Understand Packet Flow in Secure Web Appliance

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Related Information

Introduction

This document describes the network flow in Proxy configured network, specifically focused on Secure Web Appliance (SWA).

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Basic TCP/IP concepts.
- Basic knowledge of Proxy setup.
- Basic knowledge of Authentication mechanism used in environment with Proxy.

Abbreviations used is this articles are:

TCP: Transmission Control Protocol

UDP: User Datagram Protocol

IP: Internet Protocol

GRE: Generic Routing Encapsulation

HTTP: Hypertext Transfer Protocol.

HTTPS: Hypertext Transfer Protocol Secure.

URL: Uniform Resource Locator

TLS: Transport Layer Security

Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Deferent Typs of Proxy Deployment

TLS Handshake

A TLS handshake in HTTPS occurs when a client and server communicate over the Internet, providing a secure connection. The process maintains privacy and data integrity between two communicating applications. It operates through a series of steps where the client and server agree on encryption standards and codes for all subsequent transmissions. The handshake aims to deter any unauthorized access or manipulation by third parties. It also authenticates the identities of the communicating parties to eliminate impersonation. This process is crucial in HTTPS as it ensures that data remains secure while in transit.

Here are the steps of a TLS handshake:

1. **Client Hello**: The client initiates the handshake process with a hello message. This message contains the client TLS version, supported cipher suites, and a random byte string known as the "client random".

2. **Server Hello**: The server responds with a hello message. This message includes the server chosen TLS version, selected cipher suite, a random byte string known as the "server random", and the server digital certificate. If necessary, the server also requests the client digital certificate for mutual authentication.

3. **Client verifies the server certificate**: The client checks the server digital certificate with the certificate authority that issued it. This assures the client that it is communicating with the legitimate

server.

4. **Pre-master Secret**: The client sends a random byte string, known as the "pre-master secret," which contributes to the creation of the session keys. The client encrypts this pre-master secret with the server public key, so only the server can decrypt it with its private key.

5. **Master Secret**: Both the client and server use the pre-master secret and the random byte strings from the hello messages to independently compute the same "master secret." This shared secret is the basis for generating the session keys.

6. **Client Finished**: The client sends a "Finished" message, encrypted with the session key, to signal the completion of the client part of the handshake.

7. **Server Finished**: The server sends a "Finished" message, also encrypted with the session key, to signal the completion of the server part of the handshake.

HTTP Response Code

1xx : Informational

Code	Details
100 Continue	Typically seen in regards to the ICAP protocol. This is an informational response that let the client know that it can continue to send data. In regards to ICAP services (such as virus scanning), the server can only want to see first x amount of bytes. When it is done scanning the first set of bytes and did not detect a virus, it sends a 100 Continue to let the client know to send the rest of the object.

2xx: Successful

Code	Details
200 OK	The most common response code. This signifies that the request is successful without any problems.

3xx: Redirection

Code	Details
301 Permanent Redirection	This is a Permanent redirection, you can see this code when you are redirecting to **www** sub-domain.
302 Temporary Redirection	This is a temporary redirection. The client is instructed to make a new request for the object specified in the Location: header.
304 Not Modified	This is in response to a GIMS (GET If-modified-since). This is literally a standard HTTP GET that includes the header If-modified-since: <date>. This header tells the server that the client has a copy of the requested object

	in it local cache and included is the date the object was fetched. If the object has been modified since that date, the server responds with a 200 OK and a fresh copy of the object. If the object has not changed since the fetched date, the server sends back a 304 Not Modified response.
307 Authentication Redirection	This is seen mostly, in transparent Proxy Deployment, when the Proxy server is configured to authenticate the request and redirects the request to another URL to authenticate the user,

4xx codes: Client Error

Code	Details
400 Bad Request	This suggests an issue with the HTTP request, as it does not comply with the proper syntax. Possible reasons could include multiple headers on a single line, spaces within a header, or the lack of HTTP/1.1 in the URI, among others. For the correct syntax, please consult RFC 2616.
401 Unauthorized **Web Server Authentication Required**	Access to the requested object necessitates authentication. The 401 code is utilized for authentication with a target web server. When the SWA operates in transparent mode and authentication is enabled on the proxy, it returns a 401 to the client, since the appliance presents itself as if it were the OCS (origin content server). The methods of authentication that can be used are detailed in a 'www-authenticate:' HTTP response header. This informs the client whether the server is requesting NTLM, basic, or other forms of authentication.
403 Denied	The client cannot access the requested object. A variety of reasons could lead a server to deny object access. The server typically provides a cause description within the HTTP data or HTML response.
404 Not Found	The requested object does not exist on the server.
407 Proxy Authentication Required	This is the same as a 401, except that it is specifically for authentication to a proxy not the OCS. This is sent only if the request was sent **explicitly** to the proxy. A 407 cannot be sent to a client while SWA is configured as transparent proxy, as the client does not know the proxy exists. If this is the case, the client most likely FIN or RST the TCP socket.

5xx: Server Error

Code	Details

501 Internal Server Error	Generic Web server failure.
502 Bad Gateway	Occurs when a server acting as a gateway or proxy receives an invalid response from an inbound server. It signals that the gateway has received an inappropriate response from the upstream or origin server.
503 Service Unavailable	Signifies that the server is currently unable to handle the request due to a temporary overload or scheduled maintenance. It implies that the server is temporarily out of service but can be available again after some time.
504 Gateway Timeout	Indicates that a client or proxy, did not receive a timely response from Web server it attempted to access to load the web page or fulfill another request by the browser. This often implies that the upstream server is down.

Explicit Deployment

Here ....

HTTP Traffic in Explicit Deployment Without Authentication

Client and SWA

Network traffic transpires between the IP address of the client and the IP address of the SWA proxy interface (usually it is P1 interface, but it can be P2 or Management interface, depends on Proxy configuration).

The traffic from client is destined to TCP port 80 or 3128 to the SWA (Default SWA proxy ports are TCP 80 and 3128, in this example we use port 3128)

- TCP Handshake.
- HTTP Get from Client (Destination IP = SWA IP , Destination Port = 3128)
- HTTP response from Proxy (Source IP = SWA)
- Data transfer
- TCP connection termination (4-Way Handshake)

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
12544	2024-01-25 09:35:25.989719	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	78	2	65238 → 3128 [SYN] Seq=0 Win=65535 Len=0 MSS=1260 WS=64 TSval=1762371780 TSecr=0 SACK_PERM
12545	2024-01-25 09:35:25.989748	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	74	2	3128 → 65238 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1360 WS=64 SACK_PERM TSval=32270008
12567	2024-01-25 09:35:26.046546	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=1 Ack=1 Win=132288 Len=0 TSval=1762371848 TSecr=3227000837
12568	2024-01-25 09:35:26.046877	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	188	2	GET http://example.com/ HTTP/1.1
12569	2024-01-25 09:35:26.046945	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [ACK] Seq=1 Ack=123 Win=65408 Len=0 TSval=3227000847 TSecr=1762371849
12851	2024-01-25 09:35:26.286288	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	1254	2	3128 → 65238 [ACK] Seq=1 Ack=123 Win=65408 Len=1188 TSval=3227001086 TSecr=1762371849 [TCP
12852	2024-01-25 09:35:26.286297	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	HTTP	599	2	HTTP/1.1 200 OK (text/html)
12992	2024-01-25 09:35:26.347713	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=123 Ack=1189 Win=131072 Len=0 TSval=1762372145 TSecr=3227001086
12993	2024-01-25 09:35:26.347815	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=123 Ack=1722 Win=130560 Len=0 TSval=1762372145 TSecr=3227001086
12994	2024-01-25 09:35:26.353174	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [FIN, ACK] Seq=123 Ack=1722 Win=131072 Len=0 TSval=1762372150 TSecr=3227001086
12995	2024-01-25 09:35:26.353217	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [ACK] Seq=1722 Ack=124 Win=65408 Len=0 TSval=3227001147 TSecr=1762372150
12996	2024-01-25 09:35:26.353397	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [FIN, ACK] Seq=1722 Ack=124 Win=65408 Len=0 TSval=3227001147 TSecr=1762372150
12997	2024-01-25 09:35:26.412438	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=124 Ack=1723 Win=131072 Len=0 TSval=1762372212 TSecr=3227001147

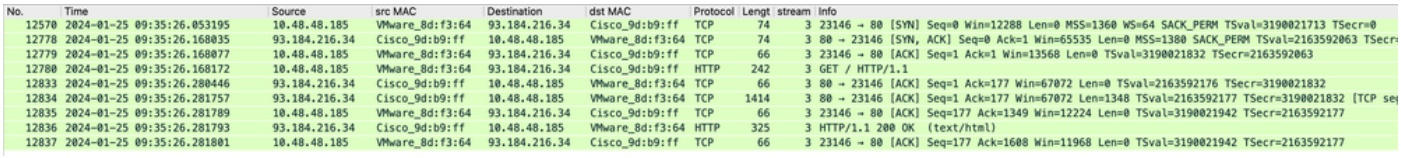
Image-Client to SWA, HTTP Explicit mode

SWA and Web Server

The network traffic occurs between the IP address of the Proxy and the IP address of the web server.

The traffic from SWA is destined to TCP port 80 and sourced with a random port (Not the Proxy Port)

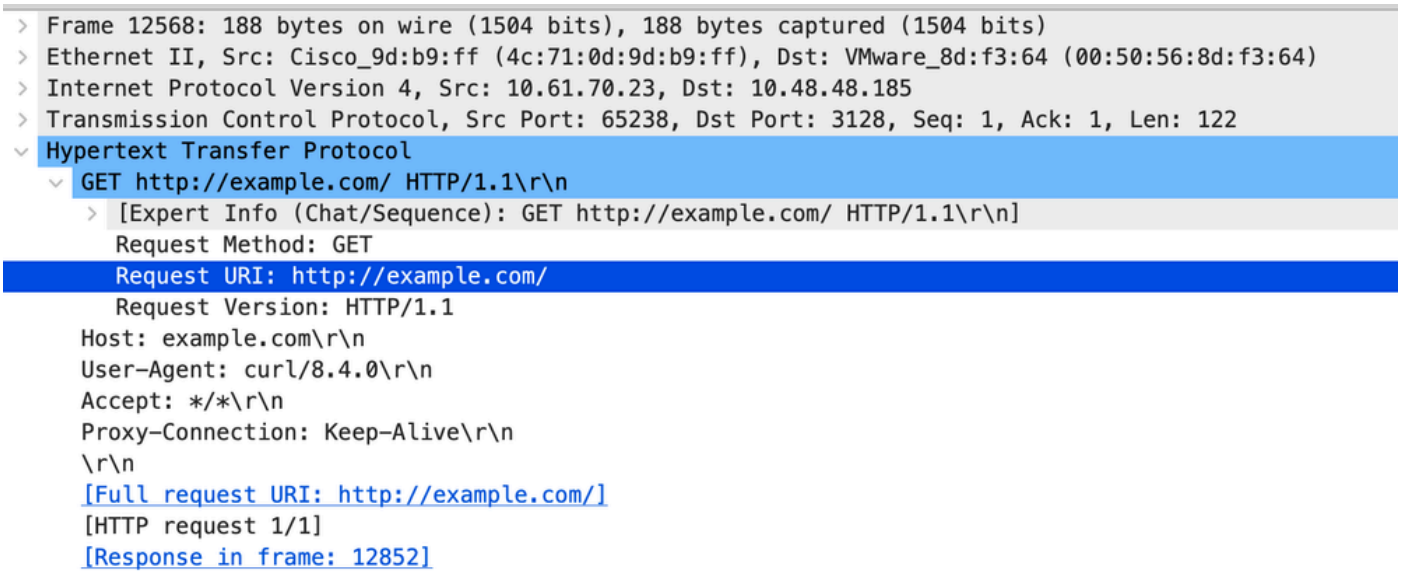
- TCP Handshake.
- HTTP Get from Proxy (Destination IP = Web server , Destination Port = 80)
- HTTP response from Web Server (Source IP = Proxy server)
- Data transfer
- TCP connection termination (4-Way Handshake)



No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
12570	2024-01-25 09:35:26.053195	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	74	3	23146 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1360 WS=64 SACK_PERM TSval=3190021713 TSecr=0
12778	2024-01-25 09:35:26.168035	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	74	3	80 → 23146 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1380 SACK_PERM TSval=2163592063 TSecr
12779	2024-01-25 09:35:26.168077	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=1 Ack=1 Win=13568 Len=0 TSval=3190021832 TSecr=2163592063
12780	2024-01-25 09:35:26.168172	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	HTTP	242	3	GET / HTTP/1.1
12833	2024-01-25 09:35:26.280446	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	3	80 → 23146 [ACK] Seq=1 Ack=177 Win=67072 Len=0 TSval=2163592176 TSecr=3190021832
12834	2024-01-25 09:35:26.281757	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	1414	3	80 → 23146 [ACK] Seq=1 Ack=177 Win=67072 Len=1348 TSval=2163592177 TSecr=3190021832 [TCP se
12835	2024-01-25 09:35:26.281789	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=177 Ack=1349 Win=12224 Len=0 TSval=3190021942 TSecr=2163592177
12836	2024-01-25 09:35:26.281793	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	325	3	HTTP/1.1 200 OK (text/html)
12837	2024-01-25 09:35:26.281801	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=177 Ack=1608 Win=11968 Len=0 TSval=3190021942 TSecr=2163592177

Image- HTTP-SWA to web server-Explicit-no cache

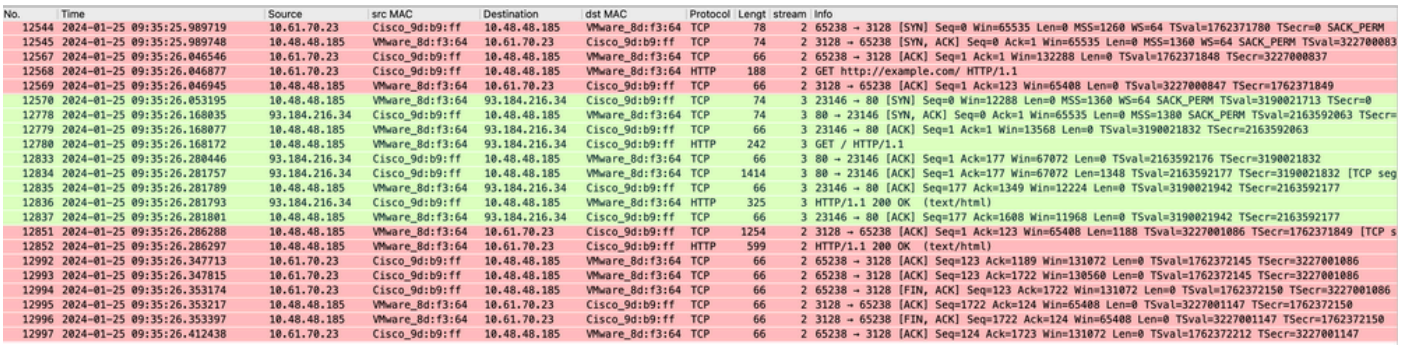
Here is sample of HTTP **Get** from Client



```
> Frame 12568: 188 bytes on wire (1504 bits), 188 bytes captured (1504 bits)
> Ethernet II, Src: Cisco_9d:b9:ff (4c:71:0d:9d:b9:ff), Dst: VMware_8d:f3:64 (00:50:56:8d:f3:64)
> Internet Protocol Version 4, Src: 10.61.70.23, Dst: 10.48.48.185
> Transmission Control Protocol, Src Port: 65238, Dst Port: 3128, Seq: 1, Ack: 1, Len: 122
v Hypertext Transfer Protocol
  v GET http://example.com/ HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET http://example.com/ HTTP/1.1\r\n]
      Request Method: GET
      Request URI: http://example.com/
      Request Version: HTTP/1.1
    Host: example.com\r\n
    User-Agent: curl/8.4.0\r\n
    Accept: */*\r\n
    Proxy-Connection: Keep-Alive\r\n
    \r\n
    [Full request URI: http://example.com/]
    [HTTP request 1/1]
    [Response in frame: 12852]
```

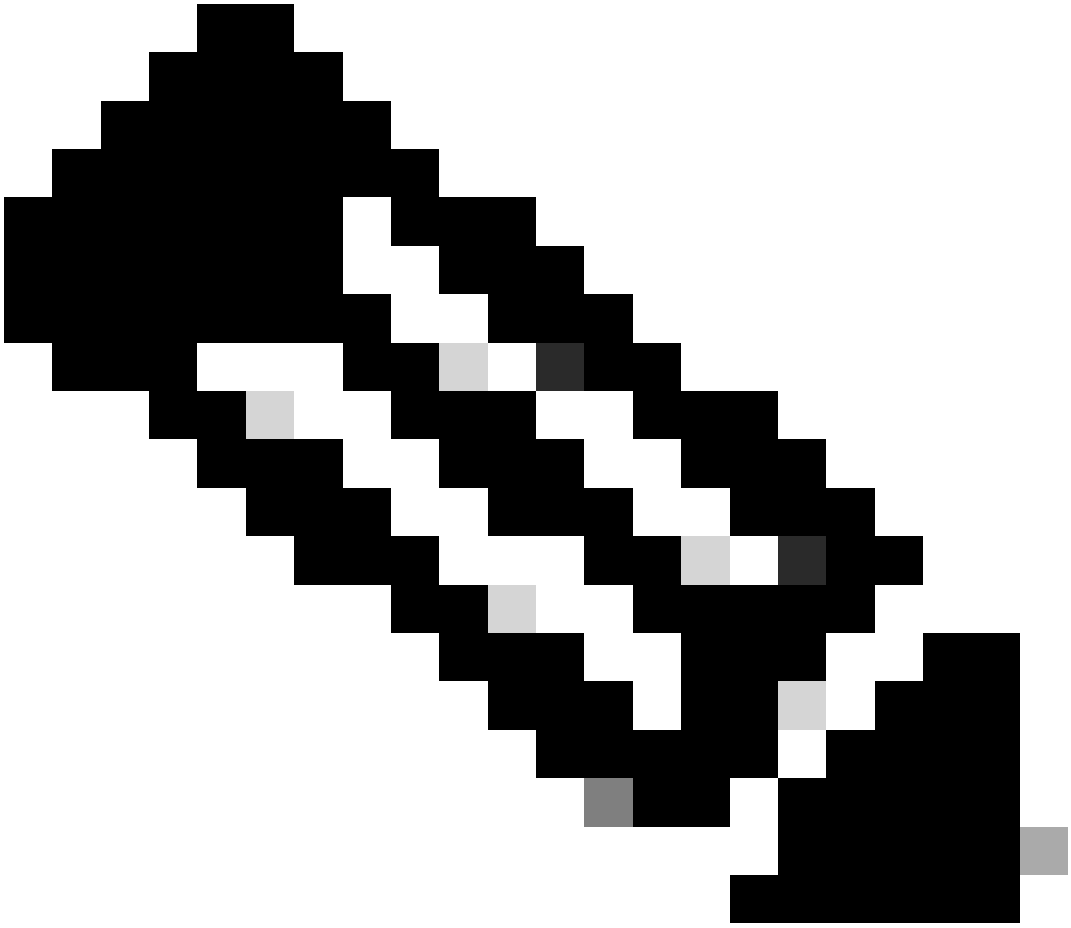
Image- Client to SWA HTTP GET- Explicit

This represents the entire flow of traffic from the client to the SWA, then to the web server, and finally back to the client.



