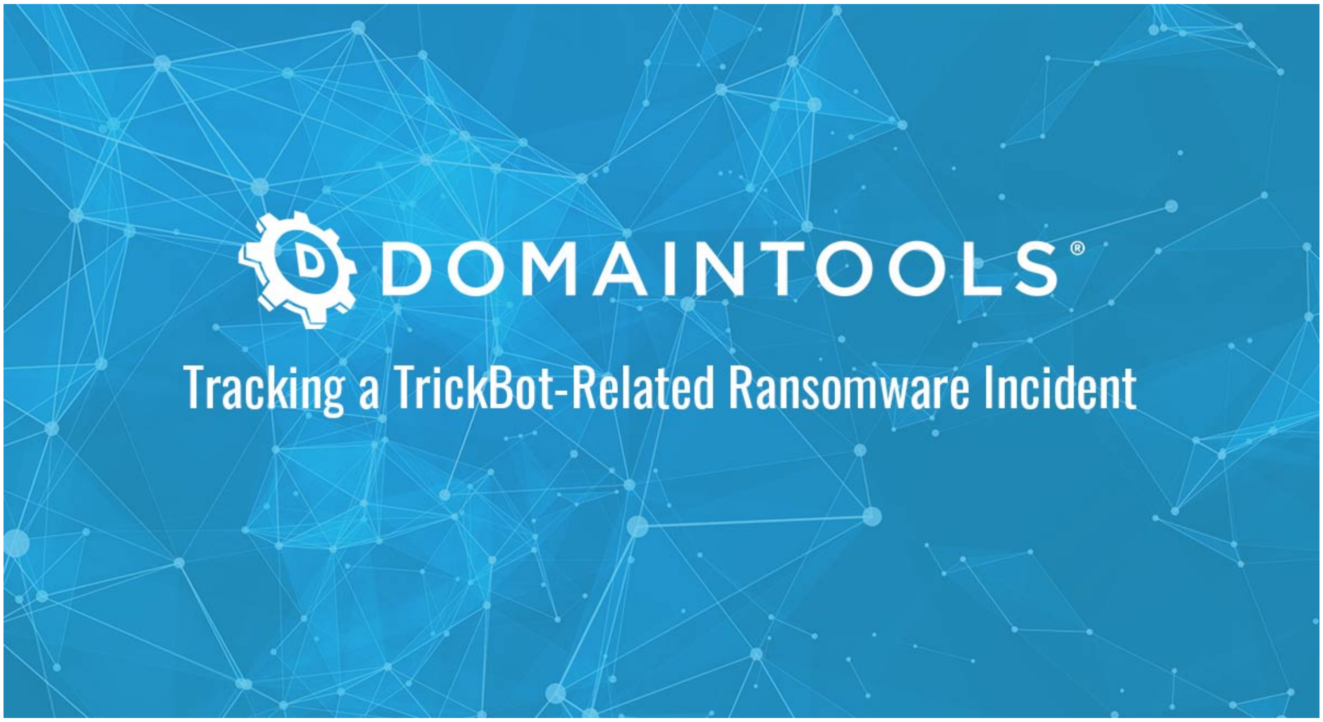
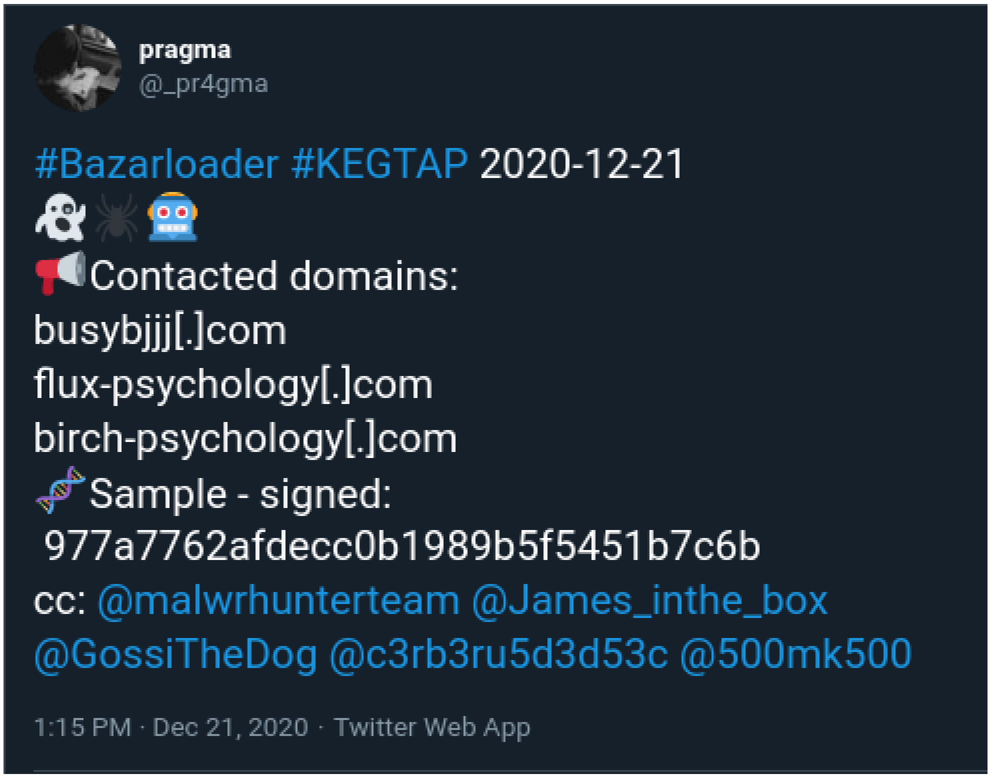
Holiday Bazar: Tracking a TrickBot-Related Ransomware Incident

domaintools.com/resources/blog/tracking-a-trickbot-related-ransomware-incident



Background

On 21 December 2020, the start of the Christmas week, evidence emerged of a ransomware campaign leveraging BazarLoader (also referred to as KEGTAP) and linked to the TrickBot ransomware gang. Initially disclosed in a tweet, the campaign rapidly unfolded over the course of that day.



