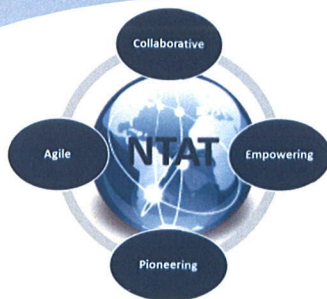


Synergising Network Analysis Tradecraft

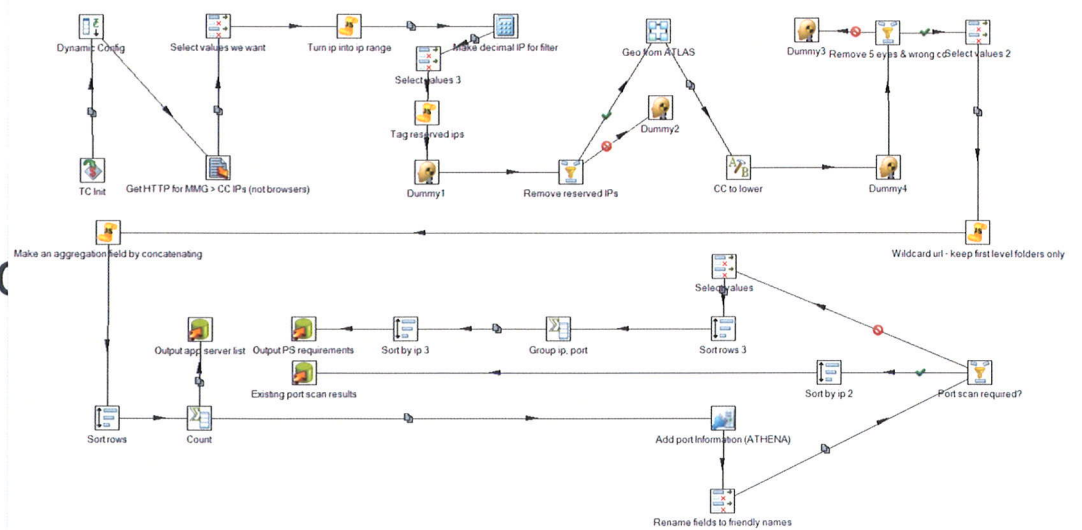
Network Tradecraft Advancement Team
(NTAT)



Overview

* What is the NTAT?

* 2011 – 2012 work and accomplishments



Tradecraft?

Tradecraft

- “The development of methods, techniques, algorithms and processes in order to generate [Intelligence](#), and developing the ability to apply this knowledge either manually or through automation. Tradecraft is developed from experience, research, intuition and by the reapplication and redefinition of existing techniques. **Industrial-Scale Tradecraft** involves data on a large scale.”

Network Tradecraft

- Usable knowledge about how to acquire intelligence FROM the network

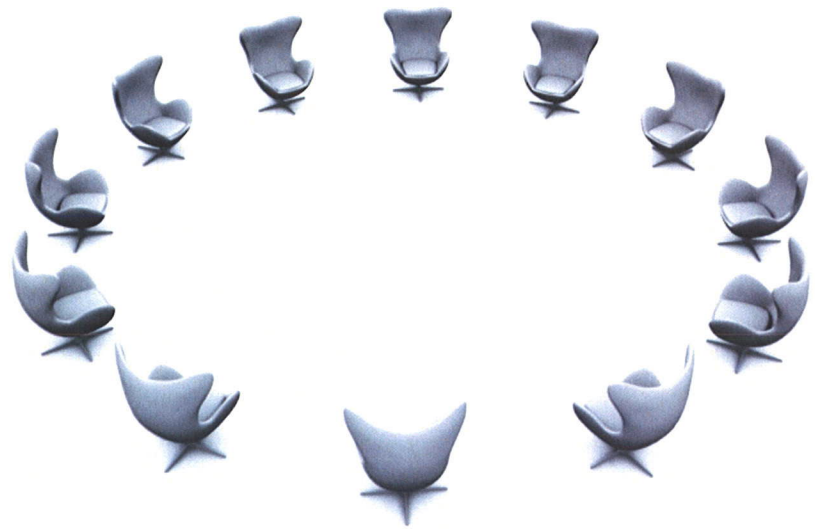


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The NTAT

- * Create repeatable, sustainable & shareable tradecraft to enable network analysis
- * Facilitate knowledge collaboration and interchange across the 5-Eyes SIGDEV community



