon S3 bucket

1. If you don't already have the files for the JW Player media player, download the player (JW Player 7) from the [Downloads](#) page on the JW Player website. Then extract the contents of the .zip file.
2. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
3. In the Amazon S3 console, choose **Create Bucket**.
4. In the **Create Bucket** dialog, enter a bucket name.

Important

For your bucket to work with CloudFront, the name must conform to DNS naming requirements. For more information, go to [Bucket Restrictions and Limitations](#) in the *Amazon Simple Storage Service Developer Guide*.

5. Select a region for your bucket. By default, Amazon S3 creates buckets in the US Standard region. We recommend that you choose a region close to you to optimize latency, minimize costs, or to address regulatory requirements.
6. Choose **Create**.
7. Select your bucket in the **Buckets** pane, and choose **Upload**.
8. On the **Upload - Select Files** page, choose **Add Files**, and add the following files:
 - jwplayer.flash.swf
 - jwplayer.js
 - Your .mp4 or .flv media file.



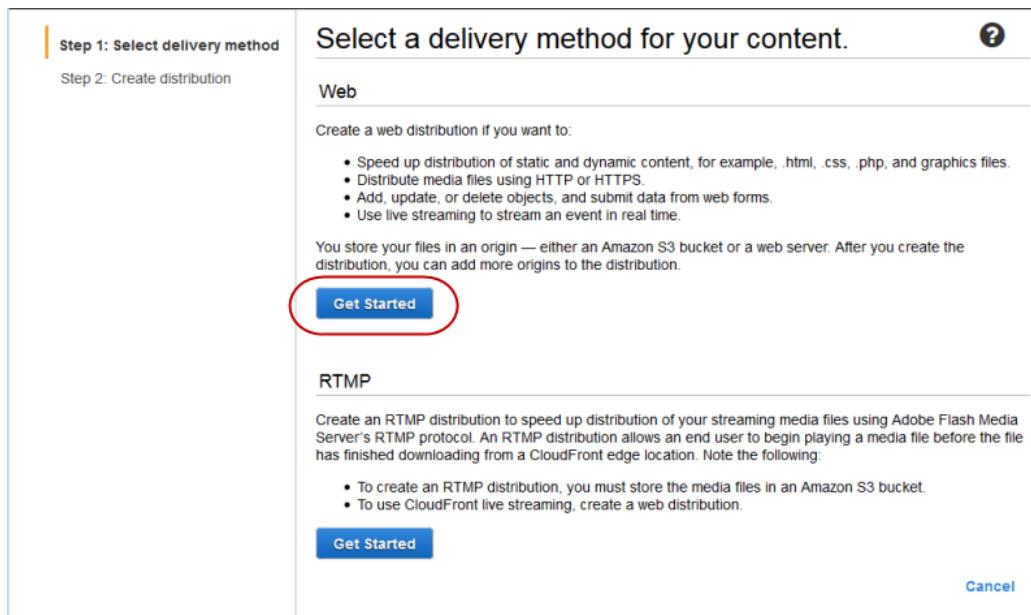
9. Grant public read permissions for the files that you added in the previous step.
 - a. Choose **Set Details**.
 - b. On the **Set Details** page, choose **Set Permissions**.
 - c. On the **Set Permissions** page, choose **Make everything public**.
10. Choose **Start Upload**.

Creating CloudFront Web and RTMP Distributions

To configure CloudFront to stream a media file, you need a CloudFront web distribution for the JW Player files and an HTML file, and an RTMP distribution for the media file. Perform the following two procedures to create a web distribution and an RTMP distribution.

To create a CloudFront web distribution for your JW Player files

1. Open the CloudFront console at <https://console.aws.amazon.com/cloudfront/>.
2. Choose **Create Distribution**.
3. On the first page of the **Create Distribution Wizard**, in the **Web** section, choose **Get Started**.



4. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To upload media and JW Player files to an Amazon S3 bucket \(p. 348\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
5. Accept the default values for the remaining fields, and choose **Create Distribution**.
6. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. The domain name also appears on the Distribution Settings page for a selected distribution.)

To create a CloudFront RTMP distribution for your media file

1. In the CloudFront console, choose **Create Distribution**.
2. In the **Create Distribution Wizard**, in the **RTMP** section, choose **Get Started**.
3. On the second page of the wizard, choose in the **Origin Domain Name** field, and select the Amazon S3 bucket that you created in the procedure [To upload media and JW Player files to an Amazon S3 bucket \(p. 348\)](#). If you have a lot of Amazon S3 buckets, you can type the first few characters of the bucket name to filter the list.
4. Accept the default values for the remaining fields on the **Create Distribution** page, and choose **Create Distribution**.
5. After CloudFront creates your distribution, the value of the **Status** column for your distribution will change from **InProgress** to **Deployed**. This should take less than 15 minutes.

The domain name that CloudFront assigns to your distribution appears in the list of distributions. The domain name also appears on the Distribution Settings page for a selected distribution.)

Embedding Video in a Web Page

The following example shows you how to embed a video in a web page using the web and RTMP distributions that you created in [Creating CloudFront Web and RTMP Distributions \(p. 349\)](#).