No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
12544	2024-01-25 09:35:25.989719	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	78	2	65238 → 3128 [SYN] Seq=0 Win=65535 Len=0 MSS=1260 WS=64 TSval=1762371780 TSecr=0 SACK_PERM
12545	2024-01-25 09:35:25.989748	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	74	2	3128 → 65238 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1360 WS=64 SACK_PERM TSval=3227000083
12567	2024-01-25 09:35:26.046546	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=1 Ack=1 Win=132288 Len=0 TSval=1762371848 TSecr=3227000837
12568	2024-01-25 09:35:26.046877	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	188	2	GET http://example.com/ HTTP/1.1
12569	2024-01-25 09:35:26.046945	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [ACK] Seq=1 Ack=123 Win=65408 Len=0 TSval=3227000847 TSecr=1762371849
12570	2024-01-25 09:35:26.053195	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	74	3	23146 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1360 WS=64 SACK_PERM TSval=3190021713 TSecr=0
12778	2024-01-25 09:35:26.168035	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	74	3	80 → 23146 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1380 SACK_PERM TSval=2163592063 TSecr=
12779	2024-01-25 09:35:26.168077	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=1 Ack=1 Win=13568 Len=0 TSval=3190021832 TSecr=2163592063
12780	2024-01-25 09:35:26.168172	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	HTTP	242	3	GET / HTTP/1.1
12833	2024-01-25 09:35:26.280446	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	3	80 → 23146 [ACK] Seq=1 Ack=177 Win=67072 Len=0 TSval=2163592176 TSecr=3190021832
12834	2024-01-25 09:35:26.281757	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	1414	3	80 → 23146 [ACK] Seq=1 Ack=177 Win=67072 Len=1348 TSval=2163592177 TSecr=3190021832 [TCP seg
12835	2024-01-25 09:35:26.281789	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=177 Ack=1349 Win=12224 Len=0 TSval=3190021942 TSecr=2163592177
12836	2024-01-25 09:35:26.281793	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	325	3	HTTP/1.1 200 OK (text/html)
12837	2024-01-25 09:35:26.281801	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	23146 → 80 [ACK] Seq=177 Ack=1608 Win=11968 Len=0 TSval=3190021942 TSecr=2163592177
12851	2024-01-25 09:35:26.286288	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	1254	2	3128 → 65238 [ACK] Seq=1 Ack=123 Win=65408 Len=1188 TSval=3227001086 TSecr=1762371849 [TCP s
12852	2024-01-25 09:35:26.286297	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	HTTP	599	2	HTTP/1.1 200 OK (text/html)
12992	2024-01-25 09:35:26.347713	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=123 Ack=1189 Win=131072 Len=0 TSval=1762372145 TSecr=3227001086
12993	2024-01-25 09:35:26.347815	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=123 Ack=1722 Win=130560 Len=0 TSval=1762372145 TSecr=3227001086
12994	2024-01-25 09:35:26.353174	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [FIN, ACK] Seq=123 Ack=1722 Win=131072 Len=0 TSval=1762372150 TSecr=3227001086
12995	2024-01-25 09:35:26.353217	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [ACK] Seq=1722 Ack=124 Win=65408 Len=0 TSval=3227001147 TSecr=1762372150
12996	2024-01-25 09:35:26.353397	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 65238 [FIN, ACK] Seq=1722 Ack=124 Win=65408 Len=0 TSval=3227001147 TSecr=1762372150
12997	2024-01-25 09:35:26.412438	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	65238 → 3128 [ACK] Seq=124 Ack=1723 Win=131072 Len=0 TSval=1762372212 TSecr=3227001147

Image- All traffic HTTP Explicit-no cache



Note: Each stream of traffic is distinguished by a different color; the flow from the client to the SWA is one color, and the flow from the SWA to the web server is another.

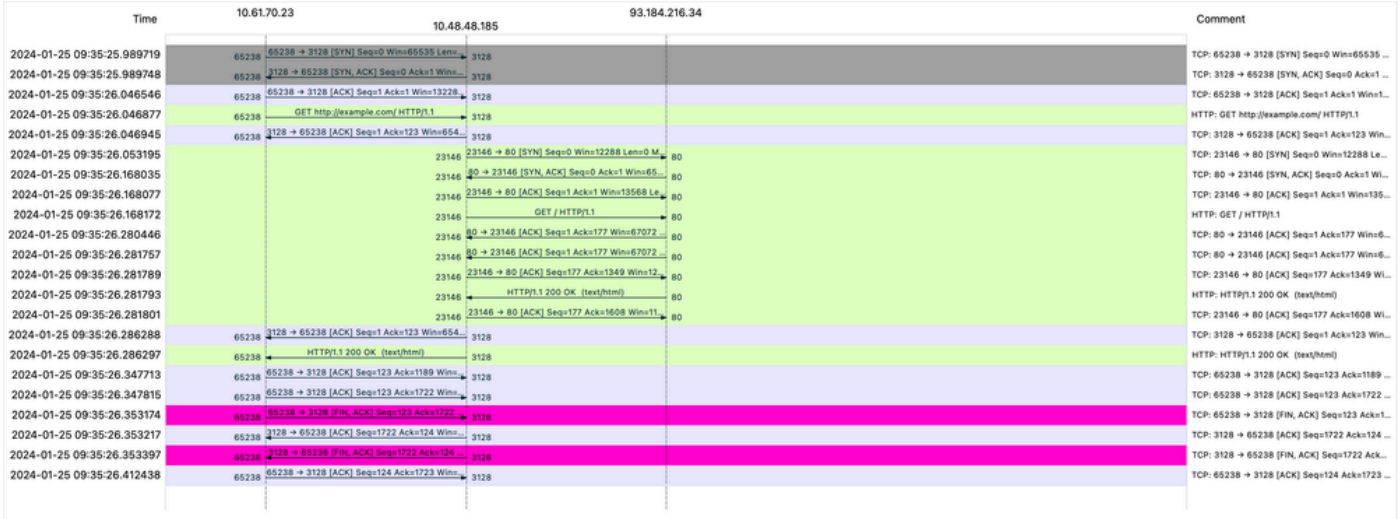


Image- Traffic Flow HTTP Explicit - no cache

Here is a sample of Accesslogs:

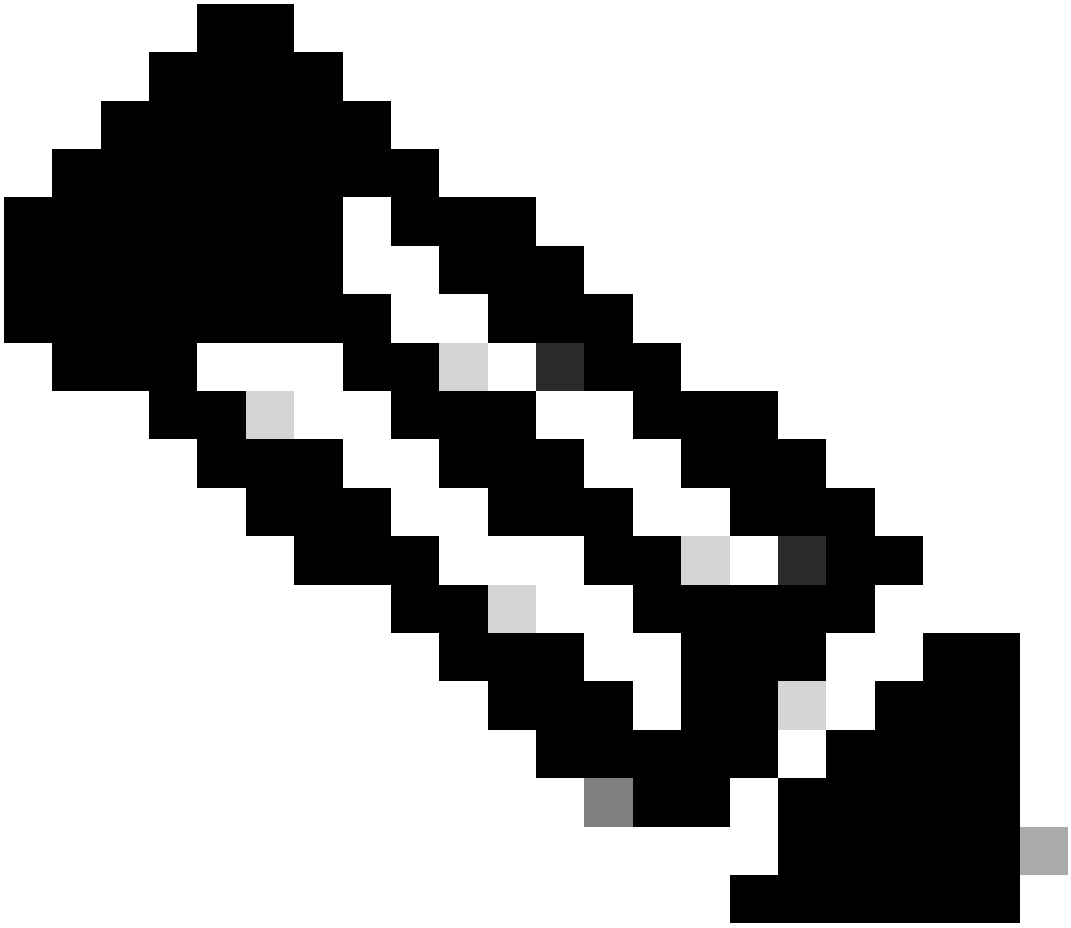
```
1706172876.686 224 10.61.70.23 TCP_MISS/200 1721 GET http://www.example.com/ - DIRECT/www.example.com t
```

Traffic With Cached Data

This represents the entire flow of traffic from the client to the SWA, when the data is in SWA Cache.

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
1920	2024-01-25 09:56:41.209030	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	78	2	55709 → 3128 [SYN] Seq=0 Win=65535 Len=0 MSS=1260 WS=64 TSval=3417110271 TSecr=0 SACK_PERM
1921	2024-01-25 09:56:41.209111	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	74	2	3128 → 55709 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1360 WS=64 SACK_PERM TSval=368792
1922	2024-01-25 09:56:41.265937	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	55709 → 3128 [ACK] Seq=1 Ack=1 Win=132288 Len=0 TSval=3417110333 TSecr=3687923930
1923	2024-01-25 09:56:41.266065	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	188	2	GET http://example.com/ HTTP/1.1
1924	2024-01-25 09:56:41.266114	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 55709 [ACK] Seq=1 Ack=123 Win=65856 Len=0 TSval=3687923930 TSecr=3417110333
1925	2024-01-25 09:56:41.269061	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	74	3	16088 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1360 WS=64 SACK_PERM TSval=3191296932 TSecr=0
1943	2024-01-25 09:56:41.385086	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	74	3	80 → 16088 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1380 SACK_PERM TSval=811197678 TSecr=
1944	2024-01-25 09:56:41.385174	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	16088 → 80 [ACK] Seq=1 Ack=1 Win=13568 Len=0 TSval=3191297043 TSecr=811197678
1945	2024-01-25 09:56:41.385270	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	HTTP	292	3	GET / HTTP/1.1
1946	2024-01-25 09:56:41.509528	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	3	80 → 16088 [ACK] Seq=1 Ack=227 Win=67072 Len=0 TSval=811197793 TSecr=3191297043
1947	2024-01-25 09:56:41.510195	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	HTTP	365	3	HTTP/1.1 304 Not Modified
1948	2024-01-25 09:56:41.510259	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	16088 → 80 [ACK] Seq=227 Ack=300 Win=13248 Len=0 TSval=3191297172 TSecr=811197793
1949	2024-01-25 09:56:41.510429	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	16088 → 80 [FIN, ACK] Seq=227 Ack=300 Win=13568 Len=0 TSval=3191297172 TSecr=811197793
1972	2024-01-25 09:56:41.513099	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	1254	2	3128 → 55709 [ACK] Seq=1 Ack=123 Win=65856 Len=1188 TSval=3687924179 TSecr=3417110333 [TCP
1973	2024-01-25 09:56:41.513111	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	HTTP	599	2	HTTP/1.1 200 OK (text/html)
1974	2024-01-25 09:56:41.585507	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	55709 → 3128 [ACK] Seq=123 Ack=1189 Win=131072 Len=0 TSval=3417110640 TSecr=3687924179
1975	2024-01-25 09:56:41.600259	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	55709 → 3128 [ACK] Seq=123 Ack=1722 Win=130560 Len=0 TSval=3417110649 TSecr=3687924179
1976	2024-01-25 09:56:41.604113	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	55709 → 3128 [FIN, ACK] Seq=123 Ack=1722 Win=131072 Len=0 TSval=3417110652 TSecr=3687924179
1977	2024-01-25 09:56:41.604191	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 55709 [ACK] Seq=1722 Ack=124 Win=65856 Len=0 TSval=3687924269 TSecr=3417110652
1978	2024-01-25 09:56:41.604293	10.48.48.185	VMware_8d:f3:64	10.61.70.23	Cisco_9d:b9:ff	TCP	66	2	3128 → 55709 [FIN, ACK] Seq=1722 Ack=124 Win=65856 Len=0 TSval=3687924269 TSecr=3417110652
1979	2024-01-25 09:56:41.636731	93.184.216.34	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	3	80 → 16088 [FIN, ACK] Seq=300 Ack=228 Win=67072 Len=0 TSval=811197917 TSecr=3191297172
1980	2024-01-25 09:56:41.636832	10.48.48.185	VMware_8d:f3:64	93.184.216.34	Cisco_9d:b9:ff	TCP	66	3	16088 → 80 [ACK] Seq=228 Ack=301 Win=13568 Len=0 TSval=3191297302 TSecr=811197917
1981	2024-01-25 09:56:41.662464	10.61.70.23	Cisco_9d:b9:ff	10.48.48.185	VMware_8d:f3:64	TCP	66	2	55709 → 3128 [ACK] Seq=124 Ack=1723 Win=131072 Len=0 TSval=3417110729 TSecr=3687924269

Image- HTTP Explicit Cached data



Note: As you can see the Web Server returns HTTP response 304: Cache not Modified. (in this Example, Packet number 1947)

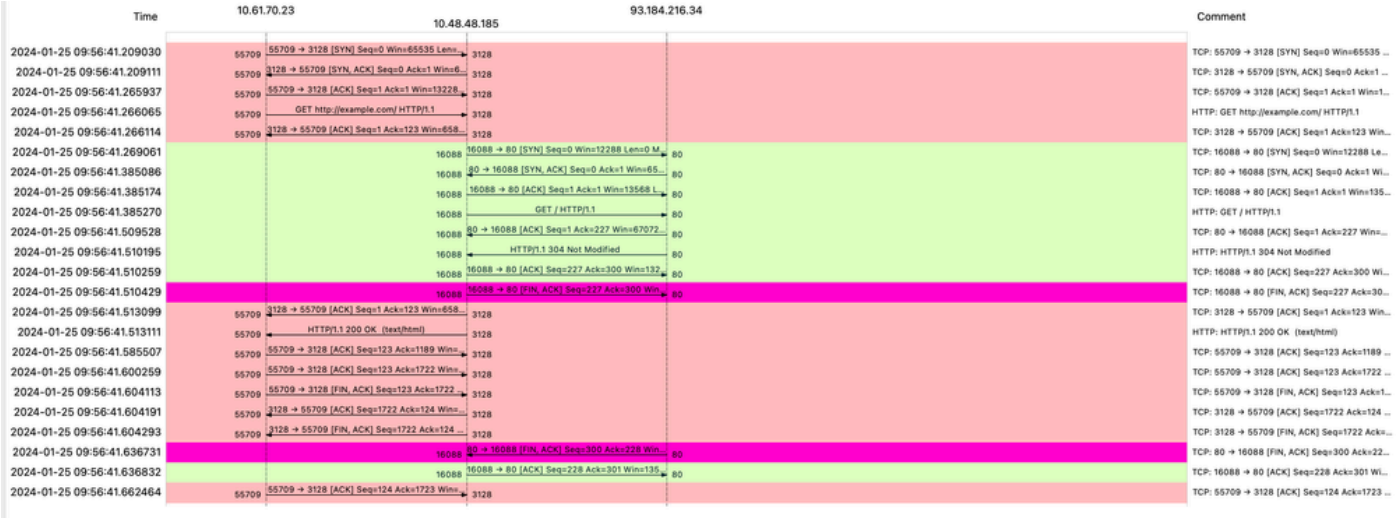


Image- Flow HTTP Explicit with cache

Here is a sample of HTTP Response 304

```
> Frame 1947: 365 bytes on wire (2920 bits), 365 bytes captured (2920 bits)
> Ethernet II, Src: Cisco_9d:b9:ff (4c:71:0d:9d:b9:ff), Dst: VMware_8d:f3:64 (00:50:56:8d:f3:64)
> Internet Protocol Version 4, Src: 93.184.216.34, Dst: 10.48.48.185
> Transmission Control Protocol, Src Port: 80, Dst Port: 16088, Seq: 1, Ack: 227, Len: 299
v Hypertext Transfer Protocol
  v HTTP/1.1 304 Not Modified\r\n
    v [Expert Info (Chat/Sequence): HTTP/1.1 304 Not Modified\r\n]
        [HTTP/1.1 304 Not Modified\r\n]
        [Severity level: Chat]
        [Group: Sequence]
      Response Version: HTTP/1.1
      Status Code: 304
      [Status Code Description: Not Modified]
      Response Phrase: Not Modified
    Accept-Ranges: bytes\r\n
    Age: 519756\r\n
    Cache-Control: max-age=604800\r\n
    Date: Thu, 25 Jan 2024 08:57:08 GMT\r\n
    Etag: "3147526947"\r\n
    Expires: Thu, 01 Feb 2024 08:57:08 GMT\r\n
    Last-Modified: Thu, 17 Oct 2019 07:18:26 GMT\r\n
    Server: ECS (dce/2694)\r\n
    Vary: Accept-Encoding\r\n
    X-Cache: HIT\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.124925000 seconds]
    [Request in frame: 1945]
    [Request URI: http://example.com/]
```

Image- HTTP Explicit 304 response

Here is a sample of Accesslogs:

```
1706173001.489 235 10.61.70.23 TCP_REFRESH_HIT/200 1721 GET http://www.example.com/ - DIRECT/www.exampl
```

HTTPs Traffic in Explicit Deployment Without Authentication

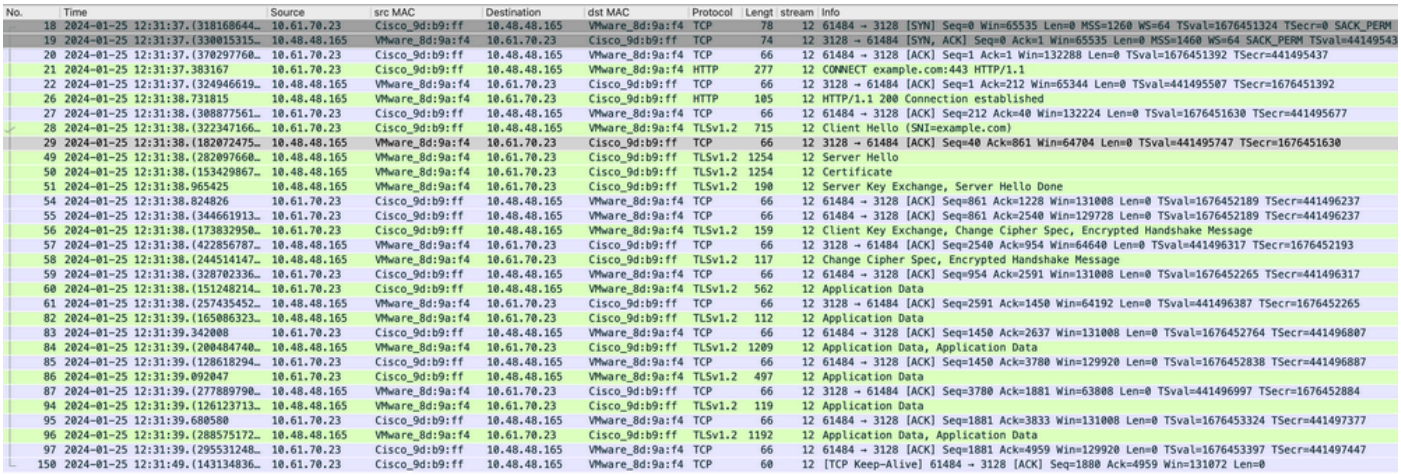
Client and SWA

Network traffic transpires between the IP address of the client and the IP address of the SWA proxy interface (usually it is P1 interface, but it can be P2 or Management interface, depends on Proxy configuration).