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The Process

Stage 1 = Fact Finding

Stage 2 = Define Focus (based on Fact Finding)

Stage 3 = Develop Tradecraft

Stage 4 = Document Tradecraft

Stage 5 = Test Documented Tradecraft and Refine

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Network Convergence Tradecraft

- * Technological convergence – where voice and data services interact with each other on a single device
- * Tradecraft to enable the targeting of handsets in telephony space and CNE exploitation in IP space
- * Improved algorithms for mobile gateway identification and implementation of these algorithms



DSD Workshop November 2011

- * 2 weeks
 - * CSE, DSD, GCHQ
 - * Virtually, via chat room, NSA & GCSB
- * Focus on data, techniques & analytic outcomes

<https://wiki.dsd/twiki/> [REDACTED]

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DSD Workshop Outcomes

Technique developed to identify wide variety of potential converged data, unique for specific country or mobile network operator

- ∅ ***potentially lead to convergence correlation dataset to help profile targets on-line activity***

Documentation of techniques to identify specific components of raw HTTP activity that alludes to the browsing, downloading and installation of smartphone applications

- ∅ ***identified the presence of application servers for mobile network operators and geographical areas***

DSD implementation of mobile gateway identification analytic based on FRETING YETI

- ∅ ***three agencies now running the same analytic provides a richer dataset of mobile gateways***

CRAFTY SHACK trial

- ∅ ***NTAT now using CRAFTY SHACK for tradecraft documentation***

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XKS Microplugin: Samsung Protocol

State	ID	CSC	Device_Model	HTTP_User_Agent	IMEI	Latest_Mcc	Mcc	Message_Id	Message_Type	Mnc	Network_Ty	Odc_Versio	aded_	Postloaded_	Preloaded_	Preloaded_apps	Version	Active User#	Casenotation
1	353	1KSA	GT-N7000	SAMSUNG-Android		412	2306-8	checkAppUpgrade Request	50	0	2.6.084				com.sec.android.app.samsungapp@2.1.0a	1.0a		ESDHL00000M0000	
2	568	1AUT	GT-P7500	SAMSUNG-Android		250	2306-0	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
3	548	1AUT	GT-P7500	SAMSUNG-Android		250	2306-1	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
4	549	1AUT	GT-P7500	SAMSUNG-Android		250	2306-0	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
5	1269	1AUT	GT-P7500	SAMSUNG-Android		250	2306-0	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
6	1281	1AUT	GT-P7500	SAMSUNG-Android		250	2306-3	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
7	1282	1AUT	GT-P7500	SAMSUNG-Android		250	2306-4	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
8	1274	1AUT	GT-P7500	SAMSUNG-Android		250	2306-5	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
9	1	1AUT	GT-P7500	SAMSUNG-Android		250	2306-0	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
10	67	1AUT	GT-P7500	SAMSUNG-Android		250	2306-0	checkAppUpgrade Request	01	0	3.0.021				com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
11	433	1SKZ	GT-I9100	SAMSUNG-Android		412	2306-0	checkAppUpgrade Request	20	0	2.6.148				com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
12	483	1XSG	GT-I9100	SAMSUNG-Android		412	2350-0	getPushNotificationMessage Re	20	0					com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
13	1074	1XSG	GT-I9100	SAMSUNG-Android		412	2350-0	getPushNotificationMessage Re	20	0					com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
14	786	1XSG	GT-I9100	SAMSUNG-Android		412	2350-0	getPushNotificationMessage Re	20	0					com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
15	1119	1XSG	GT-I9100	SAMSUNG-Android		412	2309-0	getDownloadList Request	20	0					com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
16	664	1XSG	GT-I9100	SAMSUNG-Android		412	2308-0	getKillList Request	20	0					com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
17	360	1XSG	GT-I9100	SAMSUNG-Android		412	2301-0	getUpgradeNKillCount Request	20	0				cn.wps.mc 173	android@2.1.5@android.tts@2.1.1.0a	1.0a		ESDHL00000M0000	
18	282	1XSG	GT-I9100	SAMSUNG-Android		412	2301-0	getUpgradeNKillCount Request	20	0					com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
19	490	1XEU	GT-I9100	SAMSUNG-Android		412	2301-0	getUpgradeNKillCount Request	50	0				cn.wps.mc 173	android@2.1.5@android.tts@2.1.1.0a	1.0a		ESDHL00000M0000	
20	522	1XEU	GT-I9100	SAMSUNG-Android		412	2309-0	getDownloadList Request	50	0					com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
21	951	1XEU	GT-I9100	SAMSUNG-Android		412	2309-0	getDownloadList Request	50	0					com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
22	954	1THR	GT-B5512	SAMSUNG-Android		412	2306-5	checkAppUpgrade Request	40	0	2.6.122				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
23	955	1XSG	GT-I9100	SAMSUNG-Android		412	2302-2	upgradeListEx Request	20	0	2.6.194				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
24	958	1XSG	GT-I9100	SAMSUNG-Android		412	2160-6	purchaseDetailEx Request	20	0	2.6.194				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
25	1259	1XSG	GT-I9100	SAMSUNG-Android		412	2306-2	checkAppUpgrade Request	20	0	2.6.048			cn.wps.mc 173	android@2.1.5@android.tts@2.1.1.0a	1.0a		ESDHL00000M0000	
26	1344	1XSG	GT-I9100	SAMSUNG-Android		412	2306-2	checkAppUpgrade Request	20	0	2.6.048				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
27	1500	TOP SECRET//SI//NF	2012-05-11 10:42:31	2012-05-11 10:42:31		412	2306-0	checkAppUpgrade Request	20	0	2.6.048				com.sec.android.app.samsungapp	1.0a		ESDHL00000M0000	
28	54	TOP SECRET//SI//NF	2012-05-11 06:43:27	2012-05-11 06:43:27		412	2300-0	countrySearchEx Request	20	0					com.sec.android.app.samsungapp	3.0		ESDHL00000M0000	
29	417	TOP SECRET//SI//NF	2012-05-13 02:32:35	2012-05-13 02:32:35		412	2200-1	countrySearch Request	20	111					com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	
30	488	TOP SECRET//SI//NF	2012-05-11 09:32:36	2012-05-11 09:32:39		412	5060-1	termInformation Request	20	0	2.6.048				com.sec.android.app.samsungapp	1.0		ESDHL00000M0000	