Perform the following steps:

1. Sign in to the [JW Player](#) website. If you don't already have a JW Player account, create one.
2. On the [Downloads](#) page, get the license key for the player that you downloaded earlier in this tutorial.
3. Copy the HTML code below, and paste it into a text editor.
4. Review the comments in the HTML file, and replace the following placeholders with the applicable values:
 - WEB-DISTRIBUTION-DOMAIN-NAME
 - RTMP-DISTRIBUTION-DOMAIN-NAME
 - VIDEO-FILE-NAME
 - LICENSE-KEY
5. Save the file with a .html filename extension, for example, jwplayer-example.html.

```
<HTML>
<HEAD>
<TITLE>Amazon CloudFront Streaming with JW Player 7</TITLE>

<!-- Call the JW Player JavaScript file, jwplayer.js.
Replace WEB-DISTRIBUTION-DOMAIN-NAME with the domain name of your
CloudFront web distribution, for example, d1234.cloudfront.net
(begins with "d"). This causes a browser to download the JW Player file
before streaming begins.

Replace LICENSE-KEY with your personal license key from JW Player.
-->

<script type='text/javascript' src='WEB-DISTRIBUTION-NAME/jwplayer.js'></script>
<script type='text/javascript' src='WEB-DISTRIBUTION-NAME/jwplay
er.flash.swf'></script>
<script>jwplayer.key="LICENSE-KEY";</script>

</HEAD>

<BODY>
<H1>This video is streamed by CloudFront and played by JW Player 7.</H1>

<!-- Replace RTMP-DISTRIBUTION-DOMAIN-NAME with the domain name of your
RTMP distribution, for example, s5678.cloudfront.net (begins with "s").

Replace VIDEO-FILE-NAME with the name of your .mp4 or .flv video file,
including the .mp4 or .flv filename extension. For example, if you uploaded
my-vacation.mp4, enter my-vacation.mp4. You might need to prepend "mp4:" to the
name of your video file, for example, mp4:my-vacation.mp4.

If the file is in a subdirectory, include the subdirectory name just before
the file name, for example:

"rtmp://RTMP-DISTRIBUTION-DOMAIN-NAME/cfx/st/sample-directory/VIDEO-FILE-NAME"
-->
```

```
<div id="my-video"></div>
<script type="text/javascript">
jwplayer("my-video").setup({
  file: "rtmp://RTMP-DISTRIBUTION-DOMAIN-NAME/cfx/st/VIDEO-FILE-NAME",
  width: "720",
  height: "480",
  primary: "flash"
});
</script>

</BODY>
</HTML>
```

Uploading the HTML File and Playing the Video

To play the video using the HTML file that you created in [Embedding Video in a Web Page \(p. 350\)](#), upload the file to your Amazon S3 bucket, and use the URL for your CloudFront distribution.

To upload the HTML file and play the video

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. Select your bucket, and choose **Upload**.
3. On the **Upload - Select Files** page, choose **Add Files**, and add your HTML file.
4. Grant public read permissions for the HTML file that you added in the previous step.
 - a. Choose **Set Details**.
 - b. On the **Set Details** page, choose **Set Permissions**.
 - c. On the **Set Permissions** page, choose **Make everything public**.
5. Choose **Start Upload**.
6. To play the video, enter the following URL in a web browser:
http://domain name of your CloudFront web distribution/your HTML file name

Limits

CloudFront entities are subject to the following limits.

| Entity | Limit |
|---|---|
| Data transfer rate per distribution | 10 Gbps Request a higher limit |
| Requests per second per distribution | 15,000 Request a higher limit |
| Web distributions per AWS account | 200 Request a higher limit |
| For more information, see Working with Web Distributions (p. 58) . | |
| RTMP distributions per AWS account | 100 Request a higher limit |
| For more information, see Working with RTMP Distributions (p. 87) . | |
| Alternate domain names (CNAMEs) per distribution | 100 Request a higher limit |
| For more information, see Using Alternate Domain Names (CNAMEs) (p. 50) . | |
| Origins per distribution | 25 Request a higher limit |
| Cache behaviors per distribution | 25 Request a higher limit |
| Whitelisted headers per cache behavior | 10 Request a higher limit |
| For more information, see Configuring CloudFront to Cache Objects Based on Request Headers (p. 108) . | |
| Whitelisted cookies per cache behavior | 10 Request a higher limit |
| For more information, see Configuring CloudFront to Cache Objects Based on Cookies (p. 106) . | |

| Entity | Limit |
|---|---|
| Total number of bytes in whitelisted cookie names (doesn't apply if you configure CloudFront to forward all cookies to the origin) | 512 minus the number of whitelisted cookies |
| Custom headers: maximum number of custom headers that you can configure CloudFront to forward to the origin For more information, see Forwarding Custom Headers to Your Origin (Web Distributions Only) (p. 112) . | 10 name/value pairs Request a higher limit |
| Custom headers: maximum length of a header name | 256 characters |
| Custom headers: maximum length of a header value | 2,048 characters |
| Custom headers: maximum length of all header values and names combined | 10,240 characters |
| SSL certificates per AWS account when serving HTTPS requests using dedicated IP addresses (no limit when serving HTTPS requests using SNI) For more information, see Using an HTTPS Connection to Access Your Objects (p. 229) . | 2 Request a higher limit |
| SSL certificates that can be associated with a CloudFront web distribution | 1 |
| Tags that can be added to a CloudFront web or RTMP distribution | 50 |
| Objects that you can serve per distribution | Unlimited |
| Maximum file size for HTTP GET, POST, and PUT requests | 20 GB |
| Maximum length of a request, including headers and query strings | 20,480 bytes |
| Maximum length of a URL | 8,192 bytes |
| File compression: range of file sizes that CloudFront compresses For more information, see Serving Compressed Files (p. 135) . | 1,000 to 10,000,000 bytes |
| Object invalidation: maximum number of objects allowed in active invalidation requests, excluding wildcard invalidations For more information, see Invalidate Objects (Web Distributions Only) (p. 121) . | 3,000 |
| Object invalidation: maximum number of active wildcard invalidations allowed | 15 |
| Object invalidation: maximum number of objects that one wildcard invalidation can process | Unlimited |

Amazon CloudFront Resources

Although fairly simple to use, CloudFront is rich in functionality. The resources listed here can help you learn more about CloudFront.

