European
Repository of
Cyber Incidents

Major Cyber Incidents

NOTPETYA [EuRepoC Link]

Other incident names: ExPetr, SortaPetya, Petna, ExPetr, Diskcoder.C, Nyetya, GoldenEye [1]

Description

The Russian military intelligence service, the GRU, used a Trojan to initially target Ukrainian infrastructure with a wiper called NotPetya. The attack spread worldwide to become what the United States considered the most destructive and costly cyber-attack in history. IT companies linked the campaign to the APT group Sandworm, who have been linked to many disruptive cyber-attacks against Ukraine, such as the two consecutive energy blackouts in Ukraine at the end of 2015 & 2016. Multiple governments attributed the campaign to the GRU and its Unit 74455 that is generally associated with Sandworm. Political and legal action was taken by the European Union and several individual governments in response.

Timeframe From 27 June 2017	**Initiator** Russian state-affiliated group "Sandworm"
Incident Type Disruption, Hijacking with Misuse	**Affected Target** Ukrainian Infrastructure and hundreds of entities across the world

Impact and significance

Initially, NotPetya interrupted the operation of banking, power, airports, and metro services in Ukraine. However, the destructive malware spread globally and affected hundreds of entities worldwide, including Ukrainian aircraft manufacturer, Antonov; Russia's biggest oil producer, Rosneft; and Danish shipping company Maersk's container shipping, oil, gas, and drilling operations. A port in Mumbai also halted operations as a result. [2] NotPetya also crippled pharmaceutical giant Merck, FedEx's European subsidiary TNT Express, French construction company Saint-Gobain, food producer Mondelēz, and manufacturer Reckitt Benckiser. [3] The White House estimated the damages to be more than 10 billion US dollars. [4] NotPetya was the first in a series of disruptive cyber operations attributed to Sandworm which targeted Ukraine and massively impacted third parties (see fig. 1 and fig. 3 below). The IT company McAfee has referred to NotPetya as an exercise to test and observe response capabilities. [5] The White House concluded that "the Russian military launched the most destructive and

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costly cyber-attack in history." [6] NotPetya was a turning point in political attribution towards or vis-à-vis Sandworm operations (see fig. 4 below).

Fig. 1: Cyber activities between Russia and Ukraine

In context of the HIIK offline conflict Russia - Ukraine

2015 **Sandworm vs. Ukrainian Company StarLight Media** [a]

The disruptive malware KillDisk deleted critical data and made computers unusable within Ukrainian company networks.

disruption | hijacking with misuse

Sandworm vs. Ukrainian Railway company and airport [b]

KillDisk was detected in the networks of the state-owned railway company and the international airport of Borispol, affecting critical infrastructure.

disruption | hijacking with misuse

Ukraine Power Outage [c]

A Ukrainian power sector was taken down by sophisticated malware, causing a severe power outage. The attack was attributed to Sandworm.

disruption | hijacking with misuse

2016 **Sandworm Attacks on Ukrainian financial Institutions** [d]

Hackers shut down the payment system of the Treasure and Pension Fund of Ukraine's Ministry of Finance.

disruption | hijacking with misuse

Bellingcat Hack [e] (third party affected)

Cyber-Berkut defaced the website of the journalism collective Bellingcat that investigated the MH17 downing and leaked Information of a Russian member.

data theft & doxing | hijacking with misuse

Ukraine Power Outage 2 [f]