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CSE Workshop February 2012

- * 2 weeks
 - * CSE, DSD, GCHQ, GCSB, NSA – everyone wanted to experience a Canadian winter!
 - * Build on the work started at DSD



Winter Nirvana



The Reality!



CSE Workshop Outcomes

Refinement of XKS fingerprints to identify mobile bearers, Samsung and Android Marketplace servers

Ø *17 XKS fingerprints deployed*

Documentation of analytics in CRAFTY SHACK

Ø *These analytics are now being implemented across the 5 Eyes*

Proving the tradecraft actually works!

Ø *Scenario to test the tradecraft and analytics – Op IRRITANT HORN*

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Op IRRITANT HORN



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Op IRRITANT HORN

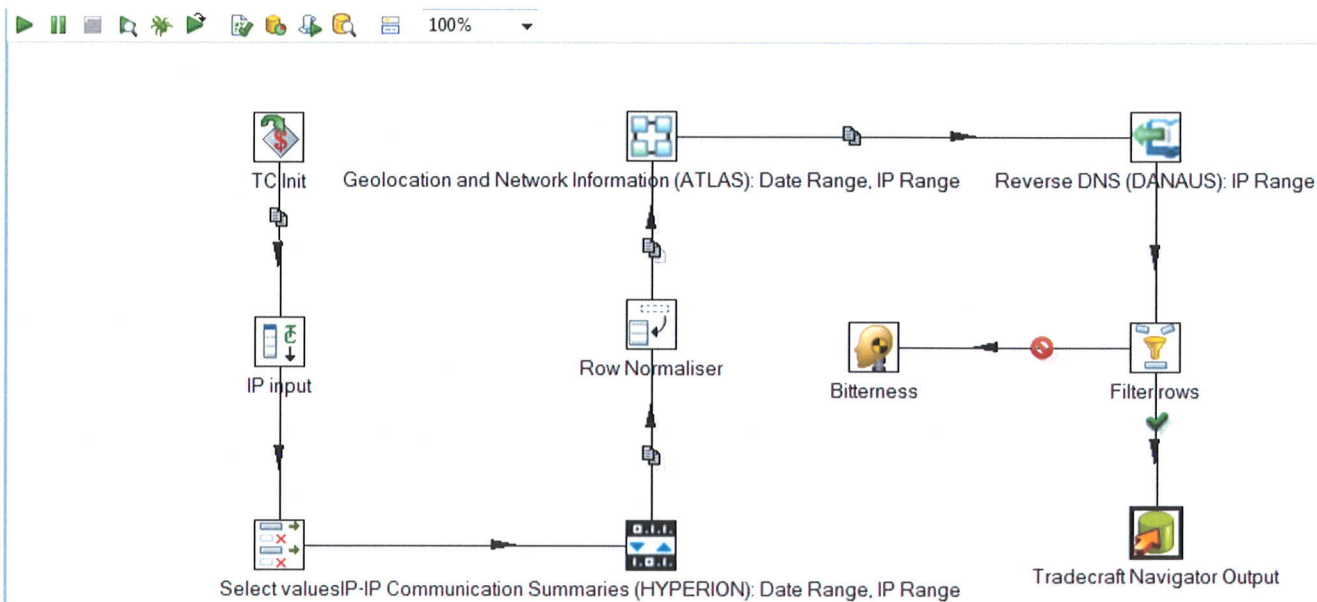
Does the tradecraft work?