The traffic from client is destined to TCP port 80 or 3128 to the SWA (Default SWA proxy ports are TCP 80 and 3128, in this example we use port 3128)

- TCP Handshake.
- HTTP **CONNECT** from Client (Destination IP = SWA , Destination Port = 3128)
- HTTP response from Proxy (Source IP = SWA)

- Client Hello with SNI of the URL (Source IP = Client)
- Server Hello (Source IP = SWA)
- Server Key Exchange (Source IP = SWA)
- Client Key Exchange (Source IP = Client)
- Data transfer
- TCP connection termination (4-Way Handshake)



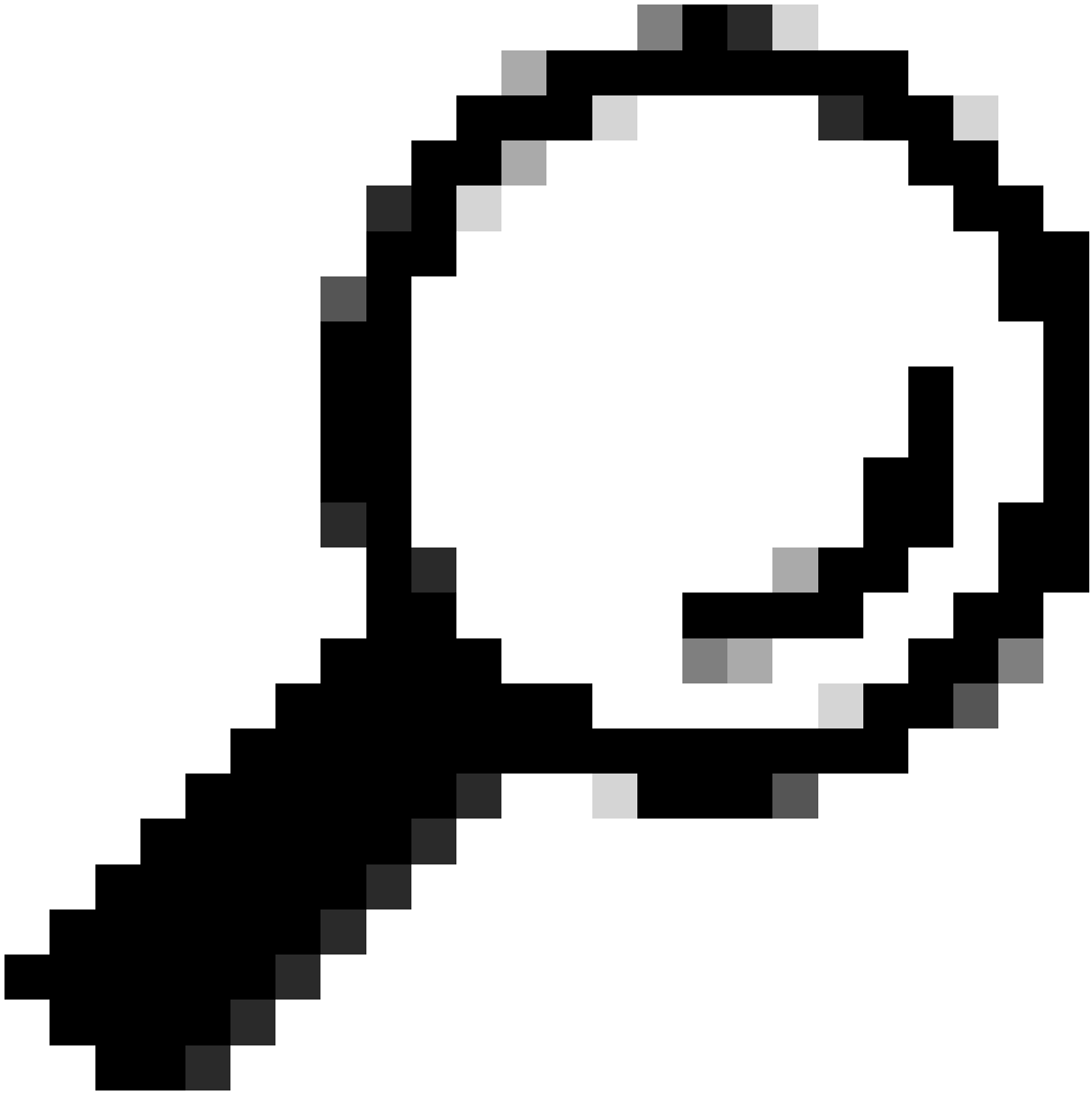
No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
18	2024-01-25 12:31:37.(318168644…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	78	12	61484 → 3128 [SYN] Seq=0 Win=65535 Len=0 MSS=1260 WS=64 TSval=1676451324 TSecr=0 SACK_PERM
19	2024-01-25 12:31:37.(330015315…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	74	12	3128 → 61484 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=44149543
20	2024-01-25 12:31:37.(370297760…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1 Ack=1 Win=132288 Len=0 TSval=1676451392 TSecr=441495437
21	2024-01-25 12:31:37.383167	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	HTTP	277	12	CONNECT example.com:443 HTTP/1.1
22	2024-01-25 12:31:37.(324946619…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=1 Ack=212 Win=65344 Len=0 TSval=441495507 TSecr=1676451392
26	2024-01-25 12:31:38.731815	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	HTTP	105	12	HTTP/1.1 200 Connection established
27	2024-01-25 12:31:38.(308877561…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=212 Ack=40 Win=132224 Len=0 TSval=1676451630 TSecr=441495677
28	2024-01-25 12:31:38.(322347166…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	715	12	Client Hello (SNI=example.com)
29	2024-01-25 12:31:38.(182072475…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=40 Ack=861 Win=64704 Len=0 TSval=441495747 TSecr=1676451630
49	2024-01-25 12:31:38.(282097660…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1254	12	Server Hello
50	2024-01-25 12:31:38.(153429867…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1254	12	Certificate
51	2024-01-25 12:31:38.965425	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	190	12	Server Key Exchange, Server Hello Done
54	2024-01-25 12:31:38.824826	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=861 Ack=1228 Win=131008 Len=0 TSval=1676452189 TSecr=441496237
55	2024-01-25 12:31:38.(344661913…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=861 Ack=2540 Win=129728 Len=0 TSval=1676452189 TSecr=441496237
56	2024-01-25 12:31:38.(173832950…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	159	12	Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
57	2024-01-25 12:31:38.(422856787…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=2540 Ack=954 Win=64640 Len=0 TSval=441496317 TSecr=1676452193
58	2024-01-25 12:31:38.(244514147…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	117	12	Change Cipher Spec, Encrypted Handshake Message
59	2024-01-25 12:31:38.(328702336…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=954 Ack=2591 Win=131008 Len=0 TSval=1676452265 TSecr=441496317
60	2024-01-25 12:31:38.(151248214…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	562	12	Application Data
61	2024-01-25 12:31:38.(257435452…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=2591 Ack=1450 Win=64192 Len=0 TSval=441496387 TSecr=1676452265
82	2024-01-25 12:31:39.(165086323…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	112	12	Application Data
83	2024-01-25 12:31:39.342008	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1450 Ack=2637 Win=131008 Len=0 TSval=1676452764 TSecr=441496807
84	2024-01-25 12:31:39.(200484740…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1209	12	Application Data, Application Data
85	2024-01-25 12:31:39.(128618294…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1450 Ack=3780 Win=129920 Len=0 TSval=1676452838 TSecr=441496887
86	2024-01-25 12:31:39.092047	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	497	12	Application Data
87	2024-01-25 12:31:39.(277889790…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=3780 Ack=1881 Win=63808 Len=0 TSval=441496997 TSecr=1676452884
94	2024-01-25 12:31:39.(126123713…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	119	12	Application Data
95	2024-01-25 12:31:39.680580	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1881 Ack=3833 Win=131008 Len=0 TSval=1676453324 TSecr=441497377
96	2024-01-25 12:31:39.(288575172…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1192	12	Application Data, Application Data
97	2024-01-25 12:31:39.(295531248…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1881 Ack=4959 Win=129920 Len=0 TSval=1676453397 TSecr=441497447
150	2024-01-25 12:31:49.(143134836…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	60	12	[TCP Keep-Alive] 61484 → 3128 [ACK] Seq=1880 Ack=4959 Win=131072 Len=0

Image- HTTPS Client to SWA-Explicit- No Cache

Here is details of Client Hello from Client to SWA, as you can see in the Server Name Indication (SNI) the URL of the web server can be seen which in this example, is **www.example.com** and client advertised 17 Cipher Suites:

```
> Frame 28: 715 bytes on wire (5720 bits), 715 bytes captured (5720 bits)
> Ethernet II, Src: Cisco_9d:b9:ff (4c:71:0d:9d:b9:ff), Dst: VMware_8d:9a:f4 (00:50:56:8d:9a:f4)
> Internet Protocol Version 4, Src: 10.61.70.23, Dst: 10.48.48.165
> Transmission Control Protocol, Src Port: 61484, Dst Port: 3128, Seq: 212, Ack: 40, Len: 649
v Hypertext Transfer Protocol
    [Proxy-Connect-Hostname: example.com]
    [Proxy-Connect-Port: 443]
v Transport Layer Security
  v TLSv1.2 Record Layer: Handshake Protocol: Client Hello
      Content Type: Handshake (22)
      Version: TLS 1.0 (0x0301)
      Length: 644
    v Handshake Protocol: Client Hello
        Handshake Type: Client Hello (1)
        Length: 640
        Version: TLS 1.2 (0x0303)
      > Random: 8f2d33b577f5cd05ab284c0a64a929e5dd29c940aa73ccc3f4bcafaf8509078d
        Session ID Length: 32
        Session ID: e91649fe756a373ce70f5b65c9729b805d864f8f39ac783b2feb9a49ced7de6b
        Cipher Suites Length: 34
      > Cipher Suites (17 suites)
        Compression Methods Length: 1
      > Compression Methods (1 method)
        Extensions Length: 533
      v Extension: server_name (len=16) name=example.com
          Type: server_name (0)
          Length: 16
        v Server Name Indication extension
            Server Name list length: 14
            Server Name Type: host_name (0)
            Server Name length: 11
            Server Name: example.com
      > Extension: extended_master_secret (len=0)
      > Extension: renegotiation_info (len=1)
      > Extension: supported_groups (len=14)
      > Extension: ec_point_formats (len=2)
      > Extension: application_layer_protocol_negotiation (len=14)
      > Extension: status_request (len=5)
      > Extension: delegated_credentials (len=10)
      > Extension: key_share (len=107) x25519, secp256r1
      > Extension: supported_versions (len=5) TLS 1.3, TLS 1.2
      > Extension: signature_algorithms (len=24)
      > Extension: record_size_limit (len=2)
      > Extension: encrypted_client_hello (len=281)
        [JA4: t13d1713h2_5b57614c22b0_748f4c70de1c]
```

Image- HTTPS Client hello - Explicit - Client to SWA



Tip: You can use this filter in Wireshark to search for URL/SNI :
tls.handshake.extensions_server_name == "www.example.com"

Here is a sample of certificate which SWA sent to Client

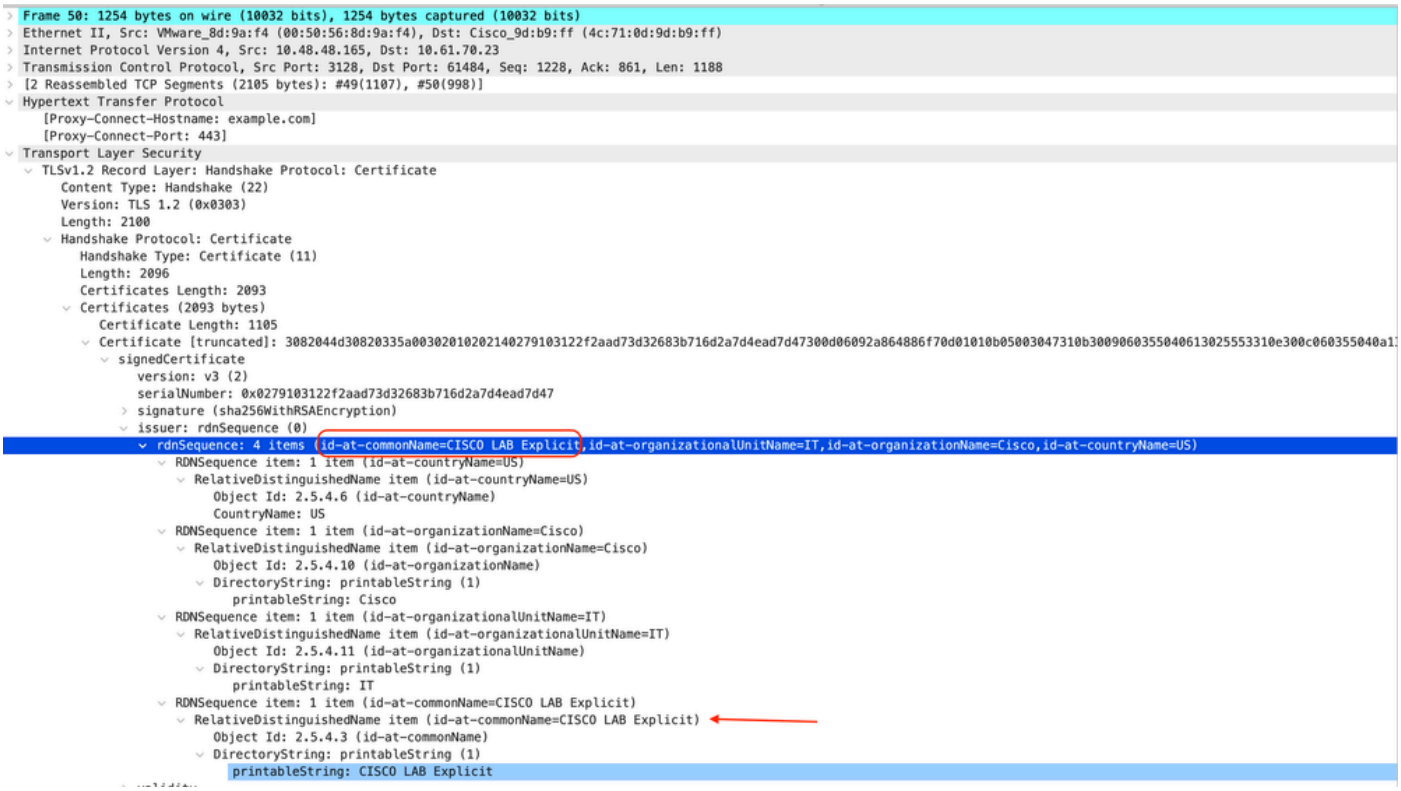


Image- HTTPS certificate - Explicit - SWA to client

SWA and Web Server

The network traffic occurs between the IP address of the Proxy and the IP address of the web server.

The traffic from SWA is destined to TCP port 443 (Not the Proxy Port)

- TCP Handshake.
- Client Hello (Destination IP = Web server , Destination Port = 443)
- Server Hello (Source IP = Web server)
- Data transfer
- TCP connection termination (4-Way Handshake)

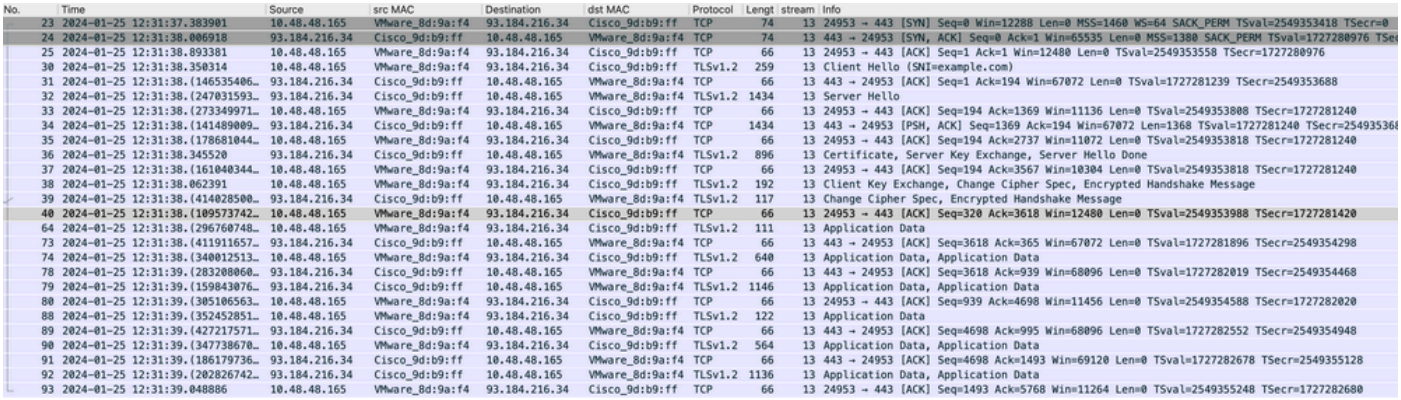
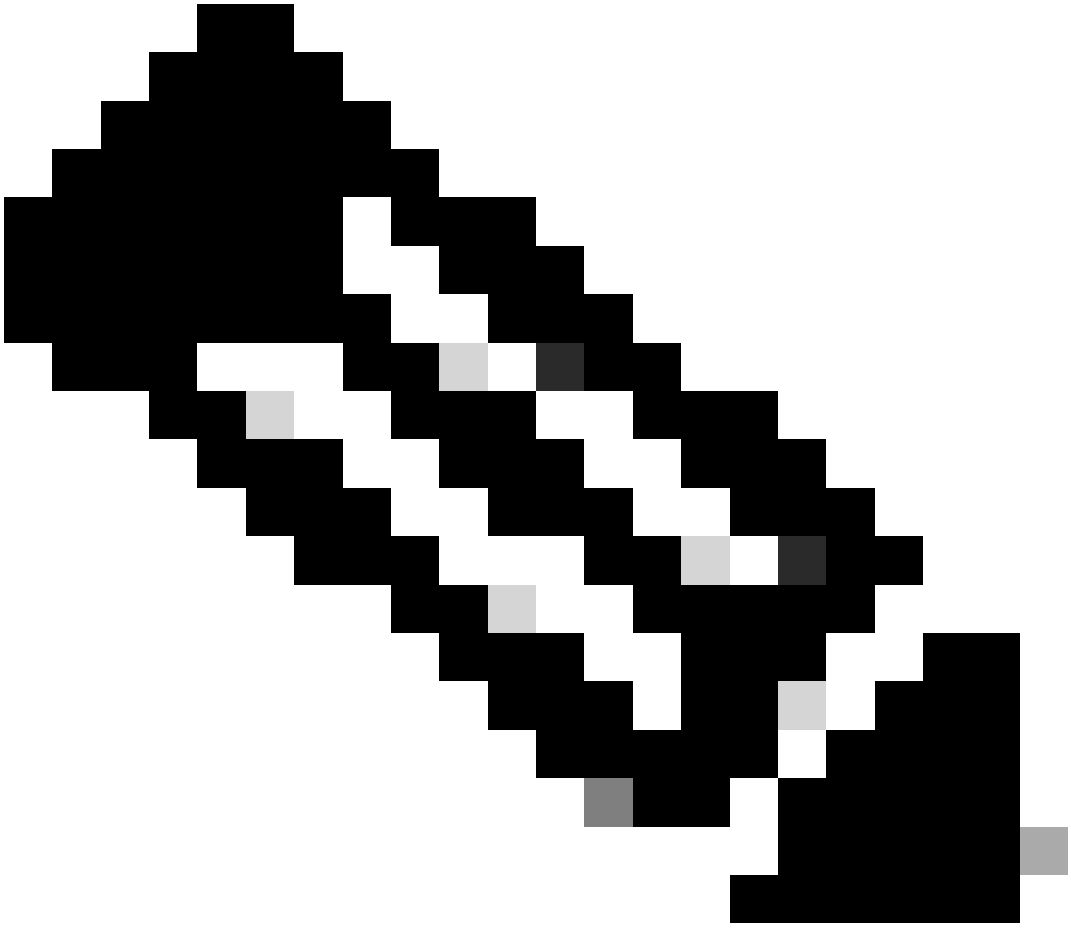