pragma
@_pr4gma

#Bazarloader #KEGTAP 2020-12-21
👻🕷🤖
📢Contacted domains:
busybjjj[.]com
flux-psychology[.]com
birch-psychology[.]com
🧬Sample - signed:
977a7762afdecc0b1989b5f5451b7c6b
cc: @malwrhunterteam @James_inthe_box
@GossiTheDog @c3rb3ru5d3d53c @500mk500

1:15 PM · Dec 21, 2020 · Twitter Web App

Based on discussions with intelligence partners and various network defenders, the adversaries responsible for this activity appeared to rapidly move from initial infection at victim locations to interactive operations en route to attempted ransomware deployment. In previous operations, TrickBot activity is associated with the deployment of Ryuk ransomware. At the time of this writing, DomainTools researchers were unable to confirm a final-stage payload for this specific campaign.

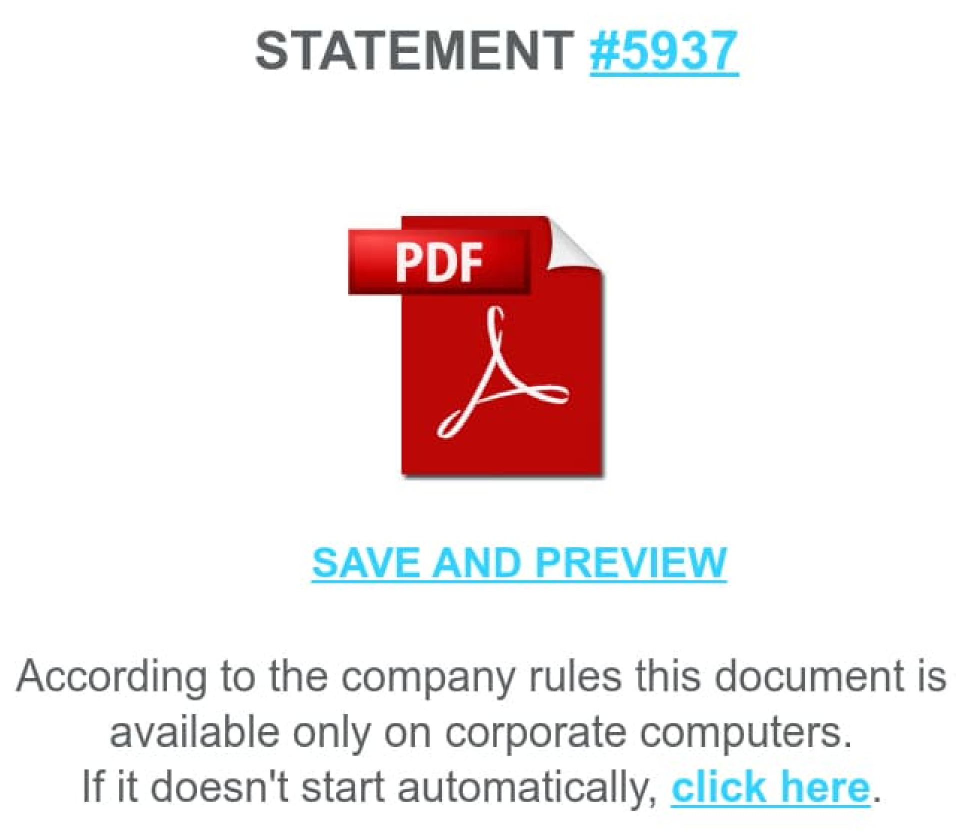
Although this specific campaign has since passed, it contains many lessons for network defenders and Cyber Threat Intelligence (CTI) professionals for monitoring and analyzing emerging campaigns to enable dynamic, flexible defense.

Initial Delivery and Download Vector

Analysis of the campaign indicates initial delivery takes place using a legitimate third-party email messaging or notification service. In this specific case, the adversary leveraged GreatResponse, used for email marketing and landing page design, to deliver seemingly benign-looking email messages with “Corporate Document” or similar themes. Observed link examples include the following:

```
corpdocument1221.gr8[.]com
companygeneralmeeting122220.gr8[.]com
Companydocument07851-3173f.gr8[.]com
```

When accessed, a victim would see a landing page such as the following:



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The link would direct to a Portable Executable (PE) file, discussed in further detail below, hosted on Google Drive. Further execution would require the user to run the downloaded executable for follow-on exploitation to occur.

The above activity is consistent with observed TrickBot operations—as well as other entity tactics—using third-party services to evade detection and mitigation. For example, TrickBot gang campaigns have previously used third-party delivery services such as Sendgrid to distribute initial phishing messages. Follow-on payloads have also been hosted on cloud file storage sites, such as Google Drive, as well.