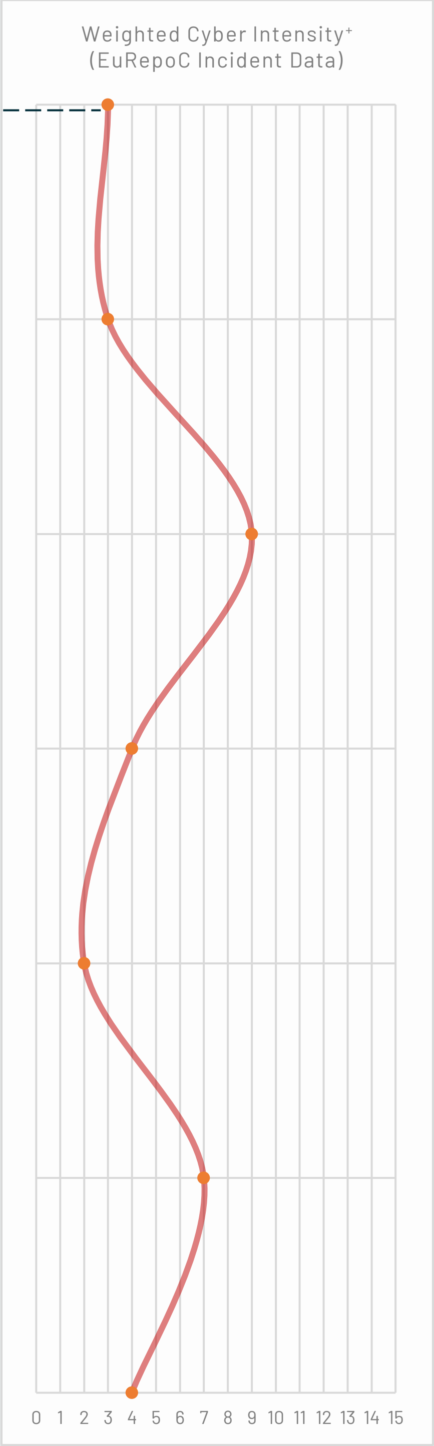
An electric transmission station north of Kiev was taken down, blacking out a portion of the city for one hour.

disruption | hijacking with misuse

2017 **Not Petya** [g] (third parties also affected)

GRU used an extremely infectious wiper called NotPetya against Ukrainian infrastructure, spreading to countries worldwide and causing immense financial damage. Political and legal action was taken in the aftermath by multiple governments.

disruption | hijacking with misuse



+ The *Weighted Cyber Intensity* score is derived from the EuRepoC 1.0 dataset. It assesses the type of attacks, their potential physical effects in reach and duration, and their socio-political severity. Scores 0-5 are considered low/moderate in intensity, scores 6-10 indicate high intensity, and 11-15 very high intensity incidents. See here for more information on the EuRepoC codebook.

Links to incidents in the EuRepoC database

[a] https://eurepoc.eu/incident/sandworm-vs-ukrainian-company-star-light-media-2015
[b] https://eurepoc.eu/incident/sandworm-vs-ukrainian-railway-company-and-airport-2015
[c] https://eurepoc.eu/incident/ukraine-power-outage-2015
[d] https://eurepoc.eu/incident/sandworm-2-0-attacks-on-ukrainian-financial-institutions-2016-1
[e] https://eurepoc.eu/incident/bellingcat-hack-2016
[f] https://eurepoc.eu/de/incident/ukraine-power-grid-2
[g]https://eurepoc.eu/incident/russian-apt-sandworm-aka-telebots-initially-targeted-ukrainian-infrastructures-with-a-wiper-campaign-called-not-petya-since-june-2017-causing-billions-of-dollars-of-financial-damage-worldwide-1

Background

In context of the politico-military conflict between Russia and Ukraine, EuRepoC data shows Sandworm has been conducting disruptive and destructive cyber campaigns against Ukraine for years. In August 2016, the hacker group “ShadowBrokers” claimed to have infiltrated the Equation Group, an elite hacking unit linked to the US National Security Agency, and they further claimed to have stolen “cyber weapons” which they were auctioning to the highest bidder via Twitter, Tumblr, PasteBin, and GitHub. [7] In April 2017, they leaked multiple NSA software tools to the public. [8] NotPetya, which utilises the exploit “EternalBlue” from the leak, was launched on or around June 27 – on the eve of Ukraine’s Constitution Day, which commemorates the adoption of independent Ukraine’s constitution after the collapse of the Soviet Union. [9] The leakage happened against the backdrop of US-Russian political differences over the development of military cyber capabilities, and it connects to the Russian interest in portraying US activities as harmful to the international community. This further plays into the resulting interest in exposing US capabilities and their use to invoke wider support for the Russian position.