Image- HTTPS - Explicit - SWA to webserver

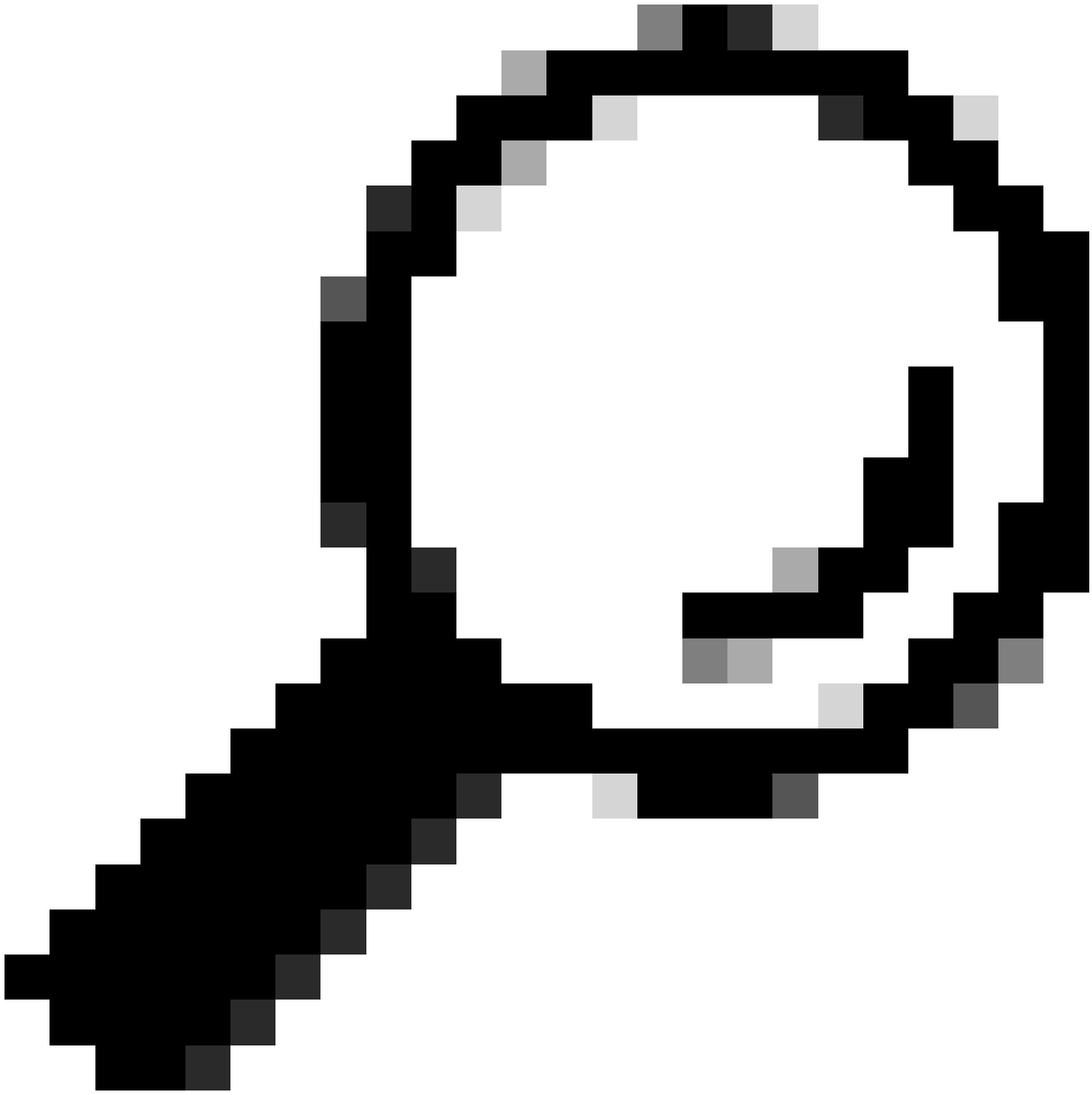
Here is the details of Client Hello from SWA to web server, as you can see SWA advertised 12 Cipher Suites:

```
> Frame 30: 259 bytes on wire (2072 bits), 259 bytes captured (2072 bits)
> Ethernet II, Src: VMware_8d:9a:f4 (00:50:56:8d:9a:f4), Dst: Cisco_9d:b9:ff (4c:71:0d:9d:b9:ff)
> Internet Protocol Version 4, Src: 10.48.48.165, Dst: 93.184.216.34
> Transmission Control Protocol, Src Port: 24953, Dst Port: 443, Seq: 1, Ack: 1, Len: 193
v Transport Layer Security
  v TLSv1.2 Record Layer: Handshake Protocol: Client Hello
      Content Type: Handshake (22)
      Version: TLS 1.0 (0x0301)
      Length: 188
    v Handshake Protocol: Client Hello
        Handshake Type: Client Hello (1)
        Length: 184
        Version: TLS 1.2 (0x0303)
      > Random: 6601ee708d9db71cf5c7c4584e5facdf08d4de00b208f6d6eb6ade08cc7d3e14
        Session ID Length: 0
        Cipher Suites Length: 24
      > Cipher Suites (12 suites)
        Compression Methods Length: 1
      > Compression Methods (1 method)
        Extensions Length: 119
      v Extension: server_name (len=16) name=example.com
          Type: server_name (0)
          Length: 16
        v Server Name Indication extension
            Server Name list length: 14
            Server Name Type: host_name (0)
            Server Name length: 11
            Server Name: example.com
      > Extension: ec_point_formats (len=4)
      > Extension: supported_groups (len=12)
      > Extension: application_layer_protocol_negotiation (len=11)
      > Extension: encrypt_then_mac (len=0)
      > Extension: extended_master_secret (len=0)
      > Extension: signature_algorithms (len=48)
        [JA4: t12d1207h1_ea129f91df3f_ed727256b201]
        [JA4_r: t12d1207h1_002f,009c,009d,00ff,c009,c013,c02b,c02c,c02f,c030,cca8,cca9_000a,000b,000d,0016,0017_0403,0503,0603,0807,0808,0809,080a,080b,0804,0805,0806,0401,0501,0601,030
        [JA3 Fullstring: 771,49195-49199-52393-52392-49196-49200-49161-49171-156-157-47-255,0-11-10-16-22-23-13,29-23-30-25-24,0-1-2]
        [JA3: 485a74d85df6d99eb1db31d9c65efe0f]
```

Image- HTTPS Client Hello - SWA to Web server- No Chache



Note: The Cipher Suites observed here differ from the Cipher Suites in the Client Hello from Client to SWA, as the SWA, configured to decrypt this traffic, utilizes its own Ciphers.



Tip: In the Server Key Exchange from SWA to Web Server, the Web Server certificate appears. However, if an Upstream Proxy finds configuration for your SWA, its certificate shows up instead of the Web Server certificate.

Here is sample of HTTP **CONNECT** from Client

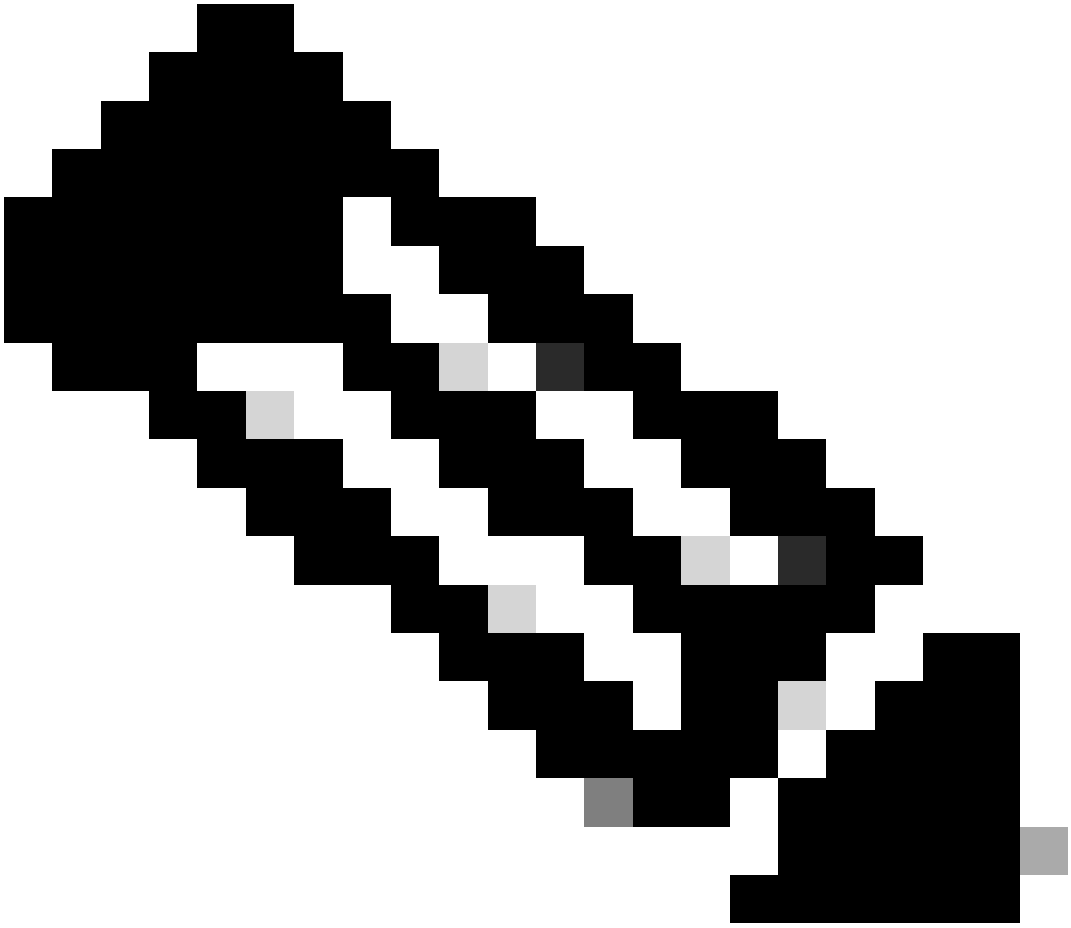
```
> Frame 21: 277 bytes on wire (2216 bits), 277 bytes captured (2216 bits)
> Ethernet II, Src: Cisco_9d:b9:ff (4c:71:0d:9d:b9:ff), Dst: VMware_8d:9a:f4 (00:50:56:8d:9a:f4)
> Internet Protocol Version 4, Src: 10.61.70.23, Dst: 10.48.48.165
> Transmission Control Protocol, Src Port: 61484, Dst Port: 3128, Seq: 1, Ack: 1, Len: 211
v Hypertext Transfer Protocol
  v CONNECT example.com:443 HTTP/1.1\r\n
    v [Expert Info (Chat/Sequence): CONNECT example.com:443 HTTP/1.1\r\n]
        [CONNECT example.com:443 HTTP/1.1\r\n]
        [Severity level: Chat]
        [Group: Sequence]
      Request Method: CONNECT
      Request URI: example.com:443
      Request Version: HTTP/1.1
    User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.15; rv:122.0) Gecko/20100101 Firefox/122.0\r\n
    Proxy-Connection: keep-alive\r\n
    Connection: keep-alive\r\n
    Host: example.com:443\r\n
    \r\n
    [Full request URI: example.com:443]
    [HTTP request 1/1]
    [Response in frame: 26]
```

Image- Client HTTP Connect

This represents the entire flow of traffic from the client to the SWA, then to the web server, and finally back to the client.

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
18	2024-01-25 12:31:37.(318168644…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	78	12	61484 → 3128 [SYN] Seq=0 Win=65535 Len=0 MSS=1260 WS=64 TSval=1676451324 TSecr=0 SACK_
19	2024-01-25 12:31:37.(330015315…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	74	12	3128 → 61484 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=44
20	2024-01-25 12:31:37.(370297760…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1 Ack=1 Win=132288 Len=0 TSval=1676451392 TSecr=441495437
21	2024-01-25 12:31:37.383167	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	HTTP	277	12	CONNECT example.com:443 HTTP/1.1
22	2024-01-25 12:31:37.(324946619…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=1 Ack=212 Win=65344 Len=0 TSval=441495507 TSecr=1676451392
23	2024-01-25 12:31:37.383901	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	74	13	24953 → 443 [SYN] Seq=0 Win=12288 Len=0 MSS=1460 WS=64 SACK_PERM TSval=2549353418 TSe
24	2024-01-25 12:31:38.006918	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	74	13	443 → 24953 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1380 SACK_PERM TSval=172728097
25	2024-01-25 12:31:38.893381	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=1 Ack=1 Win=12480 Len=0 TSval=2549353558 TSecr=1727280976
26	2024-01-25 12:31:38.731815	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	HTTP	105	12	HTTP/1.1 200 Connection established
27	2024-01-25 12:31:38.(308877561…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=212 Ack=40 Win=132224 Len=0 TSval=1676451630 TSecr=441495677
28	2024-01-25 12:31:38.(322347166…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	715	12	Client Hello (SNI=example.com)
29	2024-01-25 12:31:38.(182072475…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=40 Ack=861 Win=64704 Len=0 TSval=441495747 TSecr=1676451630
30	2024-01-25 12:31:38.350314	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TLSv1.2	259	13	Client Hello (SNI=example.com)
31	2024-01-25 12:31:38.(146535406…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	13	443 → 24953 [ACK] Seq=1 Ack=194 Win=67072 Len=0 TSval=1727281239 TSecr=2549353688
32	2024-01-25 12:31:38.(247031593…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	1434	13	Server Hello
33	2024-01-25 12:31:38.(273349971…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=194 Ack=1369 Win=11136 Len=0 TSval=2549353808 TSecr=1727281240
34	2024-01-25 12:31:38.(141489009…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	1434	13	443 → 24953 [PSH, ACK] Seq=1369 Ack=194 Win=67072 Len=1368 TSval=1727281240 TSecr=254
35	2024-01-25 12:31:38.(178681044…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=194 Ack=2737 Win=11072 Len=0 TSval=2549353818 TSecr=1727281240
36	2024-01-25 12:31:38.345520	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	896	13	Certificate, Server Key Exchange, Server Hello Done
37	2024-01-25 12:31:38.(161040344…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=194 Ack=3567 Win=10304 Len=0 TSval=2549353818 TSecr=1727281240
38	2024-01-25 12:31:38.062391	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TLSv1.2	192	13	Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
39	2024-01-25 12:31:38.(414028500…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	117	13	Change Cipher Spec, Encrypted Handshake Message
40	2024-01-25 12:31:38.(109573742…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=320 Ack=3618 Win=12480 Len=0 TSval=2549353988 TSecr=1727281420
49	2024-01-25 12:31:38.(282097660…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1254	12	Server Hello
50	2024-01-25 12:31:38.(153429867…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1254	12	Certificate
51	2024-01-25 12:31:38.965425	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	190	12	Server Key Exchange, Server Hello Done
54	2024-01-25 12:31:38.824826	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=861 Ack=1228 Win=131008 Len=0 TSval=1676452189 TSecr=441496237
55	2024-01-25 12:31:38.(344661913…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=861 Ack=2540 Win=129728 Len=0 TSval=1676452189 TSecr=441496237
56	2024-01-25 12:31:38.(173832950…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	159	12	Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
57	2024-01-25 12:31:38.(422856787…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=2540 Ack=954 Win=64640 Len=0 TSval=441496317 TSecr=1676452193
58	2024-01-25 12:31:38.(244514147…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	117	12	Change Cipher Spec, Encrypted Handshake Message
59	2024-01-25 12:31:38.(328702336…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=954 Ack=2591 Win=131008 Len=0 TSval=1676452265 TSecr=441496317
60	2024-01-25 12:31:38.(151248214…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	562	12	Application Data
61	2024-01-25 12:31:38.(257435452…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TCP	66	12	3128 → 61484 [ACK] Seq=2591 Ack=1450 Win=64192 Len=0 TSval=441496387 TSecr=1676452265
64	2024-01-25 12:31:38.(296760748…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TLSv1.2	111	13	Application Data
73	2024-01-25 12:31:38.(411911657…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	13	443 → 24953 [ACK] Seq=3618 Ack=365 Win=67072 Len=0 TSval=1727281896 TSecr=2549354298
74	2024-01-25 12:31:38.(340012513…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TLSv1.2	640	13	Application Data, Application Data
78	2024-01-25 12:31:39.(283208060…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	13	443 → 24953 [ACK] Seq=3618 Ack=939 Win=68096 Len=0 TSval=1727282019 TSecr=2549354468
79	2024-01-25 12:31:39.(159843076…	93.184.216.34	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	1146	13	Application Data, Application Data
80	2024-01-25 12:31:39.(305106563…	10.48.48.165	VMware_8d:9a:f4	93.184.216.34	Cisco_9d:b9:ff	TCP	66	13	24953 → 443 [ACK] Seq=939 Ack=4698 Win=11456 Len=0 TSval=2549354588 TSecr=1727282020
82	2024-01-25 12:31:39.(165086323…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	112	12	Application Data
83	2024-01-25 12:31:39.342008	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1450 Ack=2637 Win=131008 Len=0 TSval=1676452764 TSecr=44149680
84	2024-01-25 12:31:39.(200484740…	10.48.48.165	VMware_8d:9a:f4	10.61.70.23	Cisco_9d:b9:ff	TLSv1.2	1209	12	Application Data, Application Data
85	2024-01-25 12:31:39.(128618294…	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TCP	66	12	61484 → 3128 [ACK] Seq=1450 Ack=3780 Win=129920 Len=0 TSval=1676452838 TSecr=44149688
86	2024-01-25 12:31:39.092047	10.61.70.23	Cisco_9d:b9:ff	10.48.48.165	VMware_8d:9a:f4	TLSv1.2	497	12	Application Data

Image- Full HTTPS explicit-No Cache

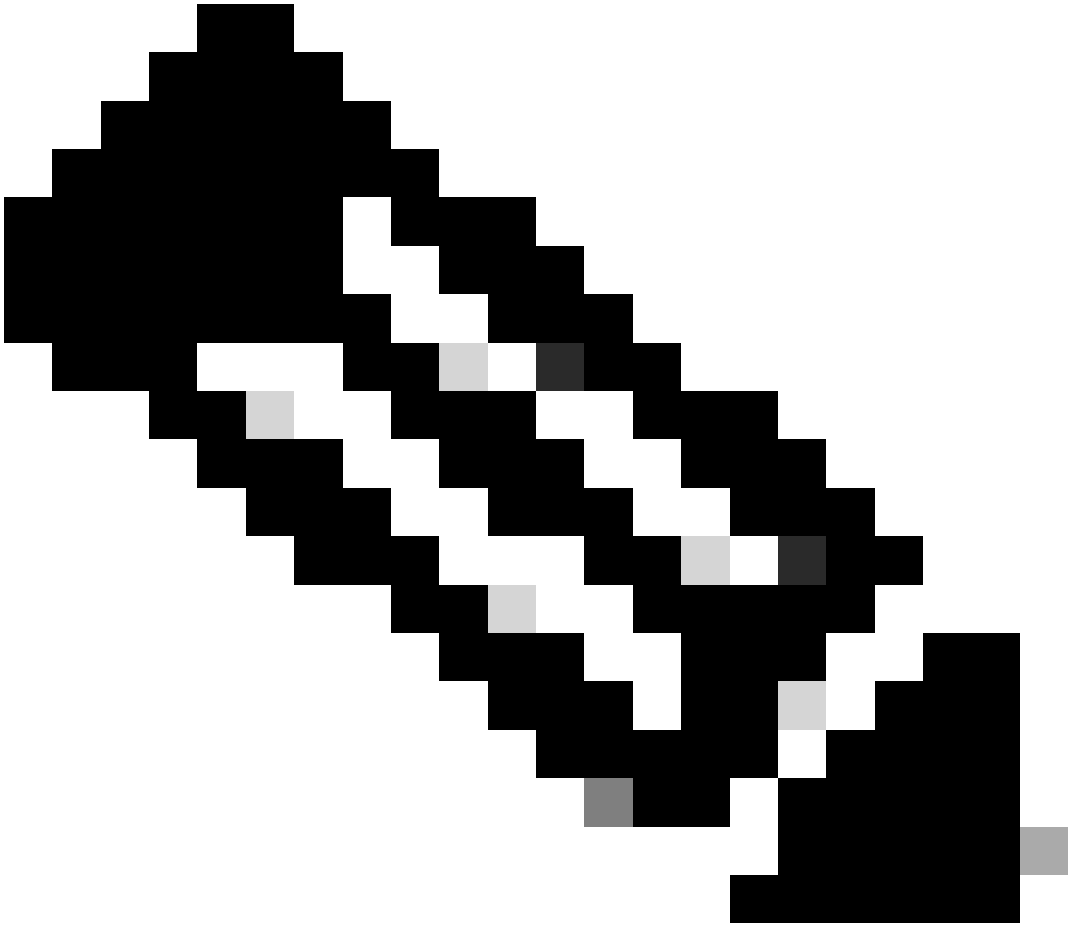


Note: Each stream of traffic is distinguished by a different color; the flow from the client to the SWA is one color, and the flow from the SWA to the web server is another.