Examining Droppers and Installers

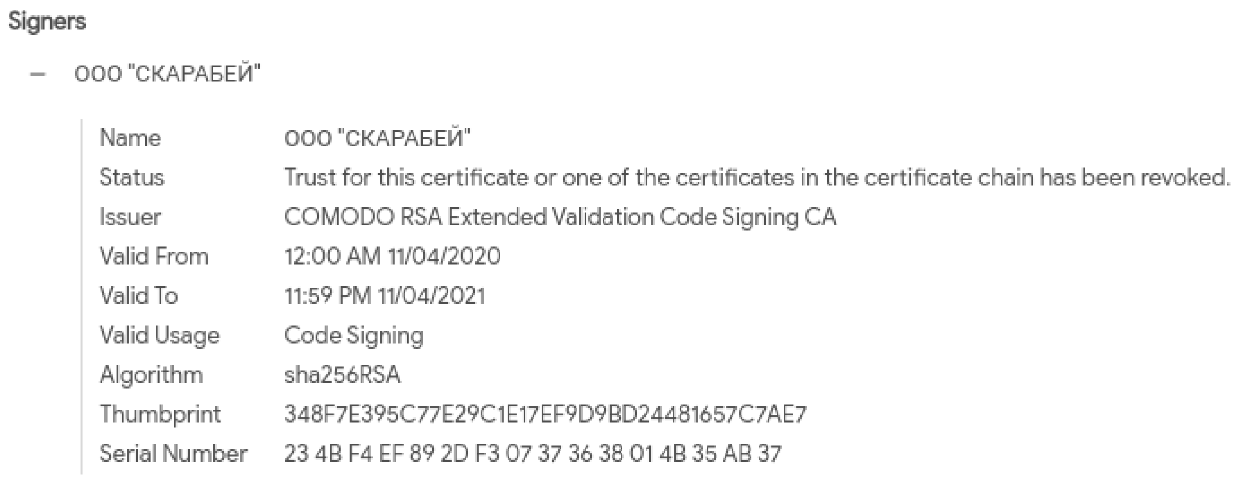
Further activity requires not only user interaction with the phishing message (displaying the landing page link) and downloading the file hosted from Google Drive, but then executing the payload as well.

Overall, as part of the completion of this "kill chain," DomainTools researchers observed 18 samples of the next-stage payload. Naming conventions for these files matched the landing page themes, although DomainTools researchers expect more variants likely exist beyond our visibility.

SHA256	MD5
90a51557f3438fec9b2ffab5828751cb43fa9eeb1fa84468effe95a9f13f12d0	774bdb1
74d757a4cabf26009ab5f1064939c54ceea43a8399419a7c965b2edb7e0ed648	2d8c817
0e809ef68d85e730190db2663ab914dfd6ccb4c355a051841366b3a5c91ada63	0dd55da
2be628add2ab1be6120026893c6a7a51dc0b3f81c7421349504a6010581aa427	a54c10b
21df8a331f272ed9b6b72509028af31612292c9f3c0776a4472b2b585c142648	eeb4201
82dbcaa7694a6e763300cee1d4b2ef6e65f6a65fd93663365ce032823984cb21	7ef4f4eb
2c6b49185dea80c48dcdd1c316a0de3413ff52a67819a720419c630093b5e638	1cd5e8b
3941242436e943fbfb7b1767aa2615bcc5637da3d939d3b06a1572de8bf044a1	5af82b3
4c4b00621d0e57bcdf188174a539ca3c92a4fc96647eabe6d79c17ae04bd519d	f0cc1619
3985648d781de545cf1209469454b88f7f6e54696b6a050dbb7ba2ba1eae2cec	c3ad311
436301cb89dadecb6c6cefc043b8a4d8f47de2054b1e84e1612cf061cd14dc15	977a776
44075e5eb7ee76b006a8f4cf2bfee30dec3c5007c02f8657f956429bb976ea4b	d52710b
bed288ad6037546ecfb9e912518583fefbb7685681a8ecfd5b27502735de20bd	b0c8317
102dca8d268dbbba33770459009d4d67e0d714b44523c28fce57ee83fe186a31	e018926
bbe896ab541c703d699f97311a30c2e07be98be1ebf7eed9a9a1fd7dfa2efb5b	de65816
69aa97d3507d4ccf7dc0bd0a97cfe509edfbdf16734fcc40cd01d8dd659fd450	4c52e80
392c73ffa3b1513cd8de9435d7e76320eff7f98db884eb6bc776c3b2bea7c77e	eea1208
e1841e78c6dace694cc5172bac1068b9ede38a3623c5429a877eb1190d90a14d	bd7d9ae

One sample, “View Report.exe”, is a 32bit executable that appears to date from late November 2020 and from part of an earlier, undocumented campaign. The remaining samples are 64bit executables compiled on the day of the campaign, 21 December 2020.

The executables in this campaign are signed with the same Sectigo code signing certificate, with the name “СКАРАБЕЙ” (Russian for “Scarab”) and a fingerprint value of “348F7E395C77E29C1E17EF9D9BD24481657C7AE7.” This certificate has since been revoked by the issuer.