Topics

- [Additional Amazon CloudFront Documentation \(p. 355\)](#)
- [Getting Support \(p. 356\)](#)
- [CloudFront Developer Tools and SDKs \(p. 356\)](#)
- [Using CloudFront Logging \(p. 356\)](#)
- [Additional Tips from the Amazon Web Services Blog \(p. 356\)](#)
- [Invalidating Objects \(p. 357\)](#)
- [Distributing Streaming Media \(p. 357\)](#)
- [Tools and Code Examples for Configuring Private Content \(p. 357\)](#)
- [Using CloudFront with a Content Management System \(p. 358\)](#)

Additional Amazon CloudFront Documentation

The following related resources can help you as you work with this service.

- [Amazon CloudFront API Reference](#) – Gives complete descriptions of the API actions, parameters, and data types, and a list of errors that the service returns.
- [Document History \(p. 359\)](#) – A high-level overview of current and previous releases with specific attention to new features, corrections, known issues, and documentation improvements.
- [Technical documentation for the Amazon Simple Storage Service \(S3\)](#) – A detailed discussion of the Amazon S3 service, including the basics of getting started, an overview of the service, a programming reference, and an API reference.
- [Amazon CloudFront product information](#) – The primary web page for information about CloudFront, including features and pricing information.
- [Terms of Use](#) – Detailed information about our copyright and trademark; your account, license, and site access; and other topics.

Getting Support

Support for CloudFront is available in a number of forms.

- [Discussion forums](#) – A community-based forum for developers to discuss technical questions related to CloudFront.
- [AWS Support Center](#) – This site brings together information about your recent support cases and results from AWS Trusted Advisor and health checks, as well as providing links to discussion forums, technical FAQs, the service health dashboard, and information about AWS support plans.
- [AWS Premium Support Information](#) – The primary web page for information about AWS Premium Support, a one-on-one, fast-response support channel to help you build and run applications on AWS Infrastructure Services.
- [Contact Us](#) – Links for inquiring about your billing or account. For technical questions, use the discussion forums or support links above.

CloudFront Developer Tools and SDKs

See the [Developer Tools](#) page for links to developer resources that provide documentation, code samples, release notes, and other information to help you build innovative applications with AWS.

In addition, Amazon Web Services provides software development kits for accessing CloudFront programmatically. The SDK libraries automate a number of common tasks, including cryptographically signing your service requests, retrying requests, and handling error responses.

- [AWS SDK for Java](#) – Setup and other documentation
- [AWS SDK for .NET](#) – Setup and other documentation
- [AWS SDK for PHP](#) – Setup and other documentation
- [AWS SDK for Ruby](#) – Setup and other documentation

Using CloudFront Logging

The following AWS blog posts discuss enhancements to CloudFront logging as well as some ways to analyze access logs.

- AWS Blog – [Amazon CloudFront Request Logging](#) (for content delivered via HTTP)
- AWS Blog – [Amazon CloudFront Now Supports Streaming Access Logs](#) (for content delivered via RTMP)
- AWS Blog – [Enhanced CloudFront Logs, Now With Query Strings](#)

Additional Tips from the Amazon Web Services Blog

The AWS Blog has a number of posts to help you use CloudFront:

- Improving website performance – [Improving Global Application Performance](#)
- Creating secure connections using HTTPS – [Amazon CloudFront: HTTPS Access, Another Edge Location, Price Reduction](#)

- Using custom origins – [New Amazon CloudFront Feature: Custom Origins](#)
- Learning more about third-party tools for Amazon CloudFront – [CloudFront Management Tool Roundup](#)

Invalidating Objects

In addition to the invalidation methods provided by CloudFront, you can use the following third-party tools to invalidate objects.

Note

These tools were developed by third-party vendors who are not associated with Amazon Web Services. For information on how to use these tools, please refer to the vendor's documentation or contact the vendor.

- CloudBuddy Personal – <http://m1.mycloudbuddy.com/index.html>
- CloudBerry Explorer – <http://cloudberrylab.com>
- Ylastic – <http://ylastic.com>
- Cyberduck – <http://cyberduck.ch>
- Bucket Explorer – <http://www.bucketexplorer.com>
- CloudFront Invalidator – <http://www.swook.net/p/cloudfront-invalidator.html>
- CDN Planet CloudFront Purge Tool – <http://www.cdnplanet.com/tools/cloudfront-purge-tool/>

You can also search for code samples on Github, <https://github.com>. Search for the phrase *CloudFront invalidation*.

Distributing Streaming Media

The following third-party sources provide additional information on distributing streaming media.

- StreamingMedia.com – [How To Get Started With Amazon CloudFront Streaming](#)
- IONCANNON.NET –
 - iPhone Windowed HTTP Live Streaming Using Amazon S3 and CloudFront Proof of Concept
 - HTTP Live Video Stream Segmente and Distributor
 - iPhone Windowed HTTP Live Streaming Server
- Flowplayer.org – [Bandwidth detection: Make sure you reach your entire audience with good quality](#)
- JW Player – [About RTMP Streaming](#)

Tools and Code Examples for Configuring Private Content

In addition to the methods provided by CloudFront, the following third-party tools provide web forms for configuring your distribution for private content. Some of the tools also provide web forms for creating signed URLs.

- **CloudBuddy** – Supports configuring a distribution for private content and supports creating signed URLs.

For more information about using [CloudBuddy](#) for CloudFront private content, go to [Configuring CloudFront Distribution and Private Content](#).

This tool is based on research at [CSS CorpLabs](#) for a [.NET implementation](#) of CloudFront private URLs.

- **Bucket Explorer** – Supports configuring a distribution for private content

For information about using [Bucket Explorer](#) for CloudFront private content, go to [How to Create a Private Distribution on a Bucket](#).