Image- HTTPS Flow- Explicit - No Cache

Here is a sample of Accesslogs:

```
1706174571.215 582 10.61.70.23 TCP_MISS_SSL/200 39 CONNECT tunnel://www.example.com:443/ - DIRECT/www.e
1706174571.486 270 10.61.70.23 TCP_MISS_SSL/200 1106 GET https://www.example.com:443/ - DIRECT/www.exam
```



Note: As you can see in transparent deployment for HTTPS traffic there are 2 lines in Accesslogs, the first line is when the traffic is Encrypted and you can see **CONNECT** and the URL of the Web Server starts with **tunnel:**//. If Decryption is enabled in SWA, the second line contains GET and the whole URL starts with HTTPS, which means the traffic has been decrypted.

Passthrough HTTPS traffic

If you configured your SWA to passthrough the traffic, here is the overall flow:

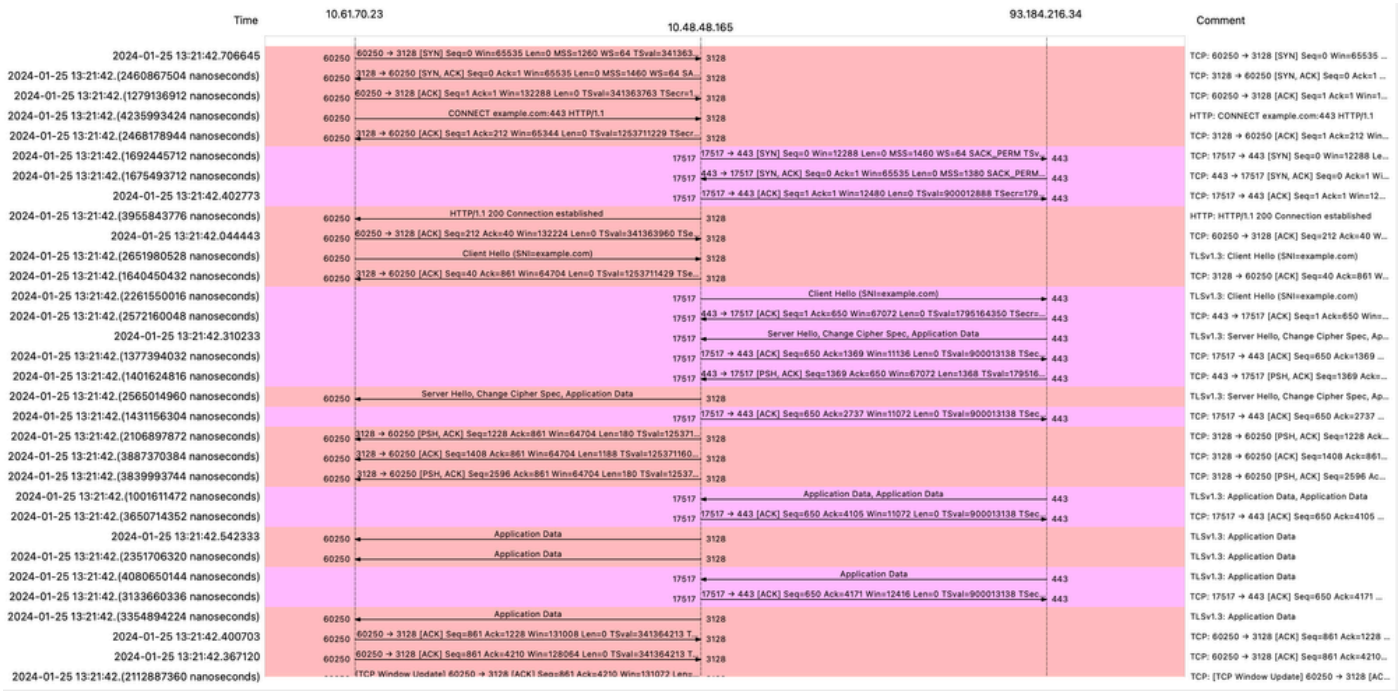


Image- HTTPS Passthrough - Explicit - Flow

Here is the sample of Client Hello from SWA to Web server:

```
Transport Layer Security
  TLSv1.3 Record Layer: Handshake Protocol: Client Hello
      Content Type: Handshake (22)
      Version: TLS 1.0 (0x0301)
      Length: 644
    Handshake Protocol: Client Hello
      Handshake Type: Client Hello (1)
      Length: 640
      Version: TLS 1.2 (0x0303)
      Random: 2c545a566b5b3f338dc9dbd80ea91ad61035c786954ced2191e266ff0b92b9c1
      Session ID Length: 32
      Session ID: 86da348af5508fc24f18f3cbd9829c7282b77e0499e5d2f38466cccbd66821e2
      Cipher Suites Length: 34
      Cipher Suites (17 suites)
        Cipher Suite: TLS_AES_128_GCM_SHA256 (0x1301)
        Cipher Suite: TLS_CHACHA20_POLY1305_SHA256 (0x1303)
        Cipher Suite: TLS_AES_256_GCM_SHA384 (0x1302)
        Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (0xc02b)
        Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)
        Cipher Suite: TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca9)
        Cipher Suite: TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca8)
        Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (0xc02c)
        Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (0xc030)
        Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA (0xc00a)
        Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA (0xc009)
        Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA (0xc013)
        Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA (0xc014)
        Cipher Suite: TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
        Cipher Suite: TLS_RSA_WITH_AES_256_GCM_SHA384 (0x009d)
        Cipher Suite: TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
        Cipher Suite: TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
      Compression Methods Length: 1
    > Compression Methods (1 method)
      Extensions Length: 533
    v Extension: server_name (len=16) name=example.com
        Type: server_name (0)
        Length: 16
      v Server Name Indication extension
          Server Name list length: 14
          Server Name Type: host_name (0)
          Server Name length: 11
          Server Name: example.com
    > Extension: extended_master_secret (len=0)
    > Extension: renegotiation_info (len=1)
    > Extension: supported_groups (len=14)
    > Extension: ec_point_formats (len=2)
```

Image- HTTPS Passthrough - Explicit - SWA to Webserver - Client hello

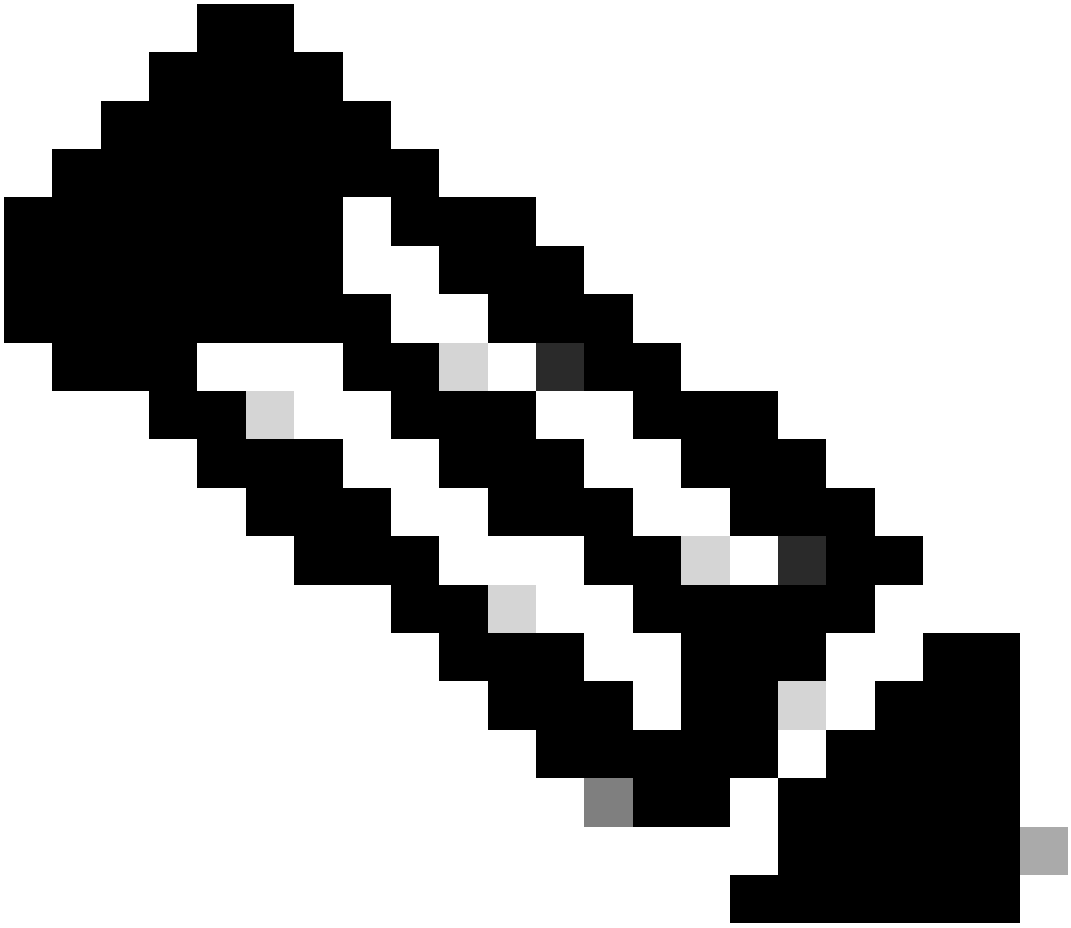
Which is same as the Client Hello from Client to SWA:

```
Transport Layer Security
  TLSv1.3 Record Layer: Handshake Protocol: Client Hello
      Content Type: Handshake (22)
      Version: TLS 1.0 (0x0301)
      Length: 644
    Handshake Protocol: Client Hello
        Handshake Type: Client Hello (1)
        Length: 640
        Version: TLS 1.2 (0x0303)
        Random: 2c545a566b5b3f338dc9dbd80ea91ad61035c786954ced2191e266ff0b92b9c1
        Session ID Length: 32
        Session ID: 86da348af5508fc24f18f3cbd9829c7282b77e0499e5d2f38466cccbd66821e2
        Cipher Suites Length: 34
      Cipher Suites (17 suites)
          Cipher Suite: TLS_AES_128_GCM_SHA256 (0x1301)
          Cipher Suite: TLS_CHACHA20_POLY1305_SHA256 (0x1303)
          Cipher Suite: TLS_AES_256_GCM_SHA384 (0x1302)
          Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (0xc02b)
          Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)
          Cipher Suite: TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca9)
          Cipher Suite: TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca8)
          Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (0xc02c)
          Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (0xc030)
          Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA (0xc00a)
          Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA (0xc009)
          Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA (0xc013)
          Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA (0xc014)
          Cipher Suite: TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
          Cipher Suite: TLS_RSA_WITH_AES_256_GCM_SHA384 (0x009d)
          Cipher Suite: TLS_RSA_WITH_AES_128_CBC_SHA (0x002f)
          Cipher Suite: TLS_RSA_WITH_AES_256_CBC_SHA (0x0035)
        Compression Methods Length: 1
      > Compression Methods (1 method)
        Extensions Length: 533
      Extension: server_name (len=16) name=example.com
          Type: server_name (0)
          Length: 16
        Server Name Indication extension
            Server Name list length: 14
            Server Name Type: host_name (0)
            Server Name length: 11
            Server Name: example.com
      Extension: extended_master_secret (len=0)
          Type: extended_master_secret (23)
          Length: 0
      Extension: renegotiation_info (len=1)
```

Image- HTTPS Passthrough - Explicit - Client to SWA - Client hello

Here is a sample Accesslog:

```
1706185288.920 53395 10.61.70.23 TCP_MISS/200 6549 CONNECT tunnel://www.example.com:443/ - DIRECT/www.e
```



Note: As you can see, it is just a single line and the action is **PASSTHRU**.

Transparent Deployment

HTTP Traffic in Transparent Deployment Without Authentication

Client and SWA

Network traffic transpires between the IP address of the client and the IP address of the web server.

The traffic from client is destined to TCP port 80 (Not the Proxy Port)

- TCP Handshake.
- HTTP Get from Client (Destination IP = Web server , Destination Port = 80)
- HTTP response from Proxy (Source IP = Web server)
- Data transfer
- TCP connection termination (4-Way Handshake)

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
7	2023-12-11 19:13:47.(372406256…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	66	0	54468 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
…	2023-12-11 19:13:47.(243585552…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	66	0	80 → 54468 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM
…	2023-12-11 19:13:47.(267161713…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=1 Ack=1 Win=262656 Len=0
…	2023-12-11 19:13:47.(388984368…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	HTTP	128	0	GET / HTTP/1.1
…	2023-12-11 19:13:47.624692	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [ACK] Seq=1 Ack=75 Win=65472 Len=0
…	2023-12-11 19:13:47.(285645694…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	1514	0	80 → 54468 [ACK] Seq=1 Ack=75 Win=65472 Len=1460 [TCP segment of a reassembled PDU]
…	2023-12-11 19:13:47.(237549915…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	HTTP	381	0	HTTP/1.1 200 OK (text/html)
…	2023-12-11 19:13:47.266907	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=75 Ack=1788 Win=262656 Len=0
…	2023-12-11 19:13:47.(353942364…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [FIN, ACK] Seq=75 Ack=1788 Win=262656 Len=0
…	2023-12-11 19:13:47.(266665884…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [ACK] Seq=1788 Ack=76 Win=65472 Len=0
…	2023-12-11 19:13:47.(111822518…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [FIN, ACK] Seq=1788 Ack=76 Win=65472 Len=0
…	2023-12-11 19:13:47.(168465673…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=76 Ack=1789 Win=262656 Len=0

Image- Client to Proxy - HTTP - Transparent - No Auth

Here is sample of HTTP Get from Client

```
> Frame 11: 243 bytes on wire (1944 bits), 243 bytes captured (1944 bits)
> Ethernet II, Src: Cisco_76:fb:16 (70:70:8b:76:fb:16), Dst: Cisco_56:5f:44 (68:bd:ab:56:5f:44)
> Internet Protocol Version 4, Src: 10.201.189.180, Dst: 93.184.216.34
> Transmission Control Protocol, Src Port: 65132, Dst Port: 80, Seq: 1, Ack: 1, Len: 177
v Hypertext Transfer Protocol
  > GET / HTTP/1.1\r\n
    Connection: keep-alive\r\n
    Host: example.com\r\n
    User-Agent: curl/8.4.0\r\n
    Accept: */*\r\n
    X-IMForwards: 20\r\n
    Via: 1.1 wsa695948022.calolab.com:80 (Cisco-WSA/15.0.0-355)\r\n
    \r\n
    [Full request URI: http://example.com/]
    [HTTP request 1/1]
    [Response in frame: 15]
```

Image- Client to Proxy - HTTP - Transparent - No Auth - Client HTTP Get

SWA and Web Server

The network traffic occurs between the IP address of the Proxy and the IP address of the web server.

The traffic from SWA is destined to TCP port 80 (Not the Proxy Port)

- TCP Handshake.
- HTTP Get from Proxy (Destination IP = Web server , Destination Port = 80)
- HTTP response from Web Server (Source IP = Proxy server)
- Data transfer
- TCP connection termination (4-Way Handshake)

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
8	2023-12-11 19:13:47.(260946116…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	74	1	65132 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1460 WS=64 SACK_PERM TSval=1559577035 TSecr=0
9	2023-12-11 19:13:47.(273148633…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	74	1	80 → 65132 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=6873333 TSecr=
10	2023-12-11 19:13:47.(285000827…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=1 Ack=1 Win=13184 Len=0 TSval=1559577035 TSecr=6873333
11	2023-12-11 19:13:47.(307381585…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	HTTP	243	1	GET / HTTP/1.1
12	2023-12-11 19:13:47.(118451681…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [ACK] Seq=1 Ack=178 Win=66368 Len=0 TSval=6873333 TSecr=1559577035
13	2023-12-11 19:13:47.(209167872…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	1514	1	80 → 65132 [ACK] Seq=1 Ack=178 Win=66368 Len=1448 TSval=6873463 TSecr=1559577035 [TCP segment o
14	2023-12-11 19:13:47.637333	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=178 Ack=1449 Win=11776 Len=0 TSval=1559577165 TSecr=6873463
15	2023-12-11 19:13:47.(276272012…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	HTTP	349	1	HTTP/1.1 200 OK (text/html)
16	2023-12-11 19:13:47.(249979843…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=178 Ack=1732 Win=11520 Len=0 TSval=1559577165 TSecr=6873463
1…	2023-12-11 19:14:12.(270488529…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [FIN, ACK] Seq=178 Ack=1732 Win=13184 Len=0 TSval=1559602015 TSecr=6873463
1…	2023-12-11 19:14:12.236807	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [ACK] Seq=1732 Ack=179 Win=66368 Len=0 TSval=6898313 TSecr=1559602015
1…	2023-12-11 19:14:12.(215970816…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [FIN, ACK] Seq=1732 Ack=179 Win=66368 Len=0 TSval=6898313 TSecr=1559602015
1…	2023-12-11 19:14:12.(218303318…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=179 Ack=1733 Win=13120 Len=0 TSval=1559602015 TSecr=6898313

Image- Proxy and Web Server - HTTP - Transparent - No Auth

Here is sample of HTTP Get from Proxy

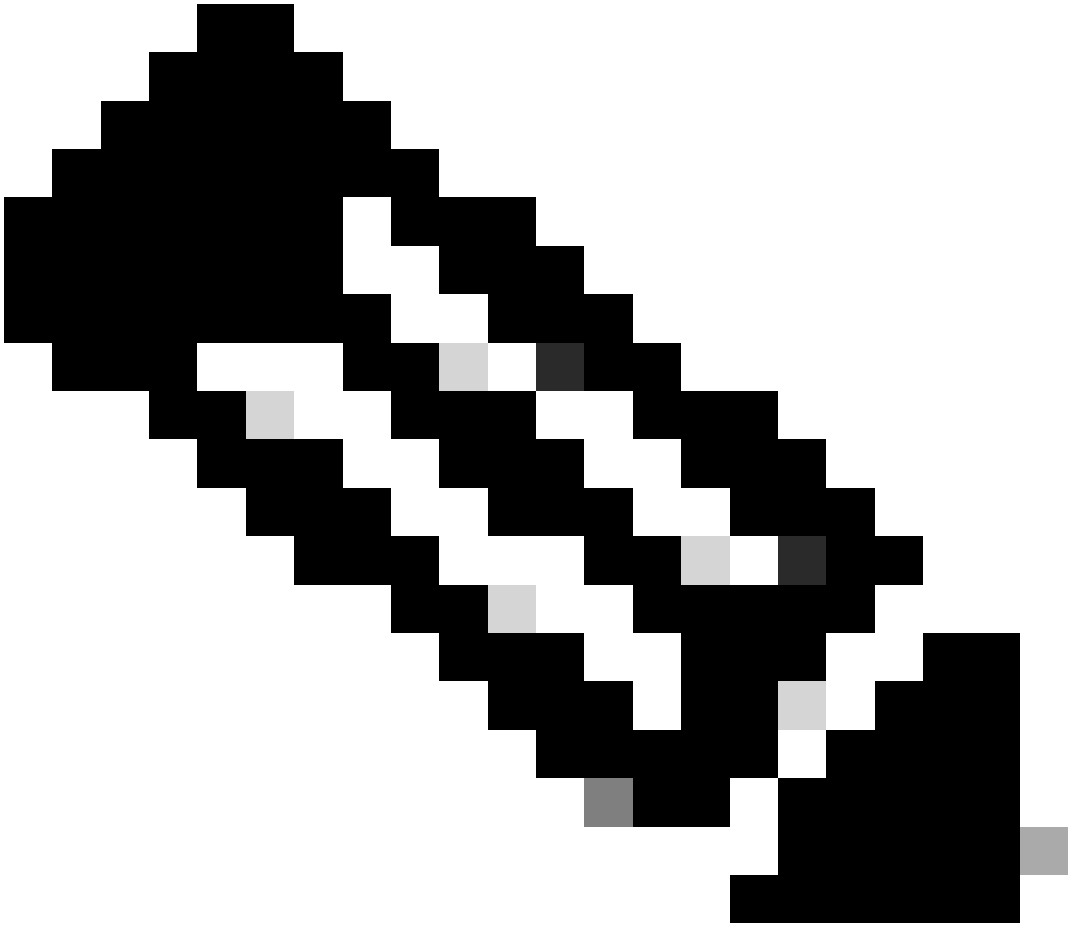
```
> Frame 20: 128 bytes on wire (1024 bits), 128 bytes captured (1024 bits)
> Ethernet II, Src: Cisco_c9:c0:7f (74:88:bb:c9:c0:7f), Dst: Cisco_76:fb:15 (70:70:8b:76:fb:15)
> Internet Protocol Version 4, Src: 192.168.1.10, Dst: 93.184.216.34
> Transmission Control Protocol, Src Port: 54468, Dst Port: 80, Seq: 1, Ack: 1, Len: 74
v Hypertext Transfer Protocol
  > GET / HTTP/1.1\r\n
    Host: example.com\r\n
    User-Agent: curl/8.4.0\r\n
    Accept: */*\r\n
    \r\n
    [Full request URI: http://example.com/]
    [HTTP request 1/1]
    [Response in frame: 23]
```

Image- Proxy to Web Server - HTTP - Transparent - No Auth - Proxy HTTP Get

This represents the entire flow of traffic from the client to the SWA, then to the web server, and finally back to the client.

