

INKY vs. Microsoft Defender for Office 365

Many of our customers, particularly the larger ones, ask us about INKY versus Microsoft's Defender for Office 365 (MSDO), formerly known as Advanced Threat Protection or ATP. They imagine pitting one against the other in a kind of bake-off.

But really, INKY is a supplement to MSDO. MSDO is a tool positioned by Microsoft to "safeguard ... against malicious threats posed by email messages, links (URLs), and collaboration tools," according to the company Website. The offering includes the ability to "define threat protection policies," "view real-time reports" on MSDO's performance, tools "to investigate, understand, simulate, and prevent threats," and "automated investigation and response capabilities." It monitors for threats against all modules in Office 365 (O365), such as SharePoint Online, OneDrive, and Teams.

To interpret Microsoft's sometimes opaque language, MSDO gives a company some protection against threats — including malware, spam, and phishing — that enter an organization by way of email. MSDO looks at attachments and links contained in the email as well as the text in the email itself.

However, while MSDO has broad protection that covers the various modules in O365, it's antiphishing protection is rudimentary at best. Prominent analyst firm Gartner has recommended that best practices should include layering additional protection on top of MSDO to improve protection against phishing attacks. As Gartner said in its report Determine If Email Security in Office 365 Meets YourOrganization's Needs, published 23 October 2020 by Infrastructure Security practice analysts Ravisha Chugh and Mark Harris, "MSDO offers a wide set of email security capabilities, but due to the rise in business email compromises, account takeovers and other sophisticated attacks, many times some malicious emails are actually missed by MSDO, and in fact by any other email gateway solutions. Therefore, organizations should strongly consider integrating third-party solutions to strengthen their email security capabilities."

INKY is more likely than MSDO to catch dangerous phish. MSDO, like most other anti-phishing solutions, relies mostly on comparing an incoming phishing email to emails it has seen before. INKY catches these phish because it uses first principles (analysis of data in the email itself) to decide whether an email is phishy or not.

But don't take our word for it. Let real-world results speak for themselves. The INKY module sits between the Secure Email Gateway (SEG) and recipients' client devices (phones, desktops, notebooks). For that reason, it sees everything that the SEG lets through. INKY is the last stop before the recipient's inbox.

The following sections contain examples of phish that slipped through MSDO – but INKY caught.



Fake Closing Disclosure Document

A supposed SharePoint document purported to be a real-estate loan statement (Figure 1). Although it had some good-looking brand elements — like Microsoft corporate and Word logos, personally identifiable information of both the target company and individual, and SharePoint as the sender — it missed the InterCap in "Sharepoint." Still, the email got past MSDO, which rewrote the link but failed to detect it as malicious.

Figure 1

Not SharePoint

Sharepoint@ My CD attached with chang To:	ed payoff figure added	September 16, 2020 at 12:46 PM
	Closing Disclosure has been shar with	ed
	Attached is the Closing Disclosure Closing Disclosure This link will work for Open	
	Microsoft	Privacy Statement

INKY came to an entirely different conclusion (Figure 2). Based on visual analysis of the rendered HTML, INKY thought that the sending domain might have something to do with Microsoft. But when it checked Microsoft's legitimate domains, the sender's wasn't among them, triggering a Potential Sender Forgery warning. The spoofed email looked like it was coming from the recipient's company. INKY detected that it actually came from Russia, setting off a Spoofed Internal Sender warning. And the cherry on top, INKY found the sending domain on the Netcraft Phishing feed, indicating the presence of a malicious link.