- **CloudBerry** – Supports configuring a distribution for private content and supports creating signed URLs.

For information about using [CloudBerry](#) for CloudFront private content, go to [How to Configure Private Content for CloudFront Streaming with CloudBerry](#).

For information on setting a default root object, see [How to set CloudFront Default Object with CloudBerry S3 Explorer](#).

For more information about private content, see the blog post [New Amazon CloudFront Feature: Private Content](#) on the AWS blog.

For an example of how to use signed cookies, use your domain name in object URLs, and still use the SSL certificate for the cloudfront.net domain, see the Space Vatican blog post [Using CloudFront Signed Cookies](#). This allows you to use an alternate domain name with HTTPS without incurring the expense of dedicated IP addresses or the limitations of SNI, as documented in [Using Alternate Domain Names and HTTPS \(p. 234\)](#).

Using CloudFront with a Content Management System

You can use CloudFront with several popular content management systems. The following links tell you how.

Drupal

- Drupal.org – [CloudFront Installation](#)
- DrupalModules.com – [CloudFront Drupal Module](#)

Sitecore

- NTT Data Advisory Service – [AWS CloudFront Sitecore Integration](#)

WordPress

- om4.com – [Using Amazon CloudFront with WordPress and WordPress MU](#)
- WordPress.org – [W3 Total Cache](#)
- WordPress.org – [Simple Amazon S3 Upload Form](#)
- WordPress.org – [OSSDL CDN Off-linker](#)
- WordPress.org – [My CDN](#)
- Inquisiter.com – [Amazon CloudFront CDN with a WordPress Blog](#)

Document History

The following table describes the important changes to the documentation since the last release of CloudFront.

- **API Version:** 2016-01-13
- **Latest documentation update:** January 21, 2016

| Change | Description | Date Changed |
|--------------|---|------------------|
| New Feature | You can now configure CloudFront to use SSL/TLS certificates that you provisioned by using the new AWS Certificate Manager service. Note that CloudFront still supports using certificates that you obtained from a third-party certificate authority and uploaded to the IAM certificate store. For more information, see Using an HTTPS Connection to Access Your Objects (p. 229) . To specify an SSL/TLS certificate by using the CloudFront API, use the <code>new Certificate</code> and <code>CertificateSource</code> elements. For more information, see the descriptions of these elements in the DistributionConfig Complex Type topic in the Amazon CloudFront API Reference . | January 21, 2016 |
| New Features | For web distributions, you can now further protect communication between CloudFront and your origin server: <ul style="list-style-type: none">• Enforce HTTPS-only connection between CloudFront and your origin webserver – You can configure CloudFront to connect to your origin server using HTTPS regardless of whether the viewer made the request by using HTTP or HTTPS.• Support for TLSv1.1 and TLSv1.2 between CloudFront and your origin webserver – CloudFront now supports TLSv1.1 and TLSv1.2 for communication between CloudFront and your origin. In addition, you can choose the protocols that you want CloudFront to use when communicating with your origin so you can, for example, choose not to allow CloudFront to communicate with your origin by using SSLv3, which is less secure than TLS. For more information, see How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin (p. 230) . | January 13, 2016 |

| Change | Description | Date Changed |
|-------------|--|-------------------|
| New Feature | <p>For web distributions, you can now configure CloudFront to include custom headers when it forwards requests to your origin. Custom headers have a variety of uses, such as the following:</p> <ul style="list-style-type: none"> • You can distinguish the requests that are forwarded to your custom origin by CloudFront from requests that come from other sources. • If you've configured more than one CloudFront distribution to use the same origin, you can distinguish between the requests that CloudFront forwards for each distribution. • You can use custom headers to control access to content on a custom origin. <p>For more information, see Forwarding Custom Headers to Your Origin (Web Distributions Only) (p. 112).</p> | December 28, 2015 |
| New Feature | <p>For web distributions, you can now configure CloudFront to automatically compress files of certain types for both Amazon S3 and custom origins, so downloads are faster and your web pages render faster. Compression also reduces your CloudFront data transfer cost because you pay for the total amount of data served. For more information, see Serving Compressed Files (p. 135).</p> | December 17, 2015 |
| New Feature | <p>You can now integrate CloudFront with AWS WAF, a web application firewall that lets you monitor the HTTP and HTTPS requests that are forwarded to CloudFront and lets you control access to your content. Based on conditions that you specify, such as the IP addresses that requests originate from or the values of query strings, CloudFront responds to requests either with the requested content or with an HTTP 403 status code (Forbidden). You can also configure CloudFront to return a custom error page when a request is blocked.</p> <p>For more information about AWS WAF, see the AWS WAF Developer Guide. For information about how to add the ID for an AWS WAF web ACL to a CloudFront distribution, see AWS WAF Web ACL (p. 75) in the topic Values that You Specify When You Create or Update a Web Distribution (p. 63).</p> | October 6, 2015 |