- * Another Arab Spring (only this time, different countries)
- * Goal: identify aggregation points for the mobile networks in the countries of interest using the tradecraft developed during the workshops
- * Did it work? YES -> the team was able to identify connections from the countries to application and vendor servers in non 5-Eyes countries
- * So what? We found some servers....
 - Ø Potential MiTM
 - Ø Effects
 - Ø Harvesting data at rest
 - Ø Harvesting data in transit

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Finding mobile application & vendor update servers



Finding mobile application & vendor update servers

100%



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Identify Servers communicating with a Mobile network

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Identify Servers communicating with a Mobile network

5 EYES CSEC DSD GCHQ GCSB NSA Factbox

Metadata

What does the tradecraft achieve?

- This tradecraft will provide a list of servers that have been seen communicating with a mobile network.

In what situations would this tradecraft be most useful?

- To identify mobile application servers for a specific network
- To identify any server that may be useful for collection purposes

Describe any problems, caveats or things to watch out for

- The list of servers returned depends on the the IP range and collection sources utilized. Success of this tradecraft may require additional research to identify other IP ranges or requesting other agencies to check their collection to identify different servers.

Links that can help you to implement this tradecraft

Created by: [redacted]
 Agency: NSA
 Email Address: [redacted]

Difficulty: ★★
 Acceptance state: Limited

Input(s): OntologyNetwork block, OntologyIp address
 Output(s): OntologyIp address, OntologyASN, OntologyNetwork block, OntologyHostname, OntologyUser Agent String, OntologyGeographic selector

Invokes Tradecraft:

- Find public IP space used by Mobile Devices and Related Servers on the Internet
- Finding Mobile Internet Gateways

Input(s): OntologyNetwork block, OntologyIp address
 Output(s): OntologyIp address, OntologyASN, OntologyNetwork block, OntologyHostname, OntologyUser Agent String, OntologyGeographic selector

Invokes Tradecraft:

- Find public IP space used by Mobile Devices and Related Servers on the Internet
- Finding Mobile Internet Gateways

Alternatives:

- Identify Servers communicating with a Mobile network

5 EYES Tradecraft Steps (document underlying analytic, do not include tools) [edit]

The IP ranges utilized for the initial implementation of this tradecraft were the Inter PLMN Backbone IP ranges obtained from IR21 documents. For other methods of identifying mobile IP blocks, see the invoked tradecraft listed above.

- Take IP ranges or individual addresses identified as being related to mobile network communications.
- Obtain geolocation information and network ownership information for each IP address. This should include: Network Owner name, Carrier name, ASN, Continent, Country, Region, City, Lat, Long, and any other related details that your system can obtain.
- Obtain Internet communication events related to the IP addresses. These events should minimally include: source information, To IP, From IP, TCP Direction, and HTTP User-Agent.
- Sort the results and dedup them. This step depends on your collection sources.
- Filter out server communications that have user-agents that aren't useful. Further analysis is needed to identify the non-useful user-agents (cheat sheet needed). Ex: friendly-scanner.
- Check the TCP Direction field:
 - If Server to Client, grab the From IP information
 - If Client to Server, grab the To IP information
 - If Server to Server, grab both the To and From IP information
 - If Unknown, capture in an error log
- Sort and dedup again based on Server IP information. TCP Direction info is no longer needed.
- Obtain geolocation information and network ownership information for each Server IP. This is done for the servers that were not in the original IP Blocks.
- Remove any servers that are not useful. This may include 5-Eyes servers.
- Output
 - List of Servers
 - List of related User Agents
 - List of related hostnames

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Average article quality based on 1 rating(s)

Last updated: 24/2/2012 by [redacted]

Category: Tradecraft