Signers

– ООО "СКАРАБЕЙ"

Name	ООО "СКАРАБЕЙ"
Status	Trust for this certificate or one of the certificates in the certificate chain has been revoked.
Issuer	COMODO RSA Extended Validation Code Signing CA
Valid From	12:00 AM 11/04/2020
Valid To	11:59 PM 11/04/2021
Valid Usage	Code Signing
Algorithm	sha256RSA
Thumbprint	348F7E395C77E29C1E17EF9D9BD24481657C7AE7
Serial Number	23 4B F4 EF 89 2D F3 07 37 36 38 01 4B 35 AB 37

While signed binaries are not new to ransomware or related operations (with notable signed examples including but not exclusive to Ryuk and LockerGoga variants), they continue to pose a threat to users as many applications and security products inherently trust code-signed items.

Following successful binary execution (through user interaction), the malware attempts to resolve and connect to one of at most two Command and Control (C2) servers embedded within the binary. Successful connectivity allows for further actions on target, including the attacker taking control of implants to launch further commands or move laterally within the victim environment.

Associated Network Infrastructure

As noted in the original Tweet sparking this investigation, there were several domains immediately identified as associated with this campaign. Further investigation and analysis of samples yielded additional items, shown in the following table:

Domain	Registrar	Create Date	IP	Hosting Provider
birch-psychology[.]com	NAMECHEAP INC	12/10/2020	192.236.155.212	Hostwinds LLC.
busybjjj[.]com	NAMECHEAP INC	12/10/2020	195.123.241.79	ITL-Bulga Ltd.
flourish-psychology[.]net	NAMECHEAP INC	12/10/2020	192.119.171.165	Madgeniu
flux-psychology[.]com	NAMECHEAP INC	12/10/2020	107.152.32.121	ServerChe INC

Domain	Registrar	Create Date	IP	Hosting Provider
freekaratee[.]com	NAMECHEAP INC	12/10/2020	94.140.114.152	SIA Nano
impactpsychcoloradoo[.]com	NAMECHEAP INC	12/10/2020	185.82.127.115	SIA Nano
livingyoga-denver[.]com	NAMECHEAP INC	12/10/2020	138.201.113.2	Hetzner Online AG
ustfitf[.]com	NAMECHEAP INC	12/10/2020	195.123.240.192	ITL-Bulgar Ltd.

The identified network infrastructure serves as the next stage of the intrusion. Following malware installation, active C2 would be used to further exploitation of the victim, leading to likely ransomware activity.

Pivoting and Identifying Additional Items

At this stage, we as defenders are largely in a “reactive” state with respect to identifying indicators and characteristics of this BazarLoader campaign. While quickly ingesting and deploying defensive measures based on indicators and observables may represent an improvement over completely passive defense, it still leaves much to be desired.

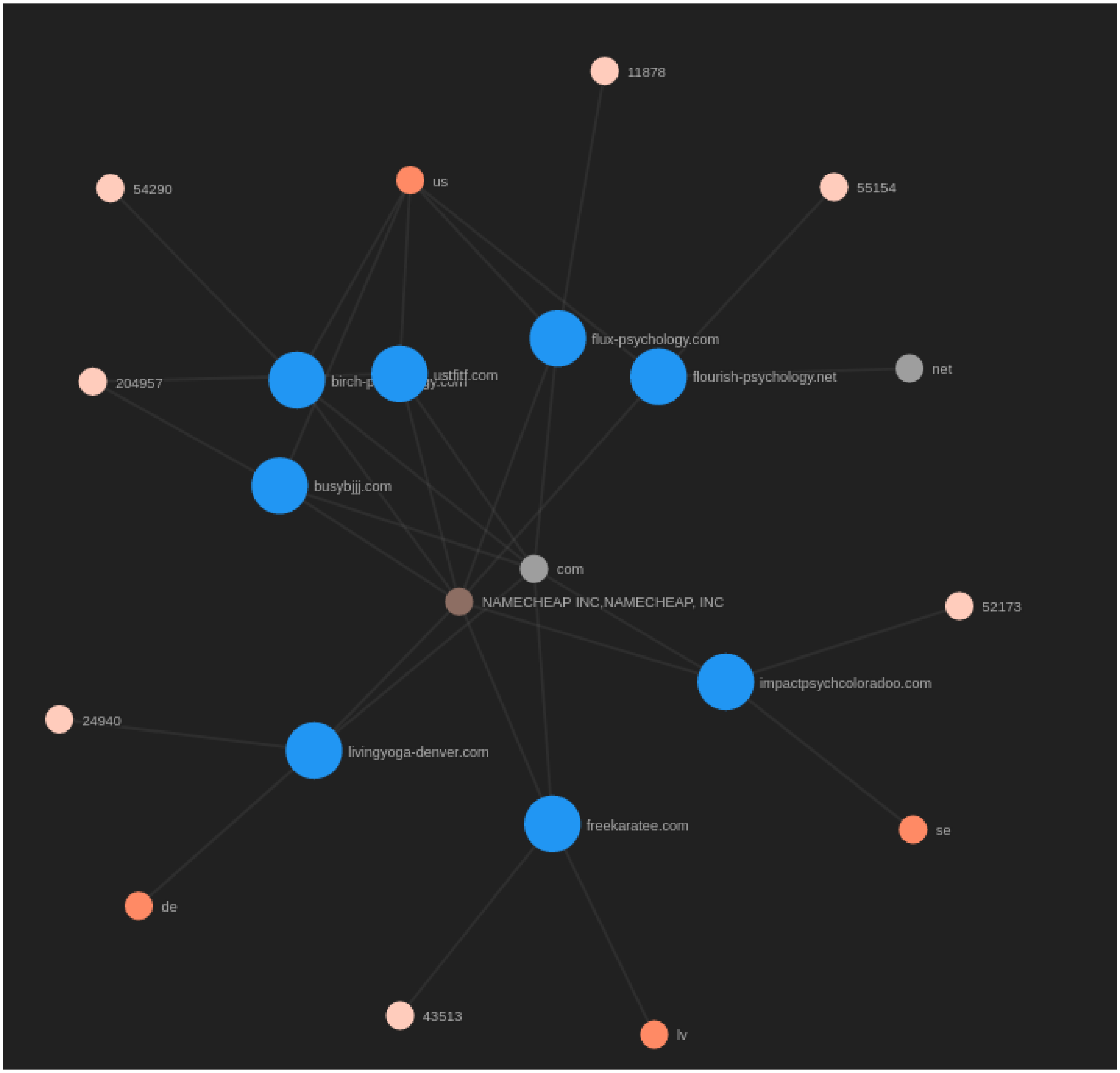
Instead, by identifying characteristics inherent to the campaign—both its network infrastructure and malware samples—we can both gain greater knowledge of the attacker’s tendencies while enabling defense attuned to these tendencies. For the latter, this means adapting defense to the adversary’s fundamental behaviors as opposed to chasing specific examples of those behaviors as represented by indicators.

