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An OSINT pathway for Tracking SMS Fraud (Smishing)

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***Abstract*— SMS phishing also called as "Smishing" has become a massive loophole in mobile networks. Currently, attackers exploit bulk SMS services and fake caller IDs to send malicious links containing scripts and attacking application APK's which are therefore directly installed into the devices. Because these are highly organized and fast-moving, local authorities and security teams are facing a significant roadblock when trying to track down the attackers or attacking infrastructure behind them. This paper offers a practical step by step guide using the Open-Source Intelligence techniques to investigate these scams. Instead of relying solely on expensive commercial software, this paper demonstrates how security analysts can use publicly available tools to track digital footprints, analyze spoofed sender identities, and uncover hidden payloads or technique used to carry out the attack and details like spoofing sender names and hidden payloads (registration of the fake website used for the attack), By this we can trace the path of the attack from the start to end. This research provides a fast, accessible ways to investigate a telecom fraud and therefore helping the respective authorities to quickly block the scams.**

Keywords—Smishing, Open-Source Intelligence (OSINT), Telecom Fraud, Phishing Analysis, URL Unmasking, Infrastructure Footprinting, Malware Capture.

I. INTRODUCTION

In recent years, the rapid development of telecom services has created a base for the telecom-enabled financial frauds. With millions of smartphone user mainly relying on the digital payments and usage of the Short Message Service (SMS) by the online service providers they have become the primary basis of the cybercriminals also the attackers. According to the recent data from the national cybersecurity initiatives like the Sanchar saathi portal and its Chakshu facility [1], hundreds of thousands of fraud communications are reported annually, highlighting the massive scaling of the problem.

This threat landscape is called Smishing (SMS phishing)—a highly organized and automated form of the cybercrime. Today, Attackers engineer some pressurized scenarios for the general public which are completely related to their daily routines. Generally, these attacks include fake electricity bill disconnection notices, immediate pan card and other KYC related issues which are mostly related to the public. And these are heavily relied on manipulating the telecommunication infrastructure, such as spoofing the official and large known Organization's Sender IDs to Build the trust on the message they sent.

The primary challenge in these attacks is the sheer speed and agility of the attackers. Threat actors utilize the "throwaway" digital infrastructure. By the time a fraudulent link is reported by a victim and manually processed by authorities, the attackers have already discarded the domain, hidden their IP addresses, and migrated their operations to a new web server. So completely relying on the Traditional methods makes the investigation too slow to intercept the fraud [12].

Therefore, there is Significant need for a faster and proactive investigative approach. This paper proposes the adoption of the standardized Open-Source Intelligence methodology. By leveraging the free, publicly available tools, the security analysts and local cyber cells can trace the digital

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footprints of the attacks. Much faster comparative to the waiting for the official telecom logs, to know the attacker's methods in real time [3], [5].

II. ANATOMY OF A SMISHING ATTACK

To investigate an attack, firstly we need to understand how exactly the attackers make it out. Modern Smishing is no longer like just someone manually typing some text messages, It's an automated system [4]. There are four Stages of the attack.

A. Crafting the Message

Attackers write a text message designed to induce panic and provoke an immediate response [11]. Generally, in India the warnings such as "your PAN card is blocked" or "Electricity will be disconnected soon" or "your bank account needs the KYC update to function". And the most important thing in these kinds of messages is that there will be a link provided in them. And mostly there are in "bit.ly" format to hide the real redirected website URL [7].

B. Sender ID Manipulation

If these Messages were sent by the attackers from a 10-digit phone number, then the victim would get suspicious. So that's why attackers will trick the telecom network to display an official sender ID, by exploiting the loosely regulated bulk SMS gateways. This is How a malicious text message will not catch the suspicion of the victim. And appears as a Legitimate alert from the Spoofed sender ID.

C. Stealing the Data and Deploying the Malware

When the victim clicks or browses the link sent in the text, the attack starts to execute in these two ways:

1. The Fake Login pages (phishing): This link redirects the user to an exact replica of the legitimate website of the organization which officially holds the spoofed ID and ask the victim to provide the personal details as required by the attacker, or else any other ways to complete the attack.
2. Malware Downloads: The link starts the download of a malicious app that was created by the attackers to carry out the attack, and they seem to be look like a Legitimate app, but it was modified and captures the required data for the attacker while working in the background of the device processes [2].

D. Infrastructure Rotation

The attackers are aware about that their fake websites would eventually get traced out by the law enforcement so to stay online for the data capturing they will change their host server from one location to another by operating remotely and they just hit some victims on old server by the time the law enforcements gets reported and traced the host server they would destroy the old data related to them and get the personal data with them safely.