An INKY bright red danger banner, appended near the top of the email

	Danger! This message looks malicious. (From: External)
	Potential Sender Forgery
	message is from a major brand, a known contact, or a coworker (Microsoft).
	Netcraft Phishing Feed URL It links to a confirmed phishing site on the Netcraft Phishing Site Feed. • https://secure-document-viewer-login.du.r.appspot.com/?eid=
	Spoofed Internal Sender This appears to be a spoofed internal email. The message claims to be from your domain (but it arrived from an external source; the sender was not logged into your mail server.
1	

Note: the message ID indicates the sender was hosted at a site in Russia:

Message-ID: 6801ab38ba2d9857d3d86f579cac0b8f@vds65618.mgn-host<mark>.ru</mark>

Helpdesk Impersonates Employer

MSDO let through an apparently innocuous email that seemed to be from the company help desk, a supposedly internal message about the recipient's needing to "Re-validate" their "account" (Figure 3). To the practiced eye, this note might have been suspicious. There are two different point sizes, "revalidate" is wrongly hyphenated and capitalized, "accessing" is capitalized, and the last sentence lacks a period. But people at real help desks could use sloppy English, and the mail is stuffed with elements specific to both the company and the individual, which might lull the recipient into complacency.

Figure 3





What INKY found triggered a whole raft of warnings in a red banner (Figure 4).

Figure 4

Multiple Warnings



The email failed the sniff test for a wide variety of reasons. As a Reported Phish, it looked, to INKY's machine learning algorithms, similar to previously reported phish. The embedded URL showed up as a malicious link on two different phish feeds (Netcraft Phishing Feed URL & Google Safe Browsing URL). INKY's text analysis models detected Phishing Content in the form of a fake account update. INKY's Spoofed Internal Sender module found that, although the email claimed to be from the recipient's employer, it actually originated in India. The First-Time Sender module noted that, although the spoofed sender's email address was supposedly from the company's helpdesk (despite the fact that no such address existed), this actual email came from an address never before seen by the recipient. The Spammy Top-Level Domain model found in the malicious link a top-level domain – .tk, the national domain of Tokelau – known to be frequently abused.

MSDO rewrote the malicious link but did not detect it as malicious.

Fake Proposal

MSDO didn't have any problem delivering this innocuous-looking email to the recipient. The sender seems to have attached a .pdf file of a proposal document (Figure 5).



Apparently Bland Pitch

	🖶 🕨 🗄 Move to)
• To: Undisclosed recipients:;	August 17, 2020 at 1:03 PM	CS
PROPOSAL DOCUMENTS.pdf		
Hello,		
It is my pleasure to submit the enclosed proposal from the second second second Kindly review and let me know if we can work on this together.		
Thank you. -		

INKY didn't like what it found, however, and gave the email a bright red banner (Figure 6).

Figure 6

High Enough Score to Trigger the Red Banner



The results of INKY's analysis models are taken together to reach a total score. When the sum is high enough, the assessment moves from yellow to red. INKY's computer vision algorithms have been trained to detect fake attachments, embedded images (with malicious links behind them) posing as normal file types (e.g., .pdf, .jpg, or .docx). This email originated from a legitimate account that had been hijacked, which is why the missive made it through MSDO's SPF and DKIM filter. In after-the-fact analysis, INKY engineers pointed out that the lack of a First-Time Sender warning indicates that the sender was a known contact of recipient.

Behind the fake attachment was a link leading to Canva, a free graphics design website (Figure 7). In this brandjacking attack, bad actors used Canva to host their malware. MSDO failed to flag the link as malicious because Canva runs a reputable site.



Yes, Canva, but Not Good Canva

Project Proposal Document	SharePoint		
Project Code: Project Name			
Proposal documents have been shared with you.			
REVIEW DOCUMENTS HERE			
Information for RFP: • Pro-forma Agreement • Bidder is requested to review and confirn • Bidder is requested to populate pricing (a • Scope of Work (22032-PU-SW-0017), inclu	n whether there are any exceptions/clarifications Ill tabs) uding appendices.		



Fake Invoice

This apparent invoice looks like it came from Microsoft's OneDrive (Figure 8). MSDO let it sail right through.

Figure 8

Legit Domain, But Not Microsoft's

•		Move to	
•	Past due invoice attached To: Undisclosed recipients:;	September 9, 2020 at 9:22 AM	FE
	OneDrive. has shared a OneDrive for Business file with you. to view or download, click the link below.		
	Message from OneDrive.		