Network Observables

Looking at the domains identified above, several “themes” emerge:

- Typical use of naming “themes” reflecting local service providers or small business entities, with an emphasis on “cleaning” companies.
- Consistent use of NameCheap for registration purposes.
- Almost exclusive use of the “.com” Top Level Domain (TLD).
- Creation on the same day, 10 December 2020.
- Hosting on various relatively small, privacy-focused Virtual Private Server (VPS) providers.
- Use of Let’s Encrypt SSL certificates for encrypted communications.

As previously documented by DomainTools, these observations can be used to unearth additional C2 infrastructure for threat hunting or preemptive defensive purposes. Unfortunately, at first glance by plotting the above items using DomainTools Iris visualizations, there seems little in common on a technical level to enable successful pivoting to additional infrastructure.



Yet a combination of limited technical details that overlap (registrar, TLD use, and time of creation) along with “thematic” observables (the naming conventions used) can enable us to unearth additional items.

With this hypothesis in mind, looking for items with a similar technical structure that also mirror the “local service” or “local business” theme, we can identify the following through DomainTools Iris:

Domain	Create Date	IP	ISP	SSL Cer
app-space-cleaner[.]com	12/15/2020	46.4.76.174	Hetzner Online AG	d456b68
babynameinspirations[.]com	12/14/2020	135.181.154.50	Hetzner Online AG	N/A
bbdworld[.]net	12/18/2020	195.201.9.204	Hetzner Online AG	N/A
blacksockproductionss[.]com	12/10/2020	192.119.162.84	Madgenius	N/A
blueridgecabin-cleaning[.]com	11/13/2020	94.140.115.253	SIA Nano IT	5392b3c
carwashevanstoon[.]com	12/15/2020	94.140.114.54	SIA Nano IT	a856e01
cguschool[.]com	12/9/2020	116.203.253.24	Hetzner Online AG	N/A
cleaningcompany-online[.]com	12/1/2020	192.227.231.237	Virtual Machine Solutions LLC	1eab0efa
coloradobudokann[.]com	12/10/2020	195.123.233.78	ITL-Bulgaria Ltd.	N/A
crowleycollegeprepp[.]com	12/10/2020	107.152.42.146	ServerCheap INC	N/A
data1-posten[.]com	12/7/2020	168.119.171.234	Hetzner Online AG	30f46401
familyzstore[.]com	12/11/2020	198.54.117.244	Namecheap Inc.	N/A
first-posten[.]com	12/7/2020	168.119.171.234	Hetzner Online AG	N/A
form-feedback[.]com	12/7/2020	178.63.220.179	Hetzner Online AG	23f3a3a
greatsfamily[.]com	12/9/2020	198.54.117.244	Namecheap Inc.	N/A
injektorrx[.]com	11/13/2020	94.140.114.187	SIA Nano IT	0aec5a4
inmanheatingandcoollng[.]com	12/15/2020	94.140.114.135	SIA Nano IT	66688b8
intlupdate[.]com	12/8/2020	5.34.178.204	ITL LLC	35d8a65