| Change | Description | Date Changed |
|-------------|--|---------------|
| New Feature | <p>CloudFront access logs for web distributions now include four new columns:</p> <ul style="list-style-type: none"> • <code>x-forwarded-for</code> – The originating IP address of the client that made a request. • <code>ssl-protocol</code> – The SSL protocol (for example, <code>TLSv1.1</code>) that the client and CloudFront negotiated for transmitting the request and response. • <code>ssl-cipher</code> – The SSL cipher (for example, <code>ECDHE-RSA-AES128-GCM-SHA256</code>) that the client and CloudFront negotiated for transmitting the request and response. • <code>x-edge-response-result-type</code> – The classification of the response (for example, <code>Hit</code> or <code>Miss</code>) just before CloudFront begins to return the response to the viewer. In some cases, this value can differ from the value of the existing log field <code>x-edge-result-type</code>, which shows how CloudFront classified the response after the last byte left the edge location. <p>For more information about access logs, see Access Logs (p. 256). For a complete listing of all of the fields that appear in access logs for web distributions, see Web Distribution Log File Format (p. 261).</p> | June 30, 2015 |
| New Feature | <p>You can now configure a maximum time-to-live (TTL) and a default TTL to specify how long CloudFront caches your objects in edge locations. You can set the TTL at the edge when your origin doesn't include a <code>Cache-Control max-age</code>, <code>Cache-Control s-maxage</code>, or <code>Expires</code> header in the response, or you can override the header value. For more information, see Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration) (p. 116).</p> | June 17, 2015 |
| New Feature | <p>The invalidation feature, which allows you to remove objects from CloudFront edge caches before they expire, now supports the <code>*</code> wildcard character. You can add a <code>*</code> wildcard character at the end of an invalidation path to remove all objects that match this path. For more information, see Invalidate Objects (Web Distributions Only) (p. 121).</p> | May 21, 2015 |

| Change | Description | Date Changed |
|--------------|---|----------------|
| New Features | <p>This release of CloudFront includes the following improvements to CloudFront reports:</p> <ul style="list-style-type: none"> • A new Devices report lets you see what types of devices your users are using to view your content. • You can now download the data for CloudFront reports in comma-separated values (CSV) format. • You can now view CloudWatch metrics in the CloudFront console, which lets you more easily view all of the metrics for a distribution. • For Devices, Browsers, and Operating Systems reports, we created separate categories for requests from bots and crawlers, for requests from custom viewers, and for requests for which the value of the <code>User-Agent</code> header is empty. • The Popular Objects report now lets you view up to 500 characters of the URL for each object. <p>For more information about CloudFront reports, see CloudFront Reports (p. 15).</p> | March 25, 2015 |
| New Feature | When you have Amazon S3 buckets in regions that require signature version 4 for authentication and you're using an origin access identity to restrict access to your Amazon S3 bucket, you can now submit <code>PUT</code> requests to CloudFront to upload objects to your bucket. For more information, see Using an Origin Access Identity in Amazon S3 Regions that Support Only Signature Version 4 Authentication (p. 170) . | March 18, 2015 |
| New Features | <p>This release of CloudFront introduces the following new features:</p> <ul style="list-style-type: none"> • For web distributions, you can now use signed cookies instead of signed URLs to control who can access your content. Signed cookies are useful when you don't want to change your current URLs or when you want to provide access to multiple restricted files, for example, all of the files in the subscribers' area of a website. For information about using signed cookies to protect your private content, see Serving Private Content through CloudFront (p. 162). • For web distributions, you can configure CloudFront to cache different versions of your objects based on the device a user is using to view your content. With this release, we add support for caching a different version of your objects when the device is a smart TV. For more information, see User-Agent Header (p. 154). | March 12, 2015 |

| Change | Description | Date Changed |
|--------------|---|-------------------|
| New Features | <p>This release of CloudFront introduces the following new features:</p> <ul style="list-style-type: none"> • Adding a path to the origin – For web distributions, you can now specify a path in addition to a domain name when you configure the origin. For example, if you're using an Amazon S3 bucket as your origin, you can specify <code>bucket-name.s3.amazonaws.com/production</code> instead of just <code>bucket-name.s3.amazonaws.com</code>. This allows you to use a single bucket to serve content for multiple distributions. This feature works both for Amazon S3 origins and for custom origins. For information about specifying an origin path in the CloudFront console, see Origin Path (p. 66). • Top-referrers report and viewer reports – For web distributions, you can now display a list of the top referrers. You can also display information about the viewers that are accessing your content, including the browsers that your users are using, the operating systems that the browsers are running on, and the locations of viewers. For information about these reports, see CloudFront Top Referrers Report (p. 23) and CloudFront Viewers Reports (p. 29). | December 15, 2014 |
| New Feature | <p>For web distributions, you can now choose the minimum SSL protocol version, SSLv3 or TLSv1, that you want CloudFront to allow when responding to requests from your users. If a user is using a browser or device that doesn't support the minimum protocol version that you specify, CloudFront won't serve your objects to the user. For information about choosing the minimum SSL protocol version in the CloudFront console, see Minimum SSL Protocol Version (p. 77).</p> | October 24, 2014 |
| New Features | <p>This release of CloudFront introduces the following new features:</p> <ul style="list-style-type: none"> • Cache Statistics charts – You can now view a graphical representation of statistics related to CloudFront edge locations. The following statistics are available for a specified time period over the last 60 days: total number of requests; hits, misses, and errors as a percentage of total requests; total bytes transferred to viewers and bytes transferred for cache misses; viewer requests by HTTP status code (2xx, 3xx, 4xx, and 5xx); and the percentage of GET requests that didn't finish downloading. For more information, see CloudFront Cache Statistics Reports (p. 16). • Faster delivery of access logs – CloudFront access log files are now delivered several times per hour, and the files are available within an hour of viewer requests. For more information about access logs, see Access Logs (p. 256). • Popular Objects report – The Popular Objects report lists the number of requests, cache hits, and cache misses, as well as error rates for the 50 most popular objects during a specified period. For more information, see CloudFront Popular Objects Report (p. 20). | October 21, 2014 |