III. THE OSINT INVESTIGATION FRAMEWORK

When a malicious SMS is reported to the Investigators, they must act rapidly upon receiving a report to prevent threat actors from rotating their infrastructure. This section provides standardized methods to be used by some of the free of cost Open-Source intelligence (OSINT) methodologies and tools to safely deconstruct the pathway of the attack that was taken place on the victim, to find the attacker.

A. URL Unmasking

The first and foremost task of the investigation is to unmask the URL sent in the text by the attacker that is in the format which was already noted in II(A). So later, the investigation the investigators must enlarge the shorten URL by the Tools provided in Table I to find whether the URL is legitimate or not and need to compare it with the official organization URL that was referenced in the SMS

B. Safe Browsing and Capture

After the URL unmasking, investigators should be able to analyse the data that was

provided in the directed website created by the hacker in order to have the data and direct the website safely investigators must use an sandbox environment from some of the tools provided in Table II and please make sure to read the Note 1.1 [9], [10]. These tools are acts as a safe middleman which gets logged into the website themselves and provide the investigation with the necessary data and evidence and some of the tools gets a high-resolution screenshot of the webpage allowing the analysts to examine the threat that would be caused by the attacker.

Note 1.1 Addressing Anti-Analysis Evasion (Cloaking): While the sandbox tools protect the investigator's Operational Security by masking their true IP, but the analysts must be aware that, sometimes the advanced Smishing attackers implement the Cloaking technique which refers the attacker host to server to give a 404 error for the sandbox tools. So, to counter this issue the investigators generally utilize the localized residential proxies therefore bypassing the cloaking technique and perceiving the attacker's server log scan as a standard mobile device user.

C. Infrastructure Footprinting

After completing the A, B steps the investigation would reach its end but in order to find the attacker or else attacking system the investigators need to look up the Website DNS information by the suggested tools in Table III and need to gather some evidence to clearly point out the host server without any error and get the registration data [6], [8]. And therefore, finding the hosting provider gives authorities the exact target that they need to issue a swift takedown request.

D. Sender Identity Analysis

If in case, there are some chances that exists which involves the attackers using the general 10-digit mobile number rather than a spoofed Sender ID, some OSINT tools provide in Table IV will be helpful for the investigation to reverse lookup the phone number information which can be very useful. And some of tools in Table IV provide data about the type of the number that was used for the attack. And, the investigators could include the community spam databases to check the integrity of the phone number.

OSINT Tools for the URL Unmasking

OSINT Tool	Core Details & Functionality	Working Mechanism	Advantages for Investigators	Est. Success Rate
ExpandURL	A rapid, lightweight URL unshortener and link checker.	Traces standard HTTP 301/302 redirect chains server-side without executing any webpage scripts.	Extremely fast; completely hides the investigator's IP; reveals the final destination URL safely.	**~95%** (Highly accurate for standard redirects, but fails on script-based redirects).
CheckShortURL	A web-based unmasker integrated with threat intelligence.	Resolves the short link and simultaneously cross-references the final domain with databases	Provides immediate threat context alongside the unmasked URL	**~90%** (Struggles if the attacker's site uses CAPTCHAs to block scanner)
Unshorten.It	A privacy-focused unmasker available as a web tool and browser extension.	Follows the redirect path and provides a safety rating based on Web of Trust (WOT) community data.	Highly accessible; provides a safe snapshot of the landing page without full sandbox overhead.	**~92%** (Excellent for rapid triage, but lacks deep network forensic data).

Table I

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OSINT Tools for safe Browsing and Data capture

OSINT Tool	Core Details & Functionality	Working Mechanism	Advantages for Investigators	Est. Evasion Resistance
urlscan.io	An automated web scanner and forensic capture tool.	Navigates to the unmasked URL using a cloud-based, headless browser. Captures the screen, HTML code, and network requests.	Provides a complete, safe visual snapshot and logs all external servers the scam site communicates with.	**~85%** (Highly effective, but some advanced phishing kits block its known server IP addresses).
Any.Run	An interactive, cloud-based malware and phishing sandbox.	Provides the investigator with a live Virtual Machine (VM) accessible via their web browser to safely click around the fake site.	Allows analysts to interact with the site (e.g., clicking "Download APK") safely while capturing network traffic (PCAP files).	**~98%** (Because a human interacts with it in real-time, it easily bypasses automated bot-detection scripts).
Archive.today	A web archiving service that creates permanent, static snapshots.	Uses its own backend servers to visit the page, download the content, and flatten it into a safe, unclickable image and HTML record.	Preserves the evidence forever, even if the scammer deletes the website five minutes later.	**~80%** (Occasionally blocked by CAPTCHAs or Cloudflare "Verify you are human" checks).
Hybrid Analysis	A deep behavioral analysis engine for malicious URLs and files.	Opens the URL in an isolated environment and monitors if the website tries to stealthily drop malware (like a rogue banking APK) onto the system.	Extracts deep Indicators of Compromise (IOCs), identifying exactly what the malware is programmed to do.	**~95%** (Excellent for analyzing the hidden payload behind the phishing link).