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
7	2023-12-11 19:13:47.(372406256…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	66	0	54468 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
8	2023-12-11 19:13:47.(260946116…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	74	1	65132 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1460 WS=64 SACK_PERM TSval=1559577035 TSecr=0
9	2023-12-11 19:13:47.(273148633…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	74	1	80 → 65132 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=6873333 TSecr
10	2023-12-11 19:13:47.(285000827…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=1 Ack=1 Win=13184 Len=0 TSval=1559577035 TSecr=6873333
11	2023-12-11 19:13:47.(307381585…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	HTTP	243	1	GET / HTTP/1.1
12	2023-12-11 19:13:47.(118451681…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [ACK] Seq=1 Ack=178 Win=66368 Len=0 TSval=6873333 TSecr=1559577035
13	2023-12-11 19:13:47.(209167872…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	1514	1	80 → 65132 [ACK] Seq=1 Ack=178 Win=66368 Len=1448 TSval=6873463 TSecr=1559577035 [TCP segment
14	2023-12-11 19:13:47.637333	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=178 Ack=1449 Win=11776 Len=0 TSval=1559577165 TSecr=6873463
15	2023-12-11 19:13:47.(276272012…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	HTTP	349	1	HTTP/1.1 200 OK (text/html)
16	2023-12-11 19:13:47.(249979843…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=178 Ack=1732 Win=11520 Len=0 TSval=1559577165 TSecr=6873463
18	2023-12-11 19:13:47.(243585552…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	66	0	80 → 54468 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM
19	2023-12-11 19:13:47.(267161713…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=1 Ack=1 Win=262656 Len=0
20	2023-12-11 19:13:47.(388984368…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	HTTP	128	0	GET / HTTP/1.1
21	2023-12-11 19:13:47.624692	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [ACK] Seq=1 Ack=75 Win=65472 Len=0
22	2023-12-11 19:13:47.(285645694…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	1514	0	80 → 54468 [ACK] Seq=1 Ack=75 Win=65472 Len=1460 [TCP segment of a reassembled PDU]
23	2023-12-11 19:13:47.(237549915…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	HTTP	381	0	HTTP/1.1 200 OK (text/html)
24	2023-12-11 19:13:47.266907	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=75 Ack=1788 Win=262656 Len=0
25	2023-12-11 19:13:47.(353942364…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [FIN, ACK] Seq=75 Ack=1788 Win=262656 Len=0
26	2023-12-11 19:13:47.(266665884…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [ACK] Seq=1788 Ack=76 Win=65472 Len=0
27	2023-12-11 19:13:47.(111822518…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	0	80 → 54468 [FIN, ACK] Seq=1788 Ack=76 Win=65472 Len=0
28	2023-12-11 19:13:47.(168465673…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	0	54468 → 80 [ACK] Seq=76 Ack=1789 Win=262656 Len=0
1…	2023-12-11 19:14:12.(270488529…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [FIN, ACK] Seq=178 Ack=1732 Win=13184 Len=0 TSval=1559602015 TSecr=6873463
1…	2023-12-11 19:14:12.236807	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [ACK] Seq=1732 Ack=179 Win=66368 Len=0 TSval=6898313 TSecr=1559602015
1…	2023-12-11 19:14:12.(215970816…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 65132 [FIN, ACK] Seq=1732 Ack=179 Win=66368 Len=0 TSval=6898313 TSecr=1559602015
1…	2023-12-11 19:14:12.(218303318…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	65132 → 80 [ACK] Seq=179 Ack=1733 Win=13120 Len=0 TSval=1559602015 TSecr=6898313

Image- Total Traffic - HTTP - Transparent - No Auth



Note: Each stream of traffic is distinguished by a different color; the flow from the client to the SWA is one color, and the flow from the SWA to the web server is another.

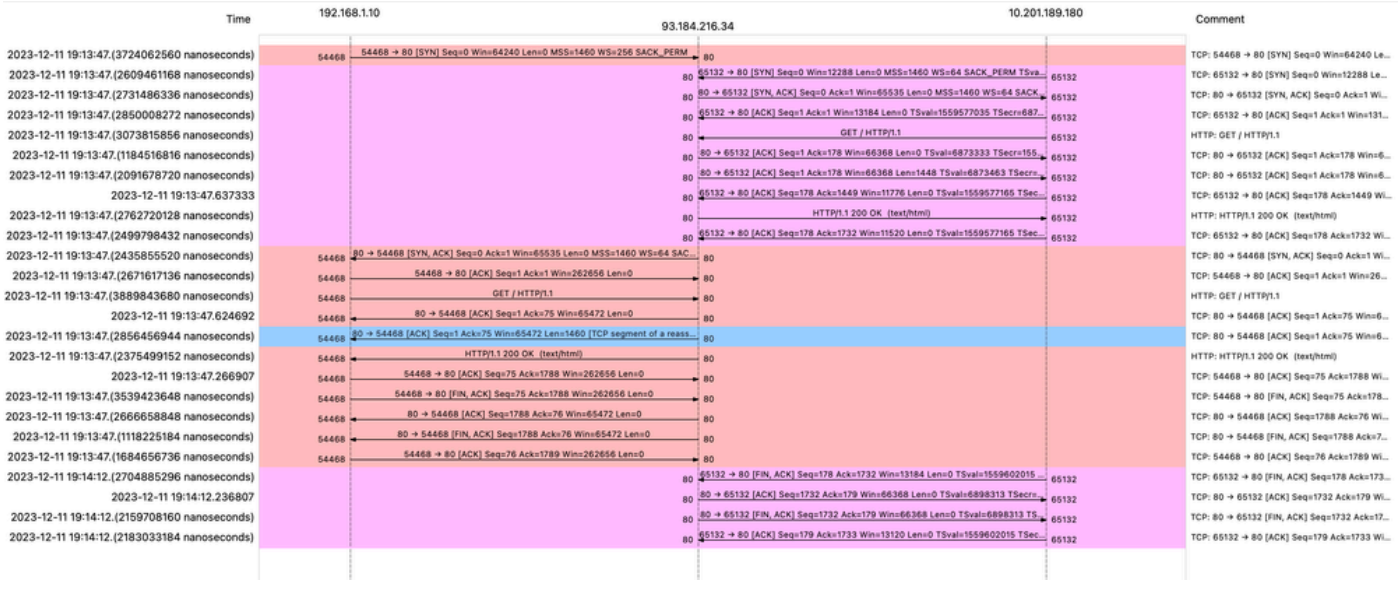


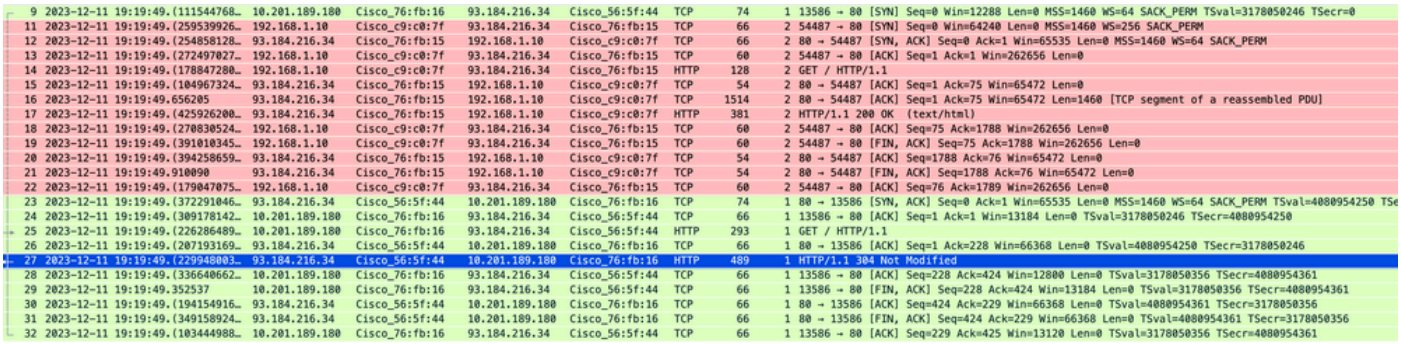
Image- WCCP HTTP Flow

Here is a sample of Accesslogs:

```
1702318427.181 124 192.168.1.10 TCP_MISS/200 1787 GET http://www.example.com/ - DIRECT/www.example.com
```

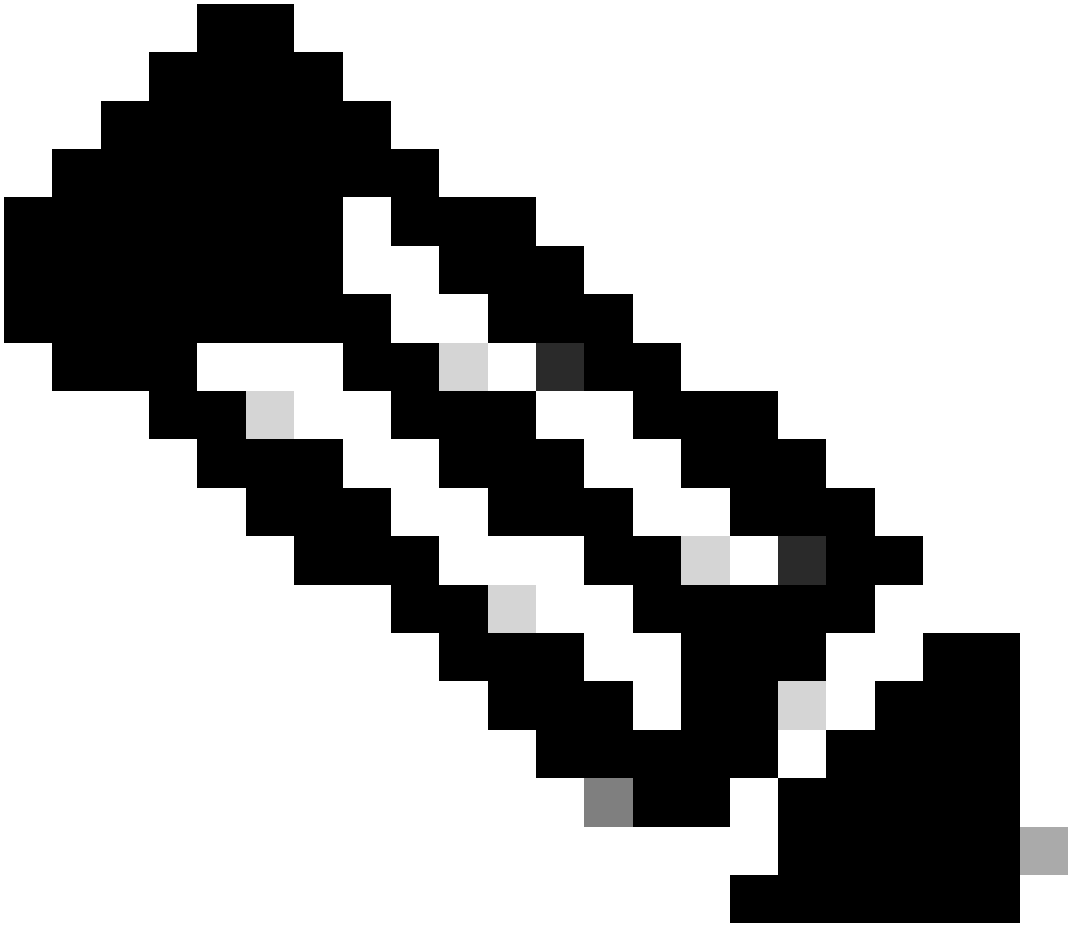
Traffic With Cached Data

This represents the entire flow of traffic from the client to the SWA, when the data is in SWA Cache.



9	2023-12-11 19:19:49.(111544768…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	74	1	13586 → 80 [SYN] Seq=0 Win=12288 Len=0 MSS=1460 WS=64 SACK_PERM TSval=3178050246 TSecr=0
11	2023-12-11 19:19:49.(259539926…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	66	2	54487 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
12	2023-12-11 19:19:49.(254858128…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	66	2	80 → 54487 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM
13	2023-12-11 19:19:49.(272497027…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	2	54487 → 80 [ACK] Seq=1 Ack=1 Win=262656 Len=0
14	2023-12-11 19:19:49.(178847280…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	HTTP	128	2	GET / HTTP/1.1
15	2023-12-11 19:19:49.(104967324…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	2	80 → 54487 [ACK] Seq=1 Ack=75 Win=65472 Len=0
16	2023-12-11 19:19:49.656205	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	1514	2	80 → 54487 [ACK] Seq=1 Ack=75 Win=65472 Len=1460 [TCP segment of a reassembled PDU]
17	2023-12-11 19:19:49.(425926200…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	HTTP	381	2	HTTP/1.1 200 OK (text/html)
18	2023-12-11 19:19:49.(270830524…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	2	54487 → 80 [ACK] Seq=75 Ack=1788 Win=262656 Len=0
19	2023-12-11 19:19:49.(391010345…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	2	54487 → 80 [FIN, ACK] Seq=75 Ack=1788 Win=262656 Len=0
20	2023-12-11 19:19:49.(394258659…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	2	80 → 54487 [ACK] Seq=1788 Ack=76 Win=65472 Len=0
21	2023-12-11 19:19:49.910090	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	2	80 → 54487 [FIN, ACK] Seq=1788 Ack=76 Win=65472 Len=0
22	2023-12-11 19:19:49.(179047075…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	2	54487 → 80 [ACK] Seq=76 Ack=1789 Win=262656 Len=0
23	2023-12-11 19:19:49.(372291046…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	74	1	80 → 13586 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=4080954250 TSe
24	2023-12-11 19:19:49.(309178142…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	13586 → 80 [ACK] Seq=1 Ack=1 Win=13184 Len=0 TSval=3178050246 TSecr=4080954250
25	2023-12-11 19:19:49.(226286489…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	HTTP	293	1	GET / HTTP/1.1
26	2023-12-11 19:19:49.(207193169…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 13586 [ACK] Seq=1 Ack=228 Win=66368 Len=0 TSval=4080954250 TSecr=3178050246
27	2023-12-11 19:19:49.(229948003…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	HTTP	489	1	HTTP/1.1 304 Not Modified
28	2023-12-11 19:19:49.(336640662…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	13586 → 80 [ACK] Seq=228 Ack=424 Win=12800 Len=0 TSval=3178050356 TSecr=4080954361
29	2023-12-11 19:19:49.352537	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	13586 → 80 [FIN, ACK] Seq=228 Ack=424 Win=13184 Len=0 TSval=3178050356 TSecr=4080954361
30	2023-12-11 19:19:49.(194154916…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 13586 [ACK] Seq=424 Ack=229 Win=66368 Len=0 TSval=4080954361 TSecr=3178050356
31	2023-12-11 19:19:49.(349158924…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	1	80 → 13586 [FIN, ACK] Seq=424 Ack=229 Win=66368 Len=0 TSval=4080954361 TSecr=3178050356
32	2023-12-11 19:19:49.(103444988…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	1	13586 → 80 [ACK] Seq=229 Ack=425 Win=13120 Len=0 TSval=3178050356 TSecr=4080954361

Image- Cached- Total Traffic - HTTP - Transparent - No Auth



Note: As you can see the Web Server returns HTTP response 304: Cache not Modified. (in this Example, Packet number 27)

Here is a sample of HTTP Response 304

```
> Frame 27: 489 bytes on wire (3912 bits), 489 bytes captured (3912 bits)
> Ethernet II, Src: Cisco_56:5f:44 (68:bd:ab:56:5f:44), Dst: Cisco_76:fb:16 (70:70:8b:76:fb:16)
> Internet Protocol Version 4, Src: 93.184.216.34, Dst: 10.201.189.180
> Transmission Control Protocol, Src Port: 80, Dst Port: 13586, Seq: 1, Ack: 228, Len: 423
v Hypertext Transfer Protocol
  > HTTP/1.1 304 Not Modified\r\n
    Accept-Ranges: bytes\r\n
    Cache-Control: max-age=604800\r\n
    Date: Mon, 11 Dec 2023 18:22:17 GMT\r\n
    Etag: "3147526947"\r\n
    Expires: Mon, 18 Dec 2023 18:22:17 GMT\r\n
    Server: ECS (dce/26C6)\r\n
    Vary: Accept-Encoding\r\n
    X-Cache: HIT\r\n
    Last-Modified: Thu, 17 Oct 2019 07:18:26 GMT\r\n
    Age: 492653\r\n
    Via: 1.1 rtp1-lab-wsa-1.cisco.com:80 (Cisco-WSA/X), 1.1 proxy.rcdn.local:80 (Cisco-WSA/12.5.5-004)\r\n
    Connection: keep-alive\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.036615136 seconds]
    [Request in frame: 25]
    [Request URI: http://example.com/]
```

Image- Cached - HTTP response 304 - HTTP - Transparent - No Auth

Here is a sample of Accesslogs:

```
1702318789.560 105 192.168.1.10 TCP_REFRESH_HIT/200 1787 GET http://www.example.com/ - DIRECT/www.examp
```

HTTPs Traffic in Transparent Deployment Without Authentication

Client and SWA

Network traffic transpires between the IP address of the client and the IP address of the web server.