| Change | Description | Date Changed |
|--------------|--|--------------------|
| New Feature | For web distributions, you can now monitor six CloudFront metrics in near real time using CloudFront. This lets you quickly spot trends in usage and availability. You can also set alarms based on the metrics, so you can get notification when a specific event occurs. For more information, see Monitoring CloudFront Activity Using CloudWatch (p. 270) . | October 9, 2014 |
| New Features | This release of CloudFront introduces the following new features: <ul style="list-style-type: none"> For web distributions, you can now configure CloudFront to cache the response to OPTIONS requests. The response includes information about the options provided by a web server and can apply to a specific resource or to the server as a whole. For more information, see Allowed HTTP Methods (p. 71) and Cached HTTP Methods (p. 71). For web distributions, when you configure CloudFront to forward whitelisted cookies to your origin and to cache objects based on cookie values, you can now use * and ? wildcards in cookie names. For more information, see Configuring CloudFront to Cache Objects Based on Cookies (p. 106). | September 29, 2014 |
| New Feature | CloudFront now supports more ciphers for forwarding HTTPS requests to custom origin servers. For more information, see Encryption (p. 148) . | August 20, 2014 |
| New Feature | For web distributions, CloudFront lets you choose whether you want CloudFront to forward headers to your origin and to cache separate versions of a specified object based on the header values in viewer requests. This allows you to serve different versions of your content based on the device the user is using, the location of the viewer, the language the viewer is using, and a variety of other criteria. For more information, see Configuring CloudFront to Cache Objects Based on Request Headers (p. 108) . | June 26, 2014 |
| New Feature | Amazon CloudFront now works with AWS CloudTrail to capture information about every request that your AWS account (including your IAM users) sends to the CloudFront API. Integrating CloudFront and CloudTrail lets you determine which requests were made to the CloudFront API, the source IP address from which each request was made, who made the request, when it was made, and more. For more information about using CloudFront with CloudTrail, see Using AWS CloudTrail to Capture Requests Sent to the CloudFront API (p. 274) . | May 28, 2014 |
| New Feature | With this release, for HTTPS viewer requests that CloudFront forwards to a custom origin, CloudFront validates that one of the domain names in the SSL certificate on your origin server matches the domain name that you specify for Origin Domain Name . If the domain names don't match, CloudFront responds to viewer requests with an HTTP status code 502 (bad gateway) instead of the requested objects. To enable this functionality, you must specify an Origin Protocol Policy of Match Viewer . For more information, see How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin (p. 230) . | May 16, 2014 |

| Change | Description | Date Changed |
|-----------------------|--|-------------------|
| New Feature | This release of CloudFront introduces a new field in CloudFront access logs for web distributions. The <code>time-taken</code> field shows the number of seconds between the time a CloudFront edge server receives a viewer's request and the time that CloudFront writes the last byte of the response to the server's output queue as measured on the server. For more information about the file format of CloudFront access logs for web distributions, see Web Distribution Log File Format (p. 261) . | April 28, 2014 |
| Updated Documentation | Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0 (p. 286) has updated procedures for subscribing to Adobe Media Server and for creating an AWS CloudFormation stack. | March 18, 2014 |
| New Feature | This release of CloudFront introduces usage charts that contain a subset of data from the CloudFront usage report. For more information, see CloudFront Usage Reports (p. 25) . | March 13, 2014 |
| New Features | This release of CloudFront introduces the following new features: <ul style="list-style-type: none"> • Redirect viewer HTTP requests to HTTPS: You can now configure CloudFront to redirect viewer HTTP requests to HTTPS. For more information, see How to Require HTTPS for Communication between Viewers, CloudFront, and Your Origin (p. 230). • Server Name Indication (SNI) for HTTPS requests with alternate domain names: If you're using your domain name in the URLs for your objects, you can now configure CloudFront to serve HTTPS requests to users whose browsers support Server Name Indication (SNI). For more information, see Using Alternate Domain Names and HTTPS (p. 234). | March 5, 2014 |
| New Feature | This release of CloudFront introduces support for HTTP on-demand streaming of media files in the Microsoft Smooth Streaming format. For more information, see Configuring On-Demand Smooth Streaming (p. 85) . | February 20, 2014 |
| New Feature | This release of CloudFront introduces support for HTTP 1.1. For more information, see Transfer Encoding (p. 157) . In addition, we added documentation about on-demand progressive downloads and on-demand Apple HTTP live streaming. For more information, see Configuring On-Demand Progressive Downloads and Configuring On-Demand Apple HTTP Live Streaming (HLS) in the <i>Amazon CloudFront Developer Guide</i> . | February 7, 2014 |

| Change | Description | Date Changed |
|--------------|---|-------------------|
| New Features | <p>This release of CloudFront introduces geo restriction. If you need to prevent users in selected countries from accessing your content, you can configure a CloudFront web distribution to do one of the following:</p> <ul style="list-style-type: none"> • Allow users to access content only if they're in a whitelist of specified countries. • Prevent users from accessing content if they're in a blacklist of specified countries. <p>For more information, see Restricting the Geographic Distribution of Your Content (p. 82).</p> | December 18, 2013 |
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • DELETE, OPTIONS, PATCH, POST, and PUT support: You can now use the DELETE, OPTIONS, PATCH, POST, and PUT HTTP methods in requests that you send to CloudFront. For more information, see Allowed HTTP Methods (p. 71). <p>For information about how to specify HTTP methods by using the CloudFront API, see Method in the topic DistributionConfig Complex Type in the Amazon CloudFront API Reference.</p> <ul style="list-style-type: none"> • Distribution types renamed: CloudFront download distributions are now known as web distributions, and streaming distributions are now known as RTMP distributions. • New columns in access logs for web distributions: Access logs for CloudFront web distributions now include three additional columns for each request: x-host-header, cs-protocol, and cs-bytes. For more information, see Web Distribution Log File Format (p. 261). | October 15, 2013 |