Attribution

The IT security community quickly came to the conclusion that the group behind the incident was also responsible for the "KillDisk" attacks against Ukraine. [10] The Five Eyes and Ukraine attributed the attack towards the Russian [11] APT Sandworm. [12] The governments of Denmark, Lithuania, and Estonia blamed Russia in official statements. Norway, Latvia, Sweden, and Finland shared their concerns in official statements of support. [13] The US indicted six GRU officers in conjunction with this operation [14] and took action in the form of economic sanctions in 2018. [15] The EU condemned the incident [16] and created the European Cyber Diplomacy Toolbox in the aftermath [17], taking legal action in the form of economic sanctions and actions against members of Sandworm in 2020. [18] According to EuRepoC data, NotPetya was the first incident resulting in political attribution towards or vis-à-vis Sandworm, and their operations in the years after were met with more political attribution (see Fig. 4 below).

Fig. 2: Operation timeline

Aug. 2016	Shadow Brokers claimed access to "cyber weapons"
14.03.2017	Microsoft releases critical security bulletin MS17-010 A patch is released to close the EternalBlue vulnerability
14.04.2017	Shadow Brokers leaked the NSA tools to the public
12.05.2017	Ransomware "WannaCry" abused EternalBlue
27.06.2017	Wiper NotPetya abused EternalBlue