INKY's brand impersonation modules detected that the mail was claiming to be a Microsoft OneDrive notification, but it didn't come from a Microsoft domain (Figure 9).



Brand Impersonation

Danger! This message looks malicious.

(From: , External)

Brand Impersonation

This message appears to be impersonating Microsoft but was not sent from one of its domains.

Sensitive Content

The message appears to discuss sensitive information (e.g., passwords, account information, coronavirus/COVID-19 updates, etc). If possible, instead of clicking a link, go directly to the sender's web site to carry out the requested action, or confirm the request outside of email before replying.

Spam Content This is most likely spam or unwanted junk email. Be careful with any attachments or links.

In reality, it came from a hijacked sender address known to the recipient (and thus seen as friendly). Because the sender address was good, the mail passed DKIM and SPF tests. The embedded link led to a legitimate site, Google Docs, but the page was booby trapped with a realistic Microsoft login form, used for credential harvesting (Figure 10).

MSDO rewrote the link but failed to detect it as malicious because the black hats jacked the Google Docs brand to launch the attack.

Figure 10

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• • • I OneDrive × +					
\leftarrow \rightarrow C $\hat{\mathbf{c}}$ docs.google.com/forms/d/e/1FAIpQLSe6j2J4y-1	/4PTM6u_lq-1bpGCO9vLPqFPWL7TGqthHAxBS90g/viewform	* 📬 🗘	0 🖾 🕯	🕨 🎫 🚺) :
	CheDrive				
	OneDrive Sign in to view or download document * Required				
	Email Address * Your answer				
	Password * Your answer				
	Submit				
8	vever submit passwords through Google Forms. This form was created inside of Sang N Thai. <u>Report Abuse</u>				

Credential Harvesting Page Looks Like a Normal Login



Not Just a Few Examples

Previous sections laid out details on the exact ways INKY grabs (before they can do any harm) phish that MSDO fails to catch. But there are not just a few of these examples. There are many. Too many to include in this post. But to give some sense of the scope of the problem, an analysis of 15 cases in which INKY nailed phish after MSDO let them through shows a variety of brand impersonations and socially engineered attacks (Table 1).

Table 1

Message ID and INKY Engineering Notes

MessageID	Notes
01542021022813BC9D2E8D9B\$52 3B723D0C@otks.co.jp	Microsoft impersonation with malicious link (Microsoft credential harvesting)
<u>f226511c-26e3-1759-9018-</u> <u>8beace571825@amazondelivery247.</u> <u>com</u>	Amazon impersonation (fake order with fake support number used to steal login credentials and credit card info
478b3784-f054-3f4b-6bdd- 459534fa10ad@mass-exp.com	Microsoft impersonation with open redirect link that redirects to Microsoft credential harvesting site
3172615B-6B94-4289-8BD6- CFD59458E871@taylorofficefurnitur enj.com	Fake purchase order that impersonates Adobe. Malicious link goes to credential harvesting
049.EF.55FEBE19ABC2.811@a39.ms gid.infolanka.com	American Express impersonation going to abused Microsoft Forms page designed to steal credit card information and PII
42EF6026-641C-4773-A2D3- 29090E217584@hwherrell.com	Fake invoice impersonating eFax with malicious link
DC21645A-7552-4BE6-832D- D9A8325B18A8@marafuga.com	Fake voicemail leads to malicious link
DM6PR13MB26831665287D075DD 8A145EBE4BA9@DM6PR13MB268 3.namprd13.prod.outlook.com	eFax Impersonation, leads to an abused brandjacking page
<u>a0188227-5fee-45ea-19c1-</u> <u>7b0ffc587a1a@chiaki.co.jp</u>	Voicemail phish with malicious HTM attachment
0100017745f9babb-acafecef-c843- 4707-92c8-e280734929f3- 000000@email.amazonses.com	Fake invoice with Microsoft credential harvesting link
20210201051134.1F6BF894901620 7A@hospital-italiano.org.ar	Helpdesk phish with credential harvesting link that impersonates Benekeith
0101017757837751-4af1c952-fa80- 4ffc-ac75-c6183c6e7508- 000000@us-west-2.amazonses.com	Zoom impersonation with malicious link
010b01774500197b-829b6ed1- ea28-457d-a780-2960599b9ffa- 000000@eu-west-2.amazonses.com	Helpdesk phish with malicious HTM attachment
H4dTYp6CryHzNkvrkquea5GU96CV 43elzr706sMg@ro	Voicemail Microsoft Impersonation with malicious link
18342021012020945605FB1E- 82915BA2F0@suntrackexpress.com	Helpdesk Microsoft impersonation with an abused forms.office.com URL