| Change | Description | Date Changed |
|-----------------------|---|--------------------|
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • Custom error pages: You can now serve error pages with your own branding and content instead of the default HTTP error messages, such as "404, page not found." You can also use custom error pages to serve a static page when your web server is unavailable. For more information, see Customizing Error Responses (p. 127). <p>For information about how to specify custom error pages by using the CloudFront API, see <code>CustomErrorResponse</code> in the topic DistributionConfig Complex Type in the <i>Amazon CloudFront API Reference</i>.</p> <ul style="list-style-type: none"> • Configurable cache duration for error responses: Also known as error caching minimum TTL, this feature lets you specify how long you want CloudFront to cache each error at CloudFront edge locations. CloudFront previously cached all error responses for five minutes; now you can specify any duration and thereby control how frequently CloudFront checks with your origin after an error. For more information, see Customizing Error Responses (p. 127). <p>For information about how to specify the cache duration for error responses by using the CloudFront API, see <code>CustomErrorResponse</code> in the topic DistributionConfig Complex Type in the <i>Amazon CloudFront API Reference</i>.</p> | September 23, 2013 |
| New Feature | You can now include the * wildcard in a CloudFront alternate domain name (CNAME), such as *.example.com. This is useful when you want to route all requests for objects in a domain and its subdomains to a CloudFront distribution. For more information, see Using Alternate Domain Names (CNAMES) (p. 50) . | September 18, 2013 |
| Updated Documentation | Documentation about live streaming with Wowza Media Server 3.6 was added. For more information, see Live HTTP Streaming Using Wowza Streaming Engine 4.2 (p. 314) . | September 10, 2013 |
| Updated Documentation | The documentation about live streaming with Adobe Flash Media Server was replaced with documentation about live streaming with Adobe Media Server version 5.0. For more information, see Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0 (p. 286) . | July 31, 2013 |

| Change | Description | Date Changed |
|--------------|--|--------------------|
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • Authentication with AWS Signature Version 4: If you are using CloudFront API version 2013-05-12 or later, you must authenticate requests by using AWS Signature version 4. For more information, see Authenticating REST Requests in the <i>Amazon CloudFront API Reference</i>. • SSL for CloudFront alternate domain names: CloudFront now supports using HTTPS and using your own domain name in the URLs for your objects (for example, <code>http://www.example.com/image.jpg</code>). For more information, see Using Alternate Domain Names and HTTPS (p. 234). <p>In addition, a simultaneous release of Amazon Route 53 introduces the following CloudFront-related feature:</p> <ul style="list-style-type: none"> • Amazon Route 53 aliases to CloudFront distributions: Amazon Route 53 now supports creating alias resource record sets that route DNS queries to alternate domain names for CloudFront distributions. You can use this feature both for alternate domain names at the zone apex (example.com) and alternate domain names for subdomains (www.example.com). For more information, see Routing Queries to an Amazon CloudFront Distribution in the <i>Amazon Route 53 Developer Guide</i>. | June 11, 2013 |
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • Fields for private content in the AWS Management Console: Settings for private content, which previously could be configured or changed only using the CloudFront API, can now be configured or changed in the AWS Management Console. This includes settings for origin access identities and trusted signers. In addition, the documentation about private content was reorganized and clarified. <p>For more information, see Serving Private Content through CloudFront (p. 162).</p> <ul style="list-style-type: none"> • Improvements to the AWS Management Console: Wizards and dialog boxes in the AWS Management Console have been resized to simplify viewing on tablet computers without compromising the appearance for other viewers. In addition, the number of pages in the Create Distribution wizard was reduced to simplify the process of creating a new distribution. | September 27, 2012 |

| Change | Description | Date Changed |
|--------------|---|-------------------|
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • Access log improvements for web distributions: For web distributions, CloudFront access logs now include fields for: <ul style="list-style-type: none"> • The cookie header in each viewer request, including name-value pairs and attributes. This field is optional. • The result type of a request (for example, Hit, RefreshHit, or Miss). • An identifier that uniquely identifies each request (the CloudFront request ID). <p>For more information, see Web Distribution Log File Format (p. 261).</p> <p>For information about how to configure a CloudFront distribution to include cookies in access logs by using the CloudFront API, see IncludeCookies in the topic DistributionConfig Complex Type in the Amazon CloudFront API Reference.</p> <ul style="list-style-type: none"> • Cookie support for web distributions: You can now choose whether you want CloudFront to forward cookies and the associated cookie attributes to your origin. If so, you can also choose whether to forward all cookies or just a selected list of cookies. For more information, see Configuring CloudFront to Cache Objects Based on Cookies (p. 106). <p>For information about how to configure a CloudFront distribution to forward cookies to your origin by using the CloudFront API, see Cookies in the topic DistributionConfig Complex Type in the Amazon CloudFront API Reference.</p> <ul style="list-style-type: none"> • Price classes for web and RTMP distributions: You can now choose a price class that corresponds with the maximum price that you want to pay for CloudFront service. If you're willing to accept higher latency for your viewers in some geographic regions in return for lower cost, you can choose a price class that doesn't include all CloudFront regions. For more information, see Choosing the Price Class for a CloudFront Distribution (p. 54). <p>For information about how to specify the price class for a CloudFront web distribution by using the CloudFront API, see PriceClass in the topic DistributionConfig Complex Type in the Amazon CloudFront API Reference.</p> <p>For information about how to specify the price class for a CloudFront RTMP distribution by using the CloudFront API, see PriceClass in the topic StreamingDistributionConfig Complex Type in the Amazon CloudFront API Reference.</p> | September 5, 2012 |