Table II

OSINT Tools for Infrastructure foot printing

OSINT Tool	Core Details & Functionality	Working Mechanism	Advantages for Investigators	Est. Data Visibility
WHOIS (ICANN/DomainTools)	A public directory of domain name registration records.	Queries the official domain registry to extract the creation date, expiration date, and the hosting registrar.	Proves the domain is malicious if it was created very recently (e.g., a "bank" site registered 2 days ago).	**~60%** (Attackers use privacy proxies to hide their names, but creation dates are always accurate).

OSINT Tool	Core Details & Functionality	Working Mechanism	Advantages for Investigators	Est. Data Visibility
ViewDNS.info	A suite of DNS and network investigation tools.	Uses Reverse IP Lookup to check the web server's IP address and lists every other website hosted on that exact same server.	Reveals connected scam networks. If an investigator finds one fake bank site, this tool often reveals ten others hosted ones	**~85%** (Highly accurate for mapping shared hosting but struggles if the attacker uses decentralized cloud nodes).
SecurityTrails	A massive database of historical DNS and WHOIS records.	Archives old network data. It checks what the website's IP address and registration details were *before* the scammer turned on their privacy protection.	Can bypass current privacy shields to reveal the scammer's true origin IP or original registration email address.	**~90%** (Excellent for uncovering operational security mistakes made by the threat actor in the past).
Censys / Shodan	Search engines for internet-connected devices and server infrastructure.	Scans the internet for specific SSL/TLS certificates and open server ports with the phishing	Can locate the attacker's true "origin server" even if they are trying to hide behind a proxy service like Cloudflare.	**~95%** (The most technically accurate tool for mapping the physical infrastructure of the attack).

Table III

OSINT Tool	Core Details & Functionality	Working Mechanism	Advantages for Investigators	Est. Identification Rate
Numverify / FreeCarrierLookup	A telecommunications routing and line-type analyzer.	Queries global telecom routing databases to identify whether the number is physical SIM or VoIP	Immediately flags if the attacker is using disposable virtual number (VoIP) rather than a physical SIM	**~95%** (Highly accurate for identifying the telecom provider, but does not provide the user's name).
Truecaller / Bharat Caller	Community-driven caller identification and spam databases.	Aggregates contact books and user-reported spam tags globally to attach a name or "Spam Score" to an unknown number.	Quickly confirms if the number is part of an active, widespread campaign based on real-time victim reports and tags.	**~85%** (Excellent for crowd-sourced intelligence, but attackers frequently rotate numbers to reset their spam scores).
EmobileTracker	An India-focused mobile number tracker and telecom locator.	Uses local Mobile Station International Subscriber Directory Number (MSISDN) data to track the telecom circle (state/region) and network operator.	Highly relevant for investigating local scams, narrowing down the physical jurisdiction of the active SIM card.	**~90%** (Provides accurate regional data, though it cannot pinpoint the exact GPS location of the device).

OSINT Tools for Phone Number Lookup

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Table IV

IV. PRACTICAL DEMONSTRATION: A CASE STUDY IN SMISHING ANALYSIS

To validate the proposed OSINT framework, this section demonstrates its application on a simulated, highly prevalent Smishing campaign currently targeting Indian citizens: the "Electricity Bill Disconnection" scam.

A. The Incident (Scenario Setup) A victim receives the following SMS from an unknown 10-digit mobile number (+91 98765 XXXXX): *"Dear Customer, your electricity power will be disconnected tonight at 9:30 PM from the update office because your previous month bill was not updated. Please update online: http://bit.ly/Elec-Update-In"*

B. Phase 1: Sender Identity Analysis The investigation begins with the delivery mechanism (referencing Table IV).

1. *Community Tagging:* The number (+91 98765 XXXXX) is queried in **Truecaller**. It returns a red-flagged profile named "Electricity Fake Call," confirming it is part of an active, mass-reported campaign.