The traffic from client is destined to TCP port 443 (Not the Proxy Port)

- TCP Handshake.
- TLS Handshake Client Hello - Server Hello - Server Key Exchange - Client Key Exchange
- Data transfer
- TCP connection termination (4-Way Handshake)

No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
243	2023-12-11 19:36:24.(416304924…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	66	14	54515 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
245	2023-12-11 19:36:24.(107989635…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	66	14	443 → 54515 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM
246	2023-12-11 19:36:24.(139334096…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	14	54515 → 443 [ACK] Seq=1 Ack=1 Win=262656 Len=0
247	2023-12-11 19:36:24.(307154096…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TLSv1…	242	14	Client Hello (SNI=example.com)
248	2023-12-11 19:36:24.(366528476…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [ACK] Seq=1 Ack=189 Win=65408 Len=0
256	2023-12-11 19:36:24.(251614876…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	1514	14	Server Hello
257	2023-12-11 19:36:24.(195519830…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	1043	14	Certificate, Server Key Exchange, Server Hello Done
258	2023-12-11 19:36:24.(186747024…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	14	54515 → 443 [ACK] Seq=189 Ack=2450 Win=262656 Len=0
259	2023-12-11 19:36:24.(193961315…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TLSv1…	147	14	Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
260	2023-12-11 19:36:24.(250163651…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [ACK] Seq=2450 Ack=282 Win=65344 Len=0
261	2023-12-11 19:36:24.(299229398…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	105	14	Change Cipher Spec, Encrypted Handshake Message
262	2023-12-11 19:36:24.(215995475…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TLSv1…	157	14	Application Data
263	2023-12-11 19:36:24.(290152051…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [ACK] Seq=2501 Ack=385 Win=65280 Len=0
264	2023-12-11 19:36:25.529330	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	100	14	Application Data
265	2023-12-11 19:36:25.994499	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	1514	14	Application Data
266	2023-12-11 19:36:25.(413207139…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	14	54515 → 443 [ACK] Seq=385 Ack=4007 Win=262656 Len=0
267	2023-12-11 19:36:25.(201453091…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TLSv1…	311	14	Application Data
268	2023-12-11 19:36:25.(181582608…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TLSv1…	85	14	Encrypted Alert
269	2023-12-11 19:36:25.(404992054…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [ACK] Seq=4264 Ack=416 Win=65280 Len=0
270	2023-12-11 19:36:25.(106927132…	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	14	54515 → 443 [FIN, ACK] Seq=416 Ack=4264 Win=262400 Len=0
271	2023-12-11 19:36:25.(370433091…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [ACK] Seq=4264 Ack=417 Win=65280 Len=0
272	2023-12-11 19:36:25.(342494763…	93.184.216.34	Cisco_76:fb:15	192.168.1.10	Cisco_c9:c0:7f	TCP	54	14	443 → 54515 [FIN, ACK] Seq=4264 Ack=417 Win=65280 Len=0
273	2023-12-11 19:36:25.794348	192.168.1.10	Cisco_c9:c0:7f	93.184.216.34	Cisco_76:fb:15	TCP	60	14	54515 → 443 [ACK] Seq=417 Ack=4265 Win=262400 Len=0

Image- Client to Proxy - HTTPs - Transparent - No Auth

Here is details of Client Hello from Client to SWA, as you can see in the Server Name Indication (SNI) the URL of the webserver can be seen which in this example, is **www.example.com .**

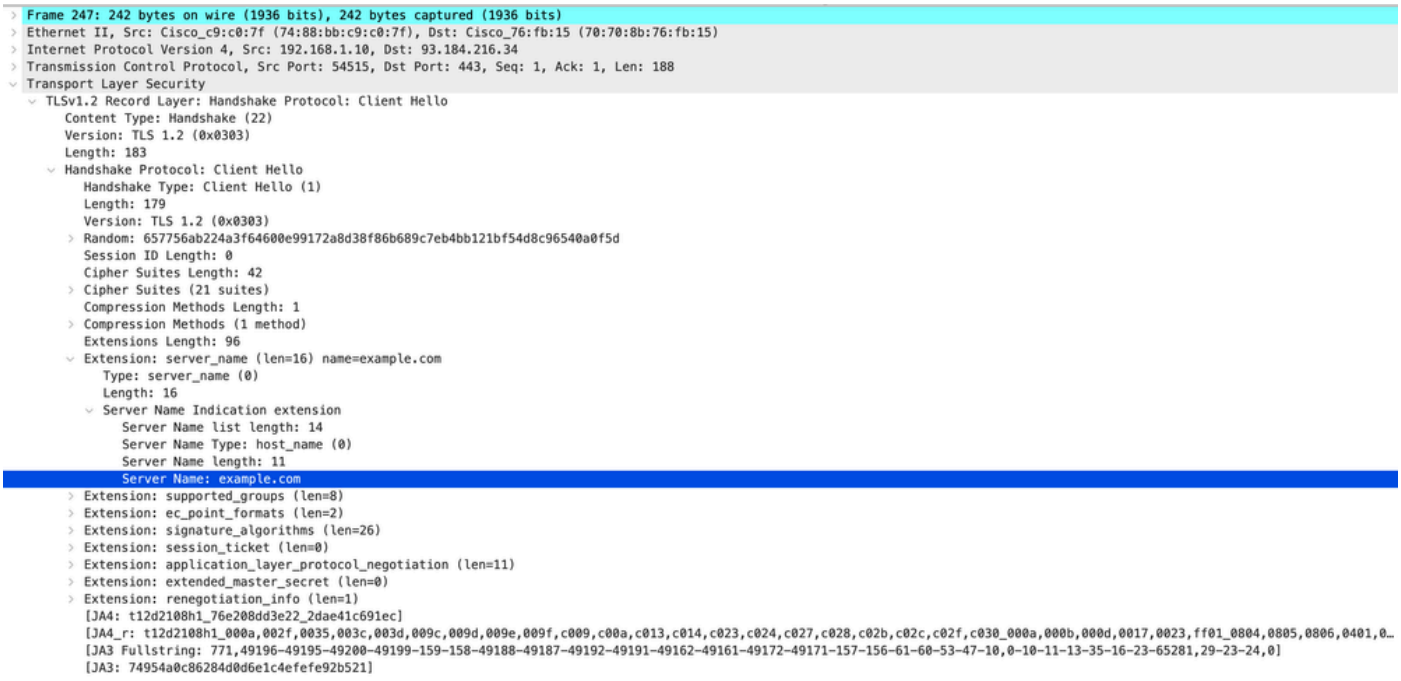
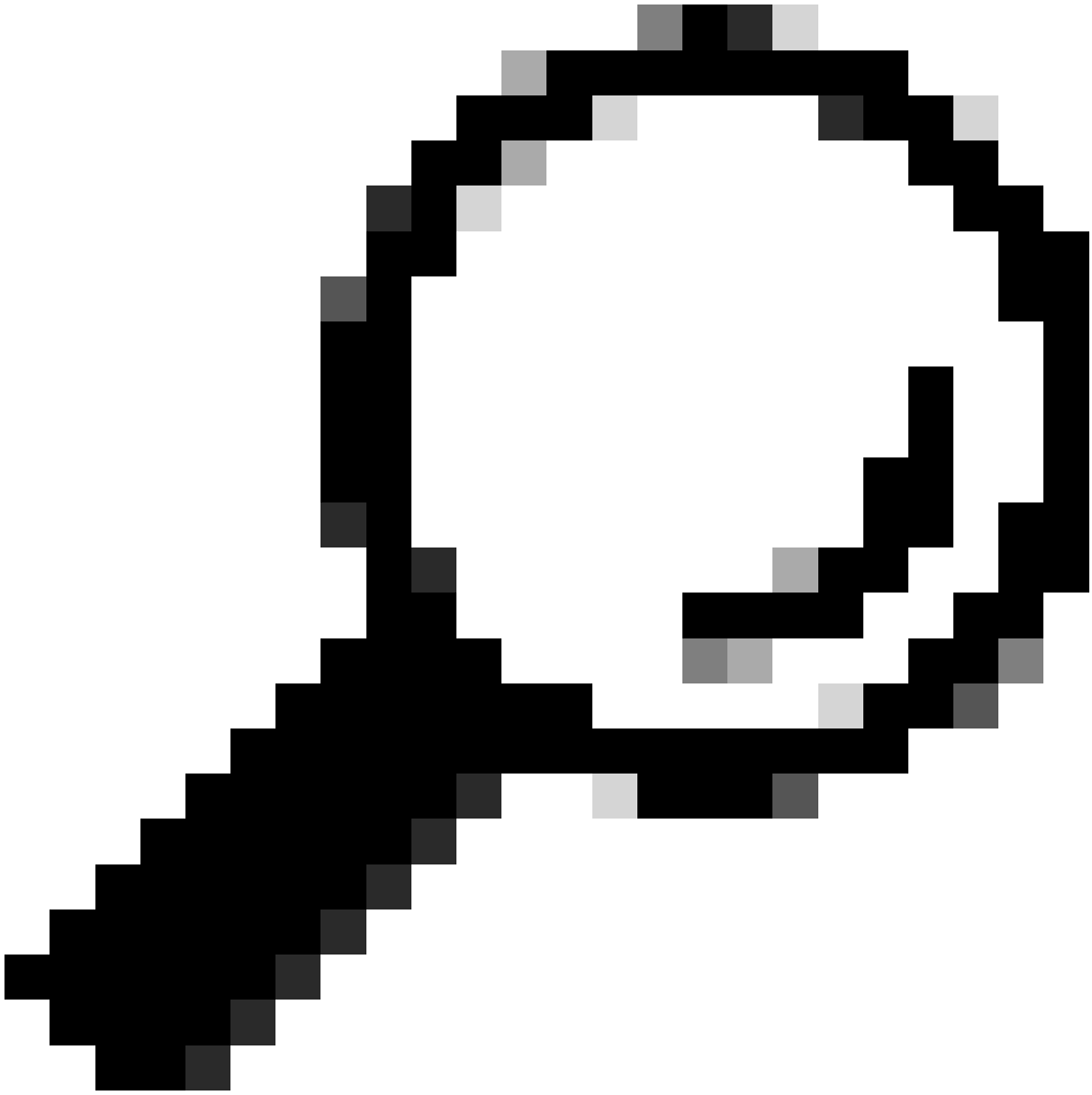


Image- Client Hello - Client to Proxy - Transparent - No Auth



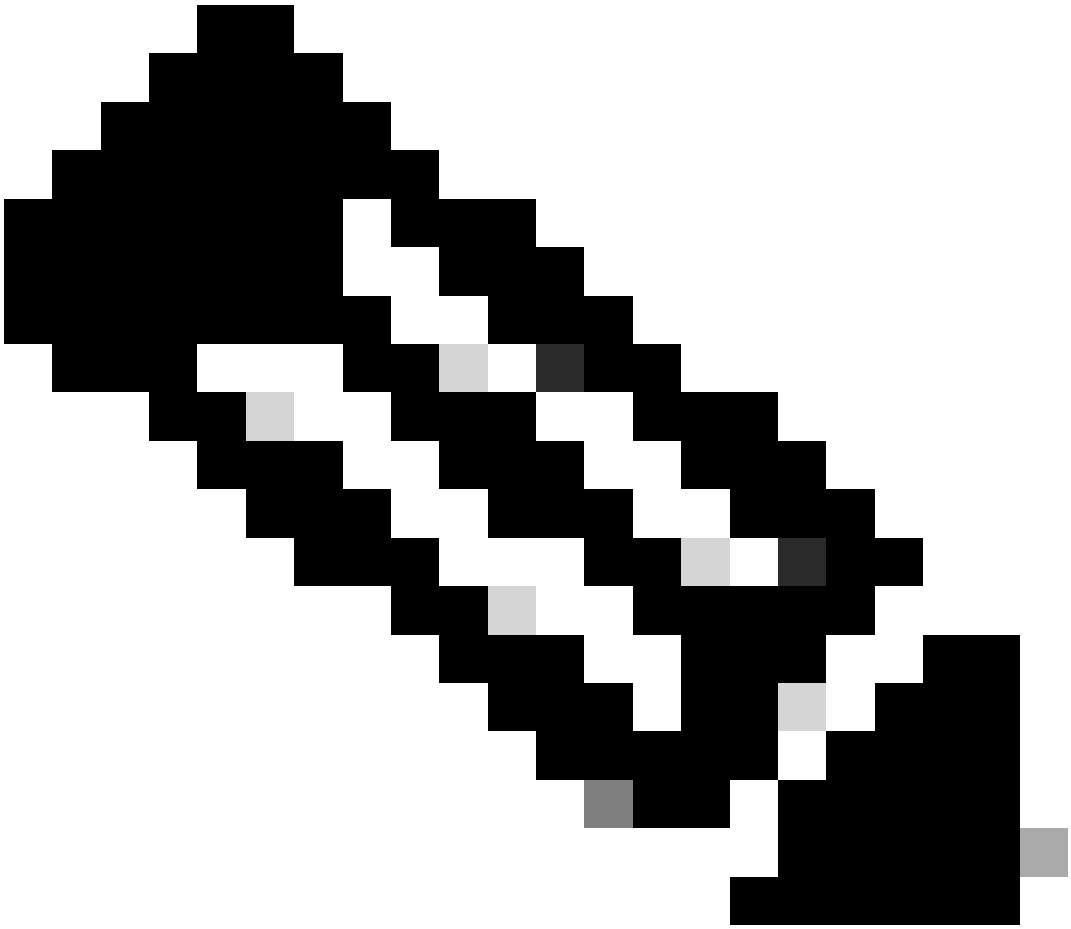
Tip: You can use this filter in Wireshark to search for URL/SNI :
tls.handshake.extensions_server_name == "www.example.com"

Here is a sample of Server Key Exchange

```
> Frame 257: 1043 bytes on wire (8344 bits), 1043 bytes captured (8344 bits)
> Ethernet II, Src: Cisco_76:fb:15 (70:70:8b:76:fb:15), Dst: Cisco_c9:c0:7f (74:88:bb:c9:c0:7f)
> Internet Protocol Version 4, Src: 93.184.216.34, Dst: 192.168.1.10
> Transmission Control Protocol, Src Port: 443, Dst Port: 54515, Seq: 1461, Ack: 189, Len: 989
> [2 Reassembled TCP Segments (2054 bytes): #256(1379), #257(675)]
v Transport Layer Security
  v TLSv1.2 Record Layer: Handshake Protocol: Certificate
      Content Type: Handshake (22)
      Version: TLS 1.2 (0x0303)
      Length: 2049
    v Handshake Protocol: Certificate
        Handshake Type: Certificate (11)
        Length: 2045
        Certificates Length: 2042
      v Certificates (2042 bytes)
          Certificate Length: 1098
        v Certificate [truncated]: 30820446308203 2ea003020102021404409073 79f2aad73d32683b716d2a7ddf2b8e2a300d06092a864886f70d01010b05003040310b3009060355040613025553110300e060355040…
          v signedCertificate
              version: v3 (2)
              serialNumber: 0x0440907379f2aad73d32683b716d2a7ddf2b8e2a
            > signature (sha256WithRSAEncryption)
            v issuer: rdnSequence (0)
              v rdnSequence: 4 items (id-at-commonName=CISCOCALo,id-at-organizationalUnitName=IT,id-at-organizationName=wsatest,id-at-countryName=US)
                > RDNSequence item: 1 item (id-at-countryName=US)
                > RDNSequence item: 1 item (id-at-organizationName=wsatest)
                > RDNSequence item: 1 item (id-at-organizationalUnitName=IT)
                > RDNSequence item: 1 item (id-at-commonName=CISCOCALo)
            > validity
            > subject: rdnSequence (0)
            > subjectPublicKeyInfo
            > extensions: 5 items
          > algorithmIdentifier (sha256WithRSAEncryption)
            Padding: 0
            encrypted [truncated]: 1db2a57a8bbf4def6b1845eace5a7a17f27704e61b102f13c20a696c076bf3e736283d6cffa6c1d9417865ba7f4d4663bd3677423996e23db7f25d232eaa3110a24e72871d8cf2111d3…
          Certificate Length: 938
        > Certificate [truncated]: 308203a63082028ea003020102020900a447d8363a186f2f300d06092a864886f70d01010b05003040310b3009060355040613025553110300e060355040a13077773617465737431 0…
v Transport Layer Security
  > TLSv1.2 Record Layer: Handshake Protocol: Server Key Exchange
  > TLSv1.2 Record Layer: Handshake Protocol: Server Hello Done
```

Image- Server Key Exchange - Client to Proxy - Transparent - No Auth

---



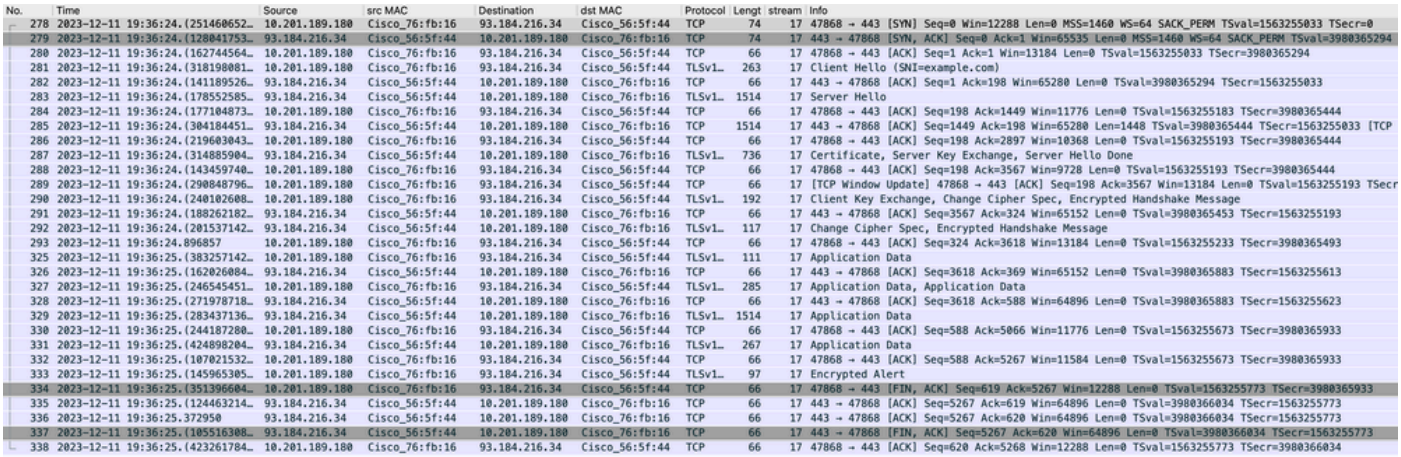
Note: As you can see the Certificate is the one which was configured in SWA as Decryption certificate.

SWA and Web Server

The network traffic occurs between the IP address of the Proxy and the IP address of the web server.