INKY vs. MSDO: Similarities and Differences

As stated earlier, INKY is not a replacement for MSDO, but a supplement, insurance against catastrophic phishing attacks. There are both similarities and differences in their approaches.

Dangerous Content

Both MSDO and INKY rewrite dangerous links. If a user clicks a bad link, they are taken to a holding or "proxy" page. However, while MSDO looks up the URL in its threat feeds, INKY does that and more. Its computer vision module renders the HTML into a visual page while other modules examine the content for signs of phishing, malware, and credential harvesting. By directly analyzing the page content in real time, INKY can determine that it is malicious. INKY's algorithms can declare a phish finding even if that page has never been reported to any threat feed.

INKY also analyses text within each email and attachment looking for sensitive words or phrases — such as "password," "invoice," or "payment." The presence of such words will be flagged in the warning banner.

Banners

INKY's email protection software places dynamic warning banners with reporting links directly into each email. Because INKY's modules are in line between the email gateway and the client device, and insert only a small piece of HTML code, the banners show up in email on any platform (computer, phone) in any email program (fat client or Web mail) in any operating environment (Windows, iOS, MacOS, Android).

Banners offer specific guidance to both protect and educate users, giving them important cues as to the content of an email and allowing them to take a closer look or proceed cautiously. Customers can also use banners to provide policy guidance to end users (e.g., This wire request must be confirmed outside of email).

MSDO does not offer any type of warning banner.

Spear Phishing

Microsoft relies on simple address matching to determine if a sender is impersonating an individual. Specific policies can be created for individuals such as executives, but this method catches only the most obvious spear phishing attempts.

One of INKY's modules uses artificial intelligence to do behavior profiling. With machine learning, the module builds a data-rich social graph of each recipient's senders and their profiles. Should some element in an email not align with a known profile, the module sends a warning of a potential impersonation to the banner. The module continues to learn from the recipient's feedback.

Brand Forgery

MSDO's defense against brand forgery depends on exact, or at least close, address matching. For example, MSDO will flag as suspicious an email from badguy@clocusign.com because the sender's domain is similar to a well-known, commonly-forged sender domain.



However, attackers can create innumerable domains, many of which might look plausible to a given recipient. For example, a recent phishing campaign impersonating American Express used domains like aexp-external.com, which, while perhaps believable to a recipient, are different enough from real American Express sending domains to completely fool MSDO.

To home in on a brand, INKY's computer vision module scans each email the way a human does, looking for visual brand indications, logos, and logo-like text. Comparing visual and underlying textual information, INKY notices nearly imperceptible font and character anomalies that busy employees often overlook. Palantir.com is not the same as Palantir.com. But they're visually very close. The supposed "P" in the first example is really the upper case Russian Cyrillic letter "Er."

Zero Day Attacks

MSDO has a hard time blocking cleverly constructed campaigns designed to bypass email filtering products. Traditional systems rely on records of previously identified attacks, a method that does nothing to stop the deluge of new attacks launched every day. INKY's phish fence employs computer vision, Al and machine learning to identify even zero-day phishing attacks.