2. *Carrier Routing:* The number is run through **EmobileTracker**. The MSISDN data reveals it is a prepaid SIM card registered in the Bihar telecom circle under a specific network operator. This gives authorities the physical jurisdiction to issue a Law Enforcement Agency (LEA) request to block the SIM and the handset's IMEI number.

C. Phase 2: URL Unmasking The analyst must not click the embedded http://bit.ly/Elec-Update-In link. Instead, the shortened link is processed through **ExpandURL** (referencing Table I). The tool follows the HTTP redirects server-side and reveals the true destination: http://ebill-update-portal.xyz/kyc-payment.

D. Phase 3: Safe Data Capture Now that the true URL is unmasked, the analyst uses **urlscan.io** (referencing Table II) to safely capture the payload. The headless browser navigates to the URL from a remote European IP address.

1. *Visual Evidence:* The sandbox captures a screenshot of a webpage perfectly mimicking a legitimate State Electricity Board payment portal.

2. *Payload Detection:* The DOM analysis reveals that clicking the "Pay Now" button does not process a payment but rather initiates the download of an Android package (EBILL_Update.apk), a known malware format used to intercept OTPs.

E. Phase 4: Infrastructure Footprinting with the threat confirmed the analyst maps the scammer's digital infrastructure (referencing Table III) to initiate a takedown.

1. *Registration Data:* A **WHOIS** query on ebill-update-portal.xyz reveals the domain was registered only 48 hours ago using a cheap, offshore registrar.

2. *Network Mapping:* Using **ViewDNS.info**, a reverse IP lookup on the server's IP address shows that the attacker is using the same web server to host five others similarly named fraudulent domains (e.g., power-kyc-update.xyz).

E. *Result of the Framework* Within 15 minutes, and using entirely free tools, the OSINT framework has successfully extracted the telecom circle of the attacker, captured the malware payload without risking infection, and identified the core web server hosting the entire fraud network. This packaged intelligence can now be forwarded to the telecom provider and the hosting company for an immediate infrastructure takedown.

IV. CHALLENGES AND LIMITATIONS

While the proposed OSINT framework provides a rapid and cost-effective method for deconstructing Smishing campaigns, investigators must navigate several technical and operational limitations. Threat actors continuously evolve their tradecraft to evade detection and delay infrastructure takedowns.

A. Ephemeral Infrastructure (Fast-Flux) The most significant challenge is the sheer speed at which attackers operate. Smishing campaigns often utilize "fast-flux" hosting, where the malicious domains and IP addresses are rotated every few hours. If an investigator does not capture the payload and unmask the URL immediately after the SMS is reported, the infrastructure may already be offline, resulting in dead links and lost forensic data.

B. Privacy Shielding and Bulletproof Hosting While tools like WHOIS are critical for footprinting, their visibility is heavily restricted by legitimate domain privacy services. Attackers routinely purchase WHOIS redaction to mask their names and registration emails. Furthermore, attackers increasingly rely on "bulletproof hosting" providers—servers specifically designed to ignore takedown requests and abuse reports from law enforcement agencies [13].

C. Evasion and Geo-Blocking (Cloaking) As noted in the methodology, attackers actively monitor their web traffic to counter automated sandboxes like *urlscan.io*. By employing reverse proxies and Web Application Firewalls (WAFs), attackers can hide their true origin server [2]. Additionally, many Smishing payloads now use geo-fencing. If the web server detects that the sandbox IP address is not from an Indian mobile network, it will serve a blank page or a benign website, successfully hiding the malicious APK or phishing portal from the investigator.

VI. CONCLUSION AND MITIGATION

The explosion of telecom-enabled fraud, specifically Smishing, requires a shift from slow, reactive investigations to rapid, proactive intelligence gathering. Because attackers utilize highly automated, disposable infrastructure—spoofed Sender IDs, URL shorteners, and rapidly rotating web servers—traditional investigative timelines are often too slow to prevent financial loss.

This paper demonstrates that a standardized Open-Source Intelligence (OSINT) framework provides a critical first-response mechanism. By utilizing accessible, zero-cost tools to unmask URLs safely, capture malicious payloads in isolated sandboxes, and footprint the attacker's server and telecom routing, security analysts can drastically reduce the time it takes to understand the "modus operandi" of an active campaign.

MITIGATION: To effectively mitigate telecom frauds, the methodologies outlined in this paper should be integrated directly into the standard operating procedures of local cyber cells and telecom security operations centers (SOCs). Future efforts must focus on automating these OSINT pipelines. By building automated scripts that instantly run reported Smishing links through these unmasking and footprinting tools, authorities can generate immediate, actionable intelligence to block malicious domains and suspend fraudulent SIM cards before the scammer can launch their next wave of attacks.

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