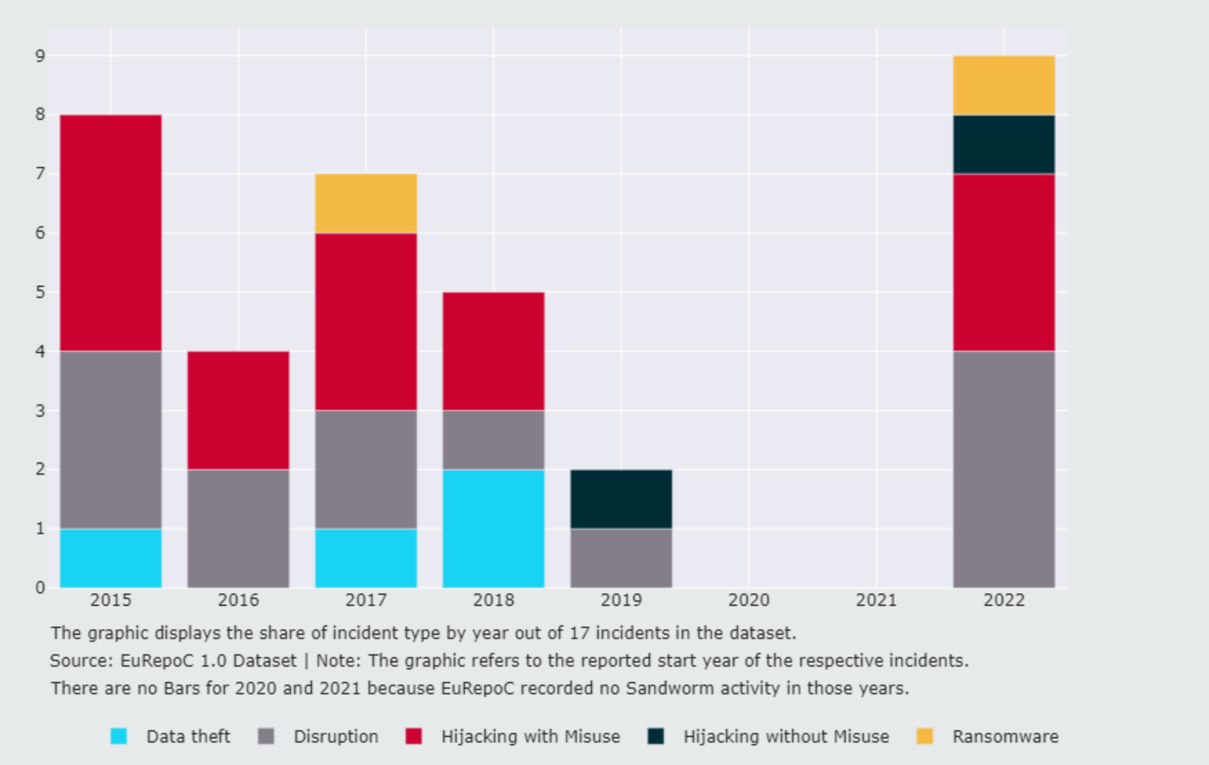
Technical details

A supply-chain attack utilising a backdoor in the update process of Ukrainian tax preparation program M.E. Doc was used for initial access of NotPetya. [19] This program was one of only two programs approved for Ukrainian companies working with the government. [20] NotPetya used the EternalBlue exploit within Windows file-sharing protocol SMB to spread within the local networks and the open-source tool Mimikatz to achieve higher access privileges. [21] The latter finds and abuses login privileges on the infected PC's memory, which is especially useful if a domain administrator was logged into the machine before. [22] A feature that differentiated NotPetya from WannaCry is that the former only spread within the local network after infection, and not over the internet. Companies not using M.E Doc were infected because they maintained VPN connections to infected networks. [23] This combination of initial access and the usage of EternalBlue for spreading made the malware tremendously infectious. According to analysts, NotPetya's goal was purely destructive. As a wiper, it irreversibly encrypted computers' master boot records. No key is known to have existed to reorder data, despite the malware displaying a message demanding a ransom. This differentiates a wiper from ransomware that actually aims at receiving ransom payments. [24]

Enablers

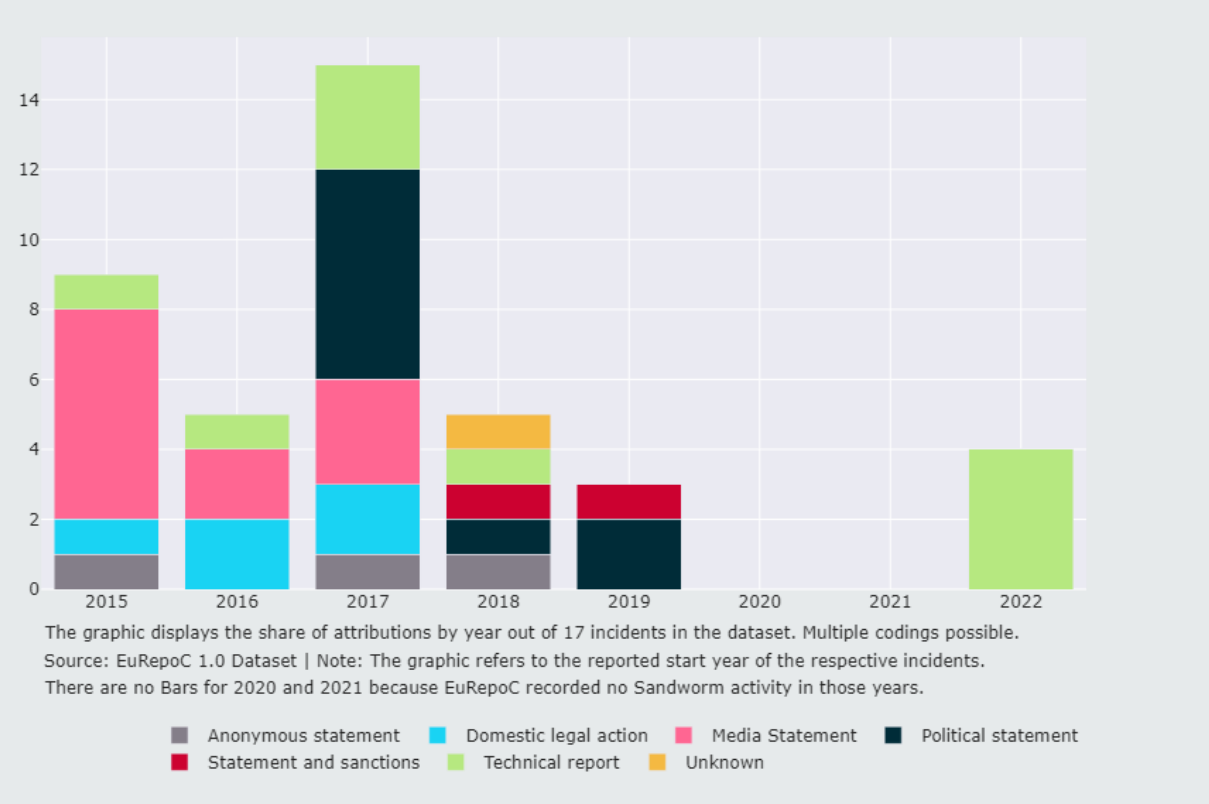
Underdeveloped cybersecurity practices and specifically bad patch administration enabled this attack; EternalBlue was patched by Microsoft on 14.03.2017, a month before the vulnerability was publicly disclosed by Shadow Brokers on 14.04.2017. [25] Before NotPetya, other extremely disruptive malware, in particular WannaCry, had already abused the vulnerability. [26] Affected machines were not updated. However, EternalBlue had originally been a stockpiled vulnerability of United States Intelligence Agency NSA`s Tailored Access Operations (TAO) unit, intended for the exclusive use by the agency Nobody but us (NOBUS). [27]