Domain	Create Date	IP	ISP	SSL Cer
johnnyclean-carwash[.]com	12/1/2020	192.119.171.231	Madgenius	a24abeb
johnnykashjewelsapp[.]com	12/15/2020	195.123.237.139	ITL-Bulgaria Ltd.	N/A
jordanbelforthiring[.]com	12/16/2020	192.64.119.2	Namecheap Inc.	N/A
kizienservices[.]com	12/9/2020	195.201.179.80	HostMaster Corp	N/A
lovelyhomemart[.]com	12/7/2020	176.9.29.52	Hetzner Online AG	9b48c3e
manageupdaternetwork[.]com	12/17/2020	94.140.114.160	SIA Nano IT	N/A
my-space-cleaner[.]com	12/10/2020	46.4.76.174	Hetzner Online AG	b613424
newappday[.]net	12/9/2020	95.217.229.116	Hetzner Online GmbH	N/A
niftythriftsteals[.]com	12/13/2020	49.12.15.63	Hetzner Online AG	630a232
nord-city[.]com	12/11/2020	46.4.70.54	Hetzner Online AG	179e434
open-register[.]com	12/16/2020	198.54.117.197	Namecheap Inc.	N/A
posten-order[.]com	12/7/2020	168.119.171.234	Hetzner Online AG	a6c19e7
pulsehomeowner[.]com	12/14/2020	159.69.186.9	Hetzner Online AG	N/A
qureshisgym[.]com	12/20/2020	95.216.159.168	Hetzner Online GmbH	N/A
real-posten[.]com	12/9/2020	135.181.94.39	Hetzner Online AG	N/A
rentinginnovations[.]com	12/13/2020	159.69.186.9	Hetzner Online AG	N/A
rmflaging[.]com	12/10/2020	94.140.115.145	SIA Nano IT	N/A

Domain	Create Date	IP	ISP	SSL Cer
service-masterss[.]com	11/13/2020	141.136.0.3	SIA Nano IT	N/A
speed-posten[.]com	12/11/2020	135.181.94.39	Hetzner Online AG	N/A
stonyhand-carwash[.]com	12/15/2020	138.201.112.173	Hetzner Online AG	N/A
tracking-posten[.]com	12/7/2020	168.119.171.234	Hetzner Online AG	b62aed1
trak-no-posten[.]com	12/10/2020	135.181.94.39	Hetzner Online AG	N/A
trakaing-pass-posten[.]com	12/9/2020	168.119.171.234	Hetzner Online AG	1fac7b2a
washguystxx[.]com	12/4/2020	141.136.0.25	SIA Nano IT	N/A
worldnewsfeed[.]net	12/15/2020	88.99.102.85	Hetzner Online AG	f852a683

This list is extensive and includes items that are likely not related to this campaign, but other items seem to fit the pattern observed quite well. Examples include:

```
blueridgecabin-cleaning[.]com
carwashevanstoon[.]com
cleaningcompany-online[.]com
coloradobudokann[.]com
Johnnyclean-carwash[.]com
stonyhand-carwash[.]com
```

These items form the basis for further threat hunting and CTI analysis. Given that all of the identified items are marked as likely malicious based on DomainTools risk scoring algorithms, the options available to defenders range from adding the domains and related infrastructure to blocklists as a preventative measure to monitoring them for further activity. For example, items such as those called out above could be flagged in various services, such as DomainTools domain monitoring, to identify when changes or file associations occur.

File Patterns

In addition to domain patterns, the malware samples associated with this campaign also feature several commonalities that can be used for either hunting or alerting purposes, depending on the tools and visibility available to the researcher. From the information available thus far, we have the following insights:

- Exclusive use of 64bit binaries downloaded from cloud storage providers.
- Use of the same Sectigo signing certificate across all known samples.
- Common file naming conventions based on variations of “company report” and similar themes.
- Commonality in C2 infrastructure.

From the above, DomainTools researchers began investigating multiple data sources for similar file characteristics as well as items contacting domains revealed in the network pivoting exercise documented in the previous section. From this and follow-on analysis from initial findings, DomainTools researchers unearthed another BazarLoader campaign from 17-18 December 2020. The following samples and C2 domains were observed:

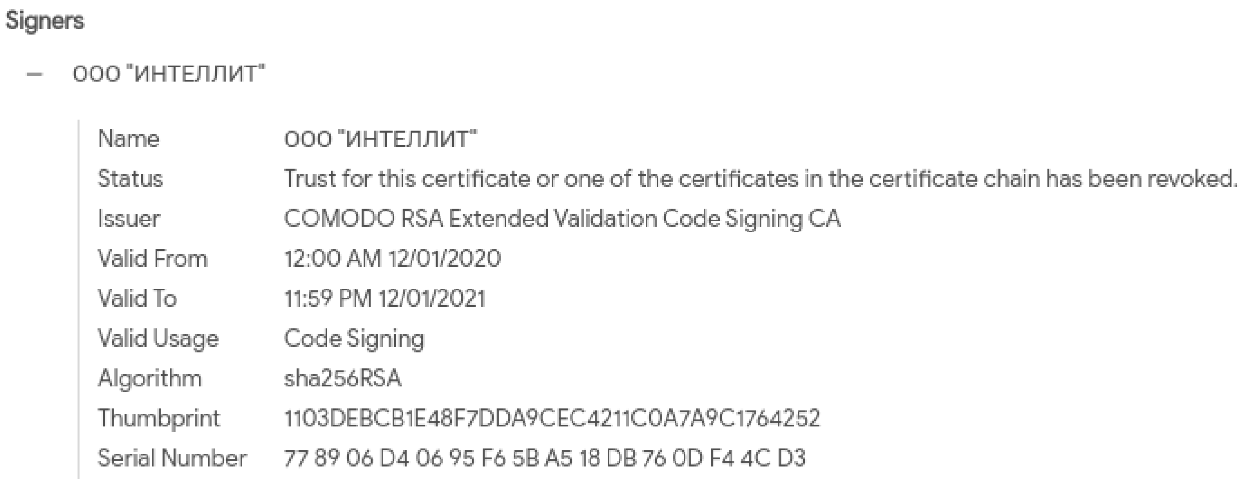
SHA256	MD5
b455c245254ebf9691dcf7f02323b42c5b34998a440fa1b8a0f981f0ce3e2bfb	f1672efc
c9a66cff4c5b5d74545c1eabc9da4ecf618f9c72174150569daa58e843cee5e5	c28b472
a7738dddb62919658c1fe3d339ccae6d0d2afe85a1bccccfce6f8a9ee6b4c5de	356bc93
0d848d9675e6e6d12d1d158b07b636db246e02145beb5db7ae9be36cb5e1c3ff	872608f
68ed893ae6ab2d7f00c3aacf46bc0c92966b647bcfe7e940a5d3ee55af01105a	3ec43f7
c67c3cc34905f4751e2f48363a0cf3cf69799f020687b6f5852058d3abd1c31d	a13275c
7978e198f7523d487e13a742101810d765c4ed191920d571ea51c99cc18eb795	8763f3f2
d33a8c70a8ae4f8eeb2f3708820486c0248edf340120f6380a8a3540e212a5dc	946c9c2
9b29924a22ef01cb9c3b8c98d5cc4508836427335d3949c93e7a4c50c2bd40d5	9014ee7
75a52886c5a83dd25cb7e7d393320ee439f7605dbe41818057fc34c1102bbfc1	b8648e8