The traffic from SWA is destined to TCP port 443 (Not the Proxy Port)

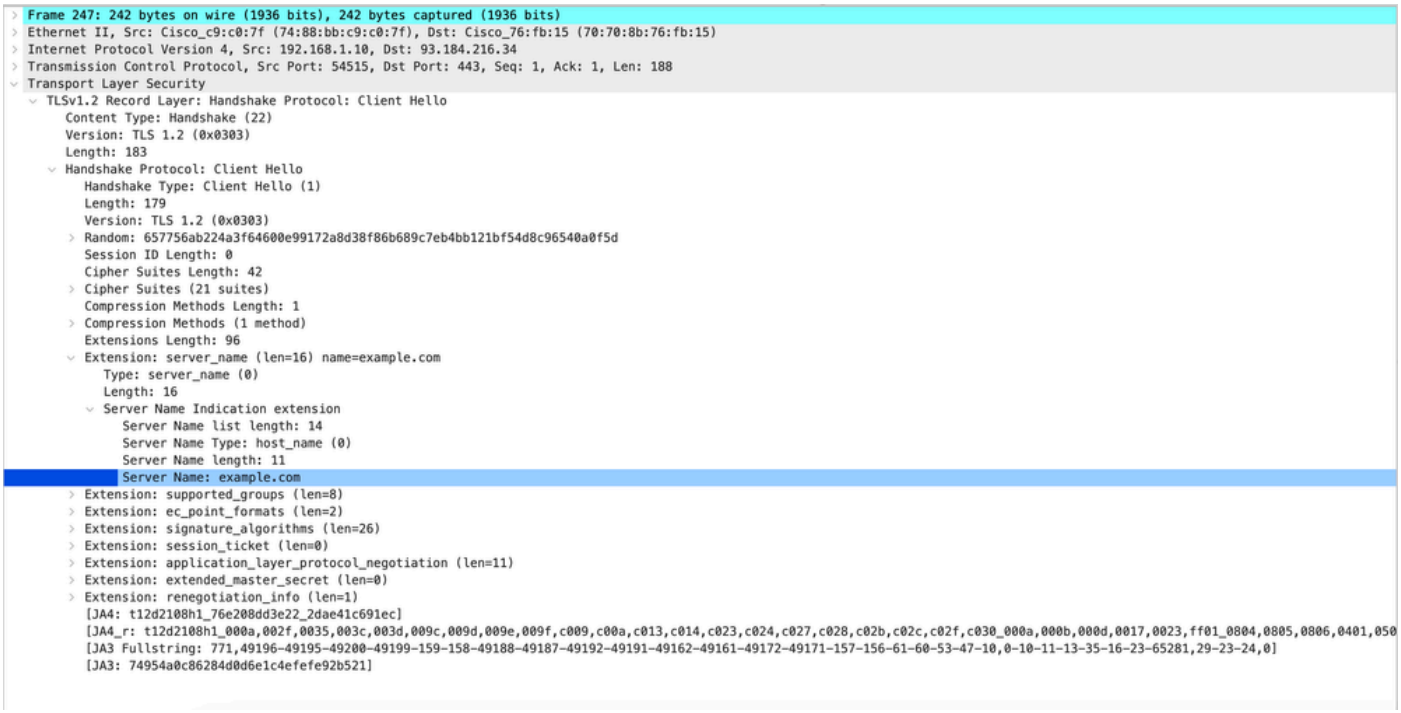
- TCP Handshake.
- TLS Handshake Client Hello - Server Hello - Server Key Exchange - Client Key Exchange
- Data transfer
- TCP connection termination (4-Way Handshake)



No.	Time	Source	src MAC	Destination	dst MAC	Protocol	Lengt	stream	Info
278	2023-12-11 19:36:24.(251460652…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	74	17	47868 → 443 [SYN] Seq=0 Win=12288 Len=0 MSS=1460 WS=64 SACK_PERM TSval=1563255033 TSecr=0
279	2023-12-11 19:36:24.(128041753…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	74	17	443 → 47868 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=64 SACK_PERM TSval=3980365294
280	2023-12-11 19:36:24.(162744564…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=1 Ack=1 Win=13184 Len=0 TSval=1563255033 TSecr=3980365294
281	2023-12-11 19:36:24.(318198081…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TLSv1…	263	17	Client Hello (SNI=example.com)
282	2023-12-11 19:36:24.(141189526…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=1 Ack=198 Win=65280 Len=0 TSval=3980365294 TSecr=1563255033
283	2023-12-11 19:36:24.(178552585…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TLSv1…	1514	17	Server Hello
284	2023-12-11 19:36:24.(177104873…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=198 Ack=1449 Win=11776 Len=0 TSval=1563255183 TSecr=3980365444
285	2023-12-11 19:36:24.(304184451…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	1514	17	443 → 47868 [ACK] Seq=1449 Ack=198 Win=65280 Len=1448 TSval=3980365444 TSecr=1563255033 [TCP
286	2023-12-11 19:36:24.(219603043…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=198 Ack=2897 Win=10368 Len=0 TSval=1563255193 TSecr=3980365444
287	2023-12-11 19:36:24.(314885904…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TLSv1…	736	17	Certificate, Server Key Exchange, Server Hello Done
288	2023-12-11 19:36:24.(143459740…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=198 Ack=3567 Win=9728 Len=0 TSval=1563255193 TSecr=3980365444
289	2023-12-11 19:36:24.(290848796…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	[TCP Window Update] 47868 → 443 [ACK] Seq=198 Ack=3567 Win=13184 Len=0 TSval=1563255193 TSecr
290	2023-12-11 19:36:24.(240102608…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TLSv1…	192	17	Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
291	2023-12-11 19:36:24.(188262182…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=3567 Ack=324 Win=65152 Len=0 TSval=3980365453 TSecr=1563255193
292	2023-12-11 19:36:24.(201537142…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TLSv1…	117	17	Change Cipher Spec, Encrypted Handshake Message
293	2023-12-11 19:36:24.896857	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=324 Ack=3618 Win=13184 Len=0 TSval=1563255233 TSecr=3980365493
325	2023-12-11 19:36:25.(383257142…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TLSv1…	111	17	Application Data
326	2023-12-11 19:36:25.(162026084…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=3618 Ack=369 Win=65152 Len=0 TSval=3980365883 TSecr=1563255613
327	2023-12-11 19:36:25.(246545451…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TLSv1…	285	17	Application Data, Application Data
328	2023-12-11 19:36:25.(271978718…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=3618 Ack=588 Win=64896 Len=0 TSval=3980365883 TSecr=1563255623
329	2023-12-11 19:36:25.(283437136…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TLSv1…	1514	17	Application Data
330	2023-12-11 19:36:25.(244187280…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=588 Ack=5066 Win=11776 Len=0 TSval=1563255673 TSecr=3980365933
331	2023-12-11 19:36:25.(424898204…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TLSv1…	267	17	Application Data
332	2023-12-11 19:36:25.(107021532…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=588 Ack=5267 Win=11584 Len=0 TSval=1563255673 TSecr=3980365933
333	2023-12-11 19:36:25.(145965305…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TLSv1…	97	17	Encrypted Alert
334	2023-12-11 19:36:25.(351396604…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [FIN, ACK] Seq=619 Ack=5267 Win=12288 Len=0 TSval=1563255773 TSecr=3980365933
335	2023-12-11 19:36:25.(124463214…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=5267 Ack=619 Win=64896 Len=0 TSval=3980366034 TSecr=1563255773
336	2023-12-11 19:36:25.372950	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [ACK] Seq=5267 Ack=620 Win=64896 Len=0 TSval=3980366034 TSecr=1563255773
337	2023-12-11 19:36:25.(105516308…	93.184.216.34	Cisco_56:5f:44	10.201.189.180	Cisco_76:fb:16	TCP	66	17	443 → 47868 [FIN, ACK] Seq=5267 Ack=620 Win=64896 Len=0 TSval=3980366034 TSecr=1563255773
338	2023-12-11 19:36:25.(423261784…	10.201.189.180	Cisco_76:fb:16	93.184.216.34	Cisco_56:5f:44	TCP	66	17	47868 → 443 [ACK] Seq=620 Ack=5268 Win=12288 Len=0 TSval=1563255773 TSecr=3980366034

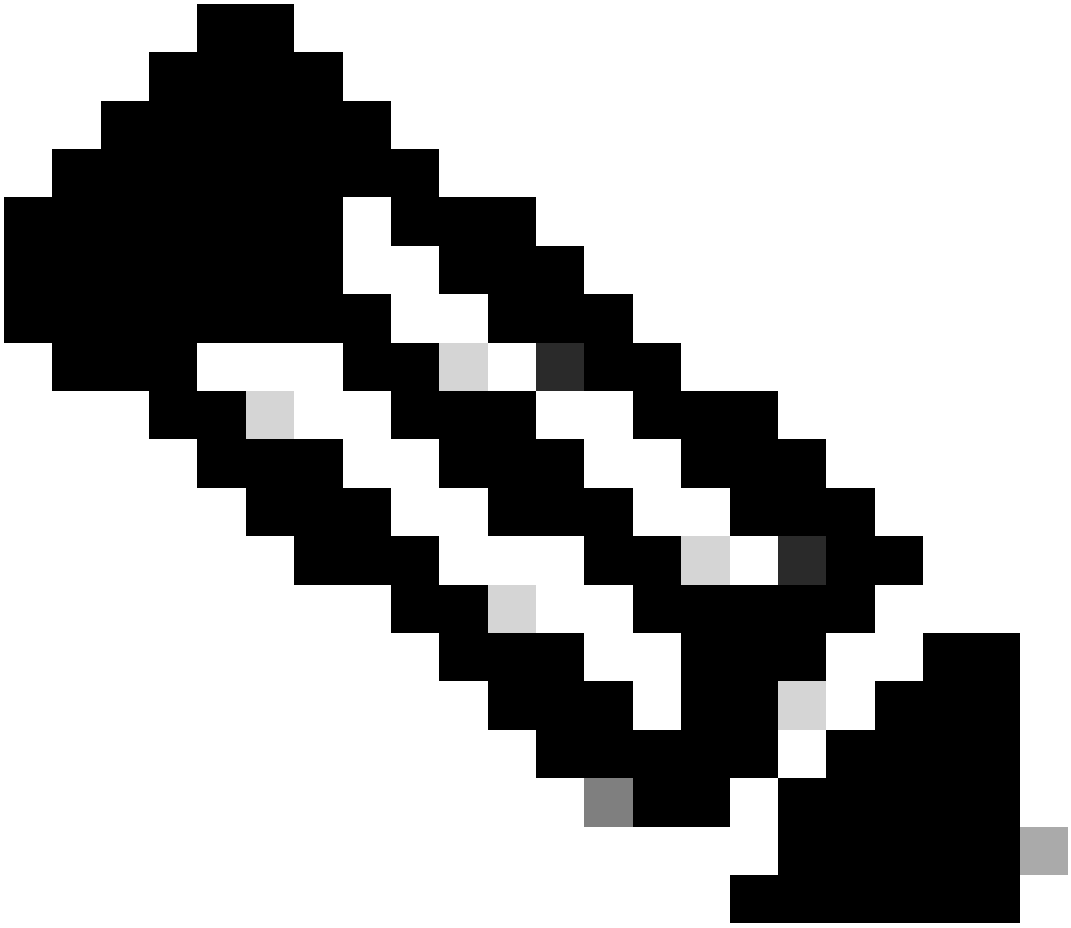
Image- Proxy to Web Server - HTTPs - Transparent - No Auth

Here is a sample of Client Hello from SWA to Web Server

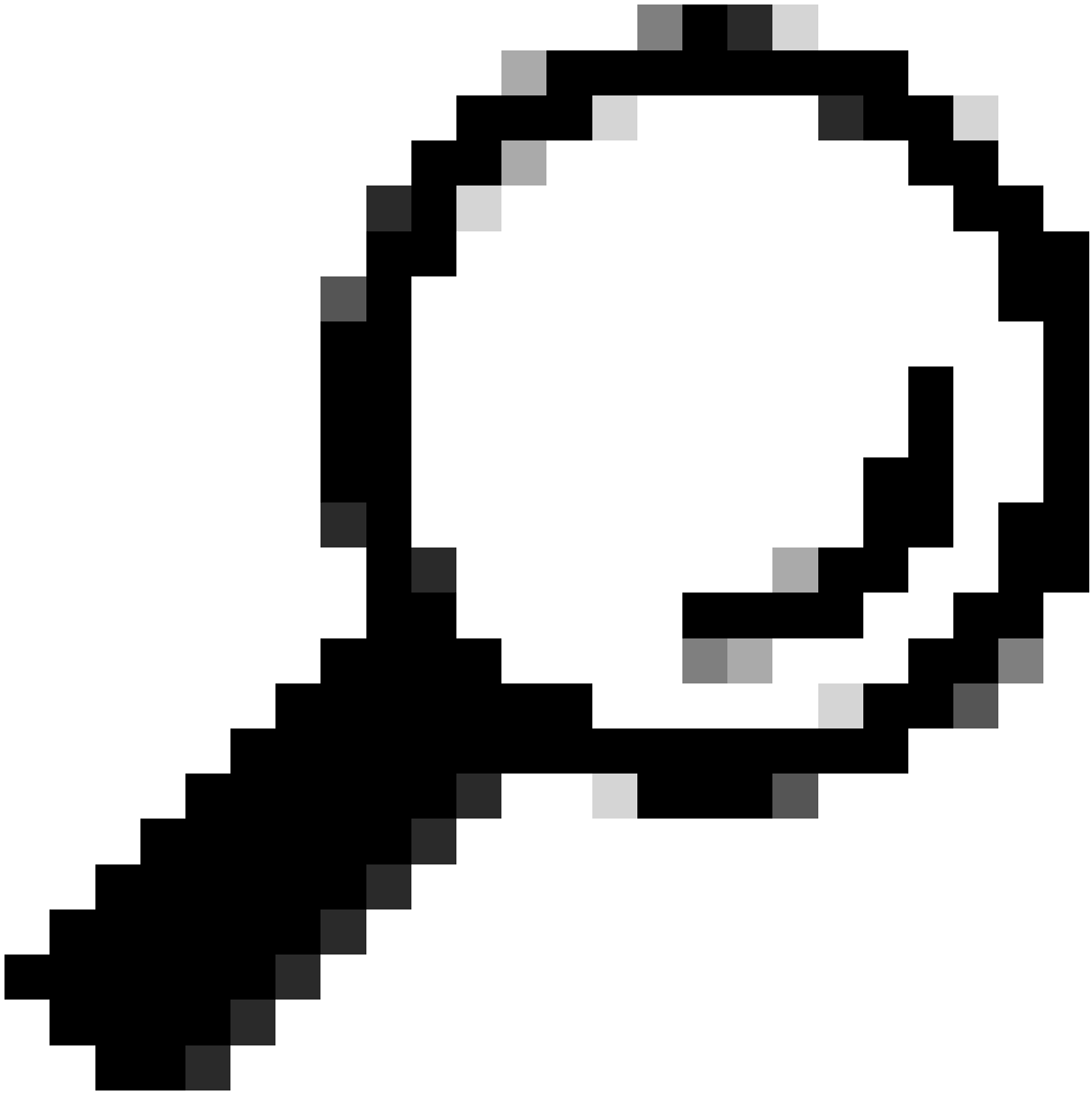


```
> Frame 247: 242 bytes on wire (1936 bits), 242 bytes captured (1936 bits)
> Ethernet II, Src: Cisco_c9:c0:7f (74:88:bb:c9:c0:7f), Dst: Cisco_76:fb:15 (70:70:8b:76:fb:15)
> Internet Protocol Version 4, Src: 192.168.1.10, Dst: 93.184.216.34
> Transmission Control Protocol, Src Port: 54515, Dst Port: 443, Seq: 1, Ack: 1, Len: 188
v Transport Layer Security
  v TLSv1.2 Record Layer: Handshake Protocol: Client Hello
      Content Type: Handshake (22)
      Version: TLS 1.2 (0x0303)
      Length: 183
    v Handshake Protocol: Client Hello
        Handshake Type: Client Hello (1)
        Length: 179
        Version: TLS 1.2 (0x0303)
      > Random: 657756ab224a3f64600e99172a8d38f86b689c7eb4bb121bf54d8c96540a0f5d
        Session ID Length: 0
        Cipher Suites Length: 42
      > Cipher Suites (21 suites)
        Compression Methods Length: 1
      > Compression Methods (1 method)
        Extensions Length: 96
      v Extension: server_name (len=16) name=example.com
          Type: server_name (0)
          Length: 16
        v Server Name Indication extension
            Server Name list length: 14
            Server Name Type: host_name (0)
            Server Name length: 11
            Server Name: example.com
      > Extension: supported_groups (len=8)
      > Extension: ec_point_formats (len=2)
      > Extension: signature_algorithms (len=26)
      > Extension: session_ticket (len=0)
      > Extension: application_layer_protocol_negotiation (len=11)
      > Extension: extended_master_secret (len=0)
      > Extension: renegotiation_info (len=1)
        [JA4: t12d2108h1_76e208dd3e22_2dae41c691ec]
        [JA4_r: t12d2108h1_000a,002f,0035,003c,003d,009c,009d,009e,009f,c009,c00a,c013,c014,c023,c024,c027,c028,c02b,c02c,c02f,c030_000a,000b,000d,0017,0023,ff01_0804,0805,0806,0401,050
        [JA3 Fullstring: 771,49196-49195-49200-49199-159-158-49188-49187-49192-49191-49162-49161-49172-49171-157-156-61-60-53-47-10,0-10-11-13-35-16-23-65281,29-23-24,0]
        [JA3: 74954a0c86284d0d6e1c4efefe92b521]
```

Image- Client Hello - Proxy to Web Server - Transparent - No Auth



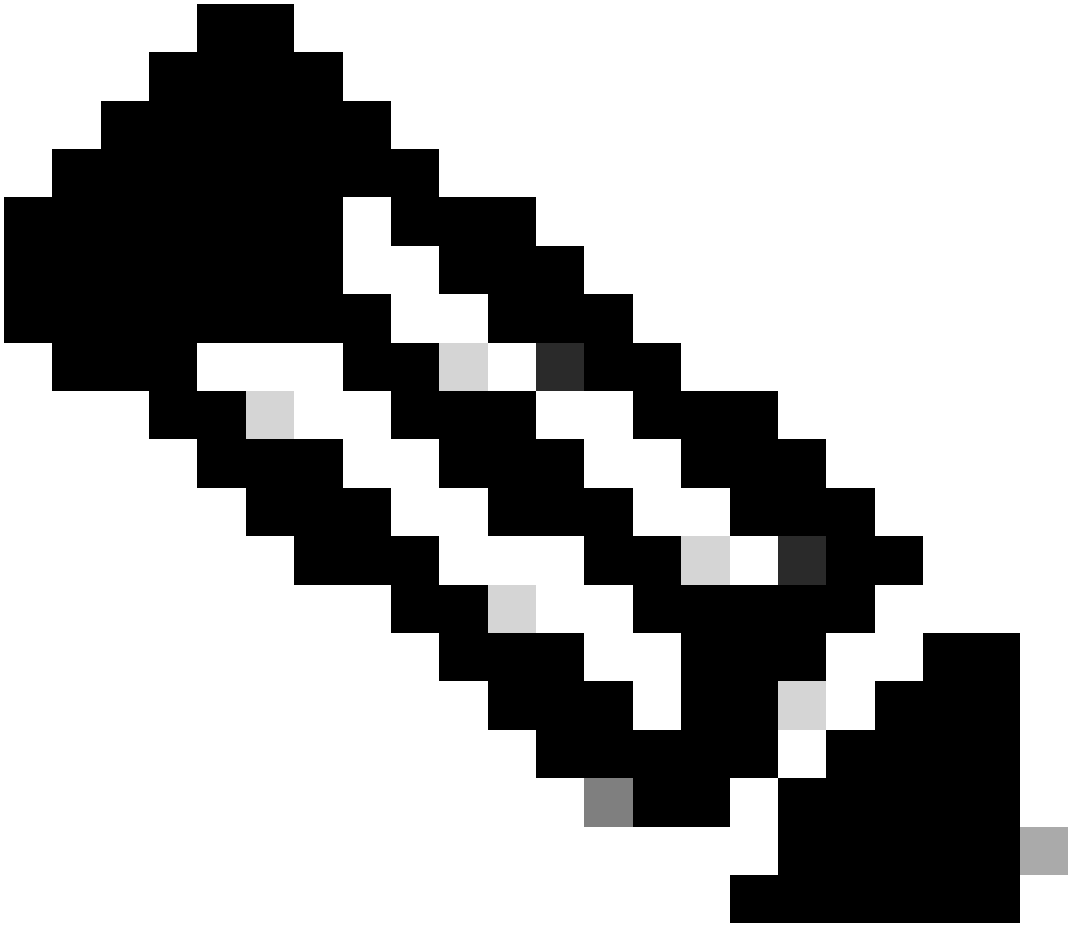
Note: The Cipher Suites observed here differ from the Cipher Suites in the Client Hello from Client to SWA, as the SWA, configured to decrypt this traffic, utilizes its own Ciphers.



Tip: In the Server Key Exchange from SWA to Web Server, the Web Server certificate appears. However, if an Upstream Proxy finds configuration for your SWA, its certificate shows up instead of the Web Server certificate.

Here is a sample of Accesslogs:

```
1702319784.943 558 192.168.1.10 TCP_MISS_SSL/200 0 TCP_CONNECT 10.184.216.34:443 - DIRECT/www.example.c
1702319785.190 247 192.168.1.10 TCP_MISS_SSL/200 1676 GET https://www.example.com:443/ - DIRECT/www.exa
```



Note: As you can see in transparent deployment for HTTPS traffic there are 2 lines in Accesslogs, the first line is when the traffic is Encrypted and you can see **TCP_CONNECT** and the IP address of the Web Server. If Decryption is enabled in SWA, the second line contains GET and the whole URL starts with **HTTPS**, which means the traffic has been decrypted and SWA knows the URL.

Related Information

- Technical Support & Documentation - Cisco Systems
- Configure Performance Parameter in Access Logs - Cisco