Fig. 3: Worldwide activity of Sandworm between 2015 and 2022



The graphic displays the share of incident type by year out of 17 incidents in the dataset.
Source: EuRepoC 1.0 Dataset | Note: The graphic refers to the reported start year of the respective incidents.
There are no Bars for 2020 and 2021 because EuRepoC recorded no Sandworm activity in those years.

Fig. 4: Type of attributions to Sandworm between 2015 and 2022



The graphic displays the share of attributions by year out of 17 incidents in the dataset. Multiple codings possible.
Source: EuRepoC 1.0 Dataset | Note: The graphic refers to the reported start year of the respective incidents.
There are no Bars for 2020 and 2021 because EuRepoC recorded no Sandworm activity in those years.

Private Sector Engagement

Crowdstrike (analysis) [28]
CarbonBlack (analysis) [29]
ISSP (analysis) [30]
LogRhythm (analysis) [31]
Kaspersky (analysis) [32]
Symantec (mitigation) [33]
Microsoft (mitigation) [34]

Legal Assessment

NotPetya was followed by "the largest coordinated attribution of its kind to date" (see above, attribution). [35, 11-13] But international law was only directly mentioned in statements condemning the incident by Estonia and, later, by the European Union. The latter referred to the applicability of international law in cyberspace and cited UN Group of Governmental Experts (GGE) reports of 2013 and 2015 [36] It was also the first cyber operation that triggered a coordinated diplomatic response from the European Union. [37] The United Kingdom referred to the incident as a display of continued Russian disregard for Ukrainian sovereignty. [38] While there was an academic discussion on NotPetya possibly passing the threshold of use of force as regulated in Art. 2 (4) of the UN Charta, this was not invoked in political responses. [40] Yet the incident also highlighted the issue of cyber insurance. Both Merck's (losses of up to 670 million US-Dollar) and Mondelēz's insurance claims were refused, citing a "warlike action" conducted by "government or sovereign power," which is a common exclusion clause in "all risk" property insurances, leading to legal disputes against their respective insurers. [41] The case has broad implications on risk insurances because multiple sovereign governments and the European Union blamed the Russian government for the incident without referring to it as a "warlike action". Merck received its first proceeds soon after the incident [42] and won their case against the insurance company in 2021, with the court arguing that the exemptions on warlike action would only apply to traditional forms of warfare. [43] However, the insurance company is still in the process of appealing the decision, citing NotPetya being a "cyber nuclear attack" in the sense of collateral damage [44]. Mondelēz's case was settled in 2022 with no details disclosed. [45]

Further Reading

On legal implications

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Wan, Katherine S. 2020. Notpetya, not warfare: rethinking the insurance war exclusion in the context of international cyberattacks. Washington Law Review, 95(3), 1595-1620.

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