SHA256	MD5
bcccb14658e8c1bee8107a2c314957c2bd9e505e73012b0aaa18df9fedf99248	dd0c5c4
56c5bee33c17a453c900725f88efb0466fd928072c420955fa599b518b9dfcd2	ee85e8c
898f6e91c82bf23b5b95e0560292b1c610970b3062eeeb9980c75f954e5024a9	2946562
7ed66b0d81958d709b7f3067f9bdc69c25cbb955506c4a812cf0b6b9a7590f0d	9490998
a32ed4b36d44c489341721920d27294cab78ad7bd970c8ac6baa3edc4337a600	5686d8a
288d28f4d53d8e44d599a4d2f70b53d5b13f0827ad2b7a953a7a3cbd6e67bf25	dfa0bc9
ac696ef5a12039b72e408b6b14e08823c407ee652a6a36b7c33d01cd8d373497	67c2474
30b2922c78a07dcd65a6f93886e7efcd6c3c883c70c2dc5f37cf41e50f240903	f7079cd

Multiple samples were identified with C2 infrastructure linked to the domain pivoting in the previous section. While this did not appear to succeed in identifying "new" items (as the files in question appear to have been active from 17-18 December 2020, before the originating campaign sparking this investigation), their discovery indicates other items in the list of possible domains may relate to future campaigns by the same actor. Additionally, some items were revealed which featured C2 domains not related to the pivoting documented earlier. Examples include:

```
akbuilding-services[.]com
Homeclean-heroes[.]com
Maidtoorderfll[.]com
```

Although exhibiting C2 domains beyond initial research, the items were linked by a common code signing certificate (again from Sectigo, and since revoked by the issuer) with the name "ИНТЕЛЛИТ" (Belorussian for "Intelligence") and thumbprint "1103DEBCB1E48F7DDA9CEC4211C0A7A9C1764252":



Signers

— ООО "ИНТЕЛЛИТ"

Name	ООО "ИНТЕЛЛИТ"
Status	Trust for this certificate or one of the certificates in the certificate chain has been revoked.
Issuer	COMODO RSA Extended Validation Code Signing CA
Valid From	12:00 AM 12/01/2020
Valid To	11:59 PM 12/01/2021
Valid Usage	Code Signing
Algorithm	sha256RSA
Thumbprint	1103DEBCB1E48F7DDA9CEC4211C0A7A9C1764252
Serial Number	77 89 06 D4 06 95 F6 5B A5 18 DB 76 0D F4 4C D3

Although a different certificate than that used in the 21 December campaign, it reflects similar themes and observations. One item in common with both signing certificates is the prefix “OOO”, which in Russian (and related) languages is equivalent to “Ltd.” While there are many legitimate entities that can and do sign their software with certificates including “OOO” in their name, this may function as a robust indicator for organizations with few or no commercial ties to Russian or related language entities for blocking or filtering files with code signing certificates containing such language. This code signing observation represents a start in overall defensive planning against malware campaigns such as that observed in this report.