| Change | Description | Date Changed |
|-----------------------|---|----------------|
| New Features | <p>This release of CloudFront introduces the following features:</p> <ul style="list-style-type: none"> • You can now invalidate objects using the CloudFront console. For more information, see Invalidate Objects (Web Distributions Only) (p. 121). • The CloudFront console was updated to better support viewing on tablet devices. | June 22, 2012 |
| New Features | <p>This release of CloudFront introduces the following features for web distributions:</p> <ul style="list-style-type: none"> • You can forward query strings to your origin. For more information, see Configuring CloudFront to Cache Based on Query String Parameters (p. 105). • You can specify up to 10 origins. For more information, see Values that You Specify When You Create or Update a Web Distribution (p. 63). • You can specify path patterns. For more information, see Values that You Specify When You Create or Update a Web Distribution (p. 63). <p>For information about how to specify these values by using the CloudFront API, see DistributionConfig Complex Type in the <i>Amazon CloudFront API Reference</i>.</p> <p>In addition, the CloudFront console has been updated. For more information, see Task List for Creating a Web Distribution (p. 58) and Task List for Streaming Media Files Using RTMP (p. 89).</p> <p>The <i>Amazon CloudFront Getting Started Guide</i> was merged into the <i>Amazon CloudFront Developer Guide</i>, and the <i>Amazon CloudFront Developer Guide</i> was reorganized to enhance usability.</p> | May 13, 2012 |
| Updated Documentation | The documentation about working with objects was reorganized and clarified. For the revised documentation, see Working with Objects (p. 99) . | April 4, 2012 |
| New Documentation | Documentation about live streaming with Microsoft IIS Media Services version 4.1 was added. For more information, see Live Smooth Streaming Using Amazon CloudFront and IIS Media Services 4.1 (p. 304) . | April 1, 2012 |
| Updated Documentation | <p>The documentation about live streaming with Adobe Flash Media Server was updated with information about Adobe Flash Media Server version 4.5.</p> <p>As of July 31, 2013, CloudFront supports live streaming with Adobe Media Server 5.0. For more information, see Live HTTP Streaming Using CloudFront and Adobe Media Server 5.0 (p. 286).</p> | March 29, 2012 |

| Change | Description | Date Changed |
|-----------------------|---|------------------|
| New Feature | <p>This release of CloudFront reduces the minimum TTL value for a web distribution. If you don't specify a minimum TTL when you create a distribution, CloudFront sets the minimum TTL to 0 seconds. For more information, see the following documentation:</p> <ul style="list-style-type: none"> • Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration) (p. 116) • The <code>CachingBehavior</code> element in the topic DistributionConfig Complex Type in the <i>Amazon CloudFront API Reference</i>. | March 15, 2012 |
| Updated Documentation | Topics about live streaming with Adobe Flash Media Server and about geoblocking were moved from a separate document into the CloudFront Streaming Tutorials (p. 286) chapter in this guide. | February 2, 2012 |
| New Feature | <p>This release of CloudFront introduces AWS Management Console support for creating a distribution with a custom origin, restricting your distribution to HTTPS exclusively, and specifying a default root object. For more information, go to the Amazon CloudFront product page or see any of the following topics in the <i>Amazon CloudFront Developer Guide</i>:</p> <ul style="list-style-type: none"> • Task List for Creating a Web Distribution (p. 58) • Using an HTTPS Connection to Access Your Objects (p. 229) • Specifying a Default Root Object (Web Distributions Only) (p. 132) | April 27, 2011 |
| New Feature | This release of CloudFront includes integration with AWS Identity and Access Management (IAM). For more information, see Authentication and Access Control for CloudFront (p. 243) . | March 10, 2011 |
| New Feature | This release of CloudFront includes new APIs to support custom origins. For more information, go to the Amazon CloudFront product page or Task List for Creating a Web Distribution (p. 58) in the <i>Amazon CloudFront Developer Guide</i> . | November 9, 2010 |
| New Feature | This release of CloudFront includes new APIs for object invalidation. For more information, go to the Amazon CloudFront product page or Invalidate Objects (Web Distributions Only) (p. 121) in the <i>Amazon CloudFront Developer Guide</i> . | August 31, 2010 |
| New Feature | CloudFront now supports the ability to assign a default root object to your distribution. For more information, see Specifying a Default Root Object (Web Distributions Only) (p. 132) . | August 5, 2010 |
| New Feature | Access logging for HTTP distributions now includes a field for query string parameters. For more information, see Web Distribution Log File Format (p. 261) . | July 14, 2010 |
| New Feature | Added support for secure connections using HTTPS. For more information, see Using an HTTPS Connection to Access Your Objects (p. 229) . | June 7, 2010 |
| New Feature | Added logging for RTMP content. For more information, see RTMP Distribution Log File Format (p. 267) . | May 13, 2010 |

| Change | Description | Date Changed |
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| New Feature | Reduced the minimum amount of time an object can be on an edge server from 24 hours to 1 hour. The default, however, remains 24 hours. For more information, see Specifying How Long Objects Stay in a CloudFront Edge Cache (Expiration) (p. 116) . | April 13, 2010 |
| New Feature | Added feature to serve private streaming content over a Real-Time Messaging Protocol (RTMP) and prevent the content from being downloaded. For more information, see Serving Private Content through CloudFront (p. 162) . | March 28, 2010 |
| New Feature | Added feature to deliver streaming content over a Real-Time Messaging Protocol (RTMP) connection. For more information, see Task List for Streaming Media Files Using RTMP (p. 89) . | December 15, 2009 |
| New Feature | Added feature to restrict access to your content delivered over HTTP. For more information, see Serving Private Content through CloudFront (p. 162) . | November 11, 2009 |
| New Guide | We've separated the API reference material into its own guide. The <i>Amazon CloudFront Developer Guide</i> contains general information about how to use CloudFront, and the Auto Scaling API Reference contains detailed information about the control API requests, responses, and errors. | November 11, 2009 |

AWS Glossary

For the latest AWS terminology, see the [AWS Glossary](#) in the *AWS General Reference*.