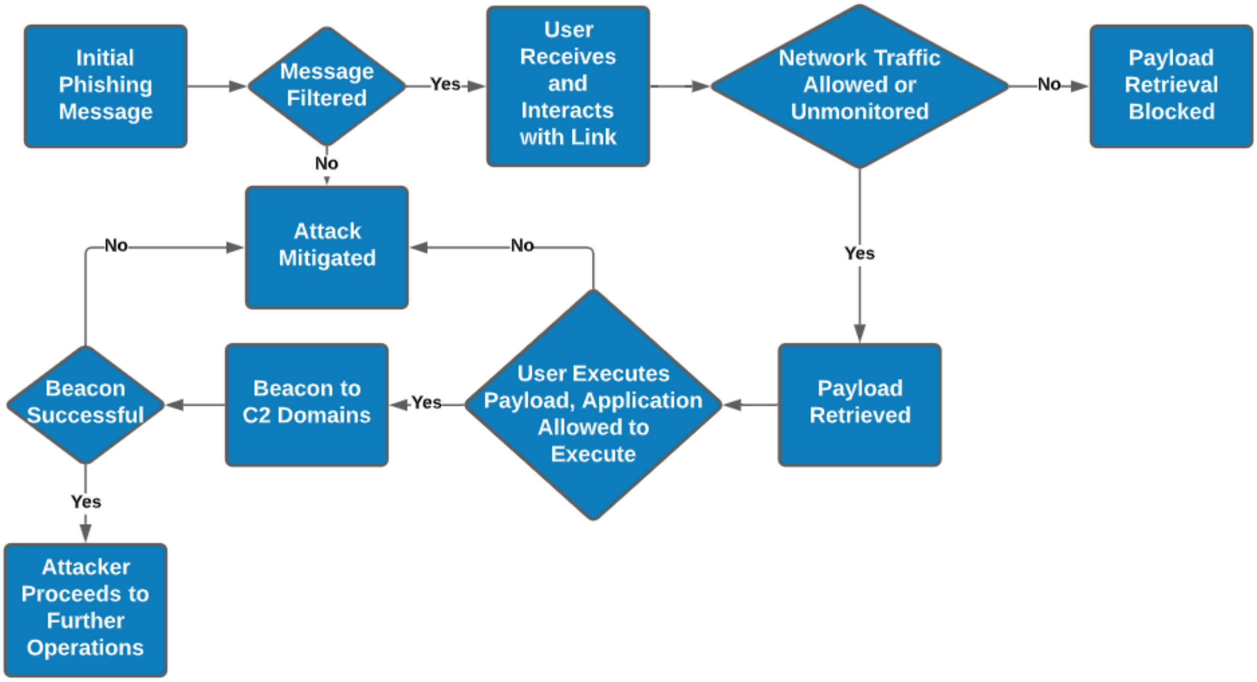
Defensive Recommendations and Mitigations

We have already discussed several examples of possible alerting items for this campaign, ranging from signing certificate observables to infrastructure commonalities. However, network defenders must be attuned and responsive to a variety of adversary “tells” in campaigns to ensure robust and complete defense from intruder operations.

First, the simple identification of new or anomalous network traffic—whether as email links, user interactions, or programmatic communication—can do wonders for network security posture. For example, all of the domains identified in the analysis so far have scored as likely malicious through the DomainTools risk-scoring algorithm. By programmatically tying network security monitoring or log capture (such as proxy logs) to a threat intelligence source such as DomainTools, defenders can rapidly identify communication to new, likely risky sources and use this as a mechanism to launch further investigations. Done in a timely fashion, this can work to disrupt ransomware actor operations and interrupt events before they proceed toward ransomware deployment.

Second, organizations must be attuned to the malicious use of code signing for the delivery of malware. In this specific campaign, the Sectigo signing authority was abused to sign malware for delivery and execution. From a defender’s perspective, we cannot completely distrust Sectigo (as it is used by many organizations), but we can identify ways to narrow our degrees of trust to reduce attack surface. Within the context of the currently discussed campaigns, identifying the “OOO” string, corresponding to “Ltd” in Russian and related languages, may be sufficient to distinguish between trusted and unknown software depending on one’s business operations. Identifying such “tells” and their implications can allow defenders to take even trusted items, such as code signing certificates, and narrow what is truly allowed or acceptable within their environments versus what is anomalous or suspicious.

Finally, the entire infection chain outlined above relies on a user interacting with a phishing message then executing an unknown binary from a cloud storage location. These items represent critical touch points for defensive response and monitoring—and user education. Through email security monitoring, organizations can identify, categorize, and filter providers for things such as landing pages and response emails to reduce attack surface. Furthermore, organizations can limit or completely block the download of files (or at least executable files) from external cloud storage locations to further reduce risk. Lastly, execution by the user of an unknown (even if signed) binary can be limited through either training or operating system controls to eliminate the ultimate stage of this attack sequence.


Initial Phishing Message
Message Filtered
Yes
No
User Receives and Interacts with Link
Network Traffic Allowed or Unmonitored
No
Payload Retrieval Blocked
Yes
Attack Mitigated
No
No
Payload Retrieved
User Executes Payload, Application Allowed to Execute
Yes
Beacon to C2 Domains
Beacon Successful
Yes
Attacker Proceeds to Further Operations

Overall, visibility into network communications, the ability to refine those communications with the support of external CTI sources, and combining this with host-based or malware-centric observations will enable defenders to identify, track, and hopefully mitigate potential ransomware events such as that described above. This whole-of-killchain approach, similarly documented with respect to BazarLoader by Red Canary in 2019, ensures detection at various stages of adversary operations. Through concerted effort and continued refinement, defenders will be able to identify “normal” activity within their environment and set that against abnormal traffic that may be related to malicious operations. As a result, defended organizations can gain some lead time over intruders, setting up proactive or preemptive defenses to limit exposure to campaigns as they materialize.

Conclusion

In this analysis, we identified an initial campaign and used related items to reveal a slightly earlier ransomware campaign likely related to the same adversary. By applying this process in a continuous, iterative fashion, we as network defenders and CTI professionals can continually reduce the scope and degree of movement for adversaries and improve the prospects of network defense. Marrying network security monitoring with network indicator enrichment through sources such as DomainTools can reveal campaigns in progress, while subsequent relations to file-based observations can cement these views to enable holistic network defense. Ultimately, network defenders must leverage all sources available to them in order to adequately respond to and detect such threats, with the goal of minimizing adversary dwell time and maximizing defender opportunities for response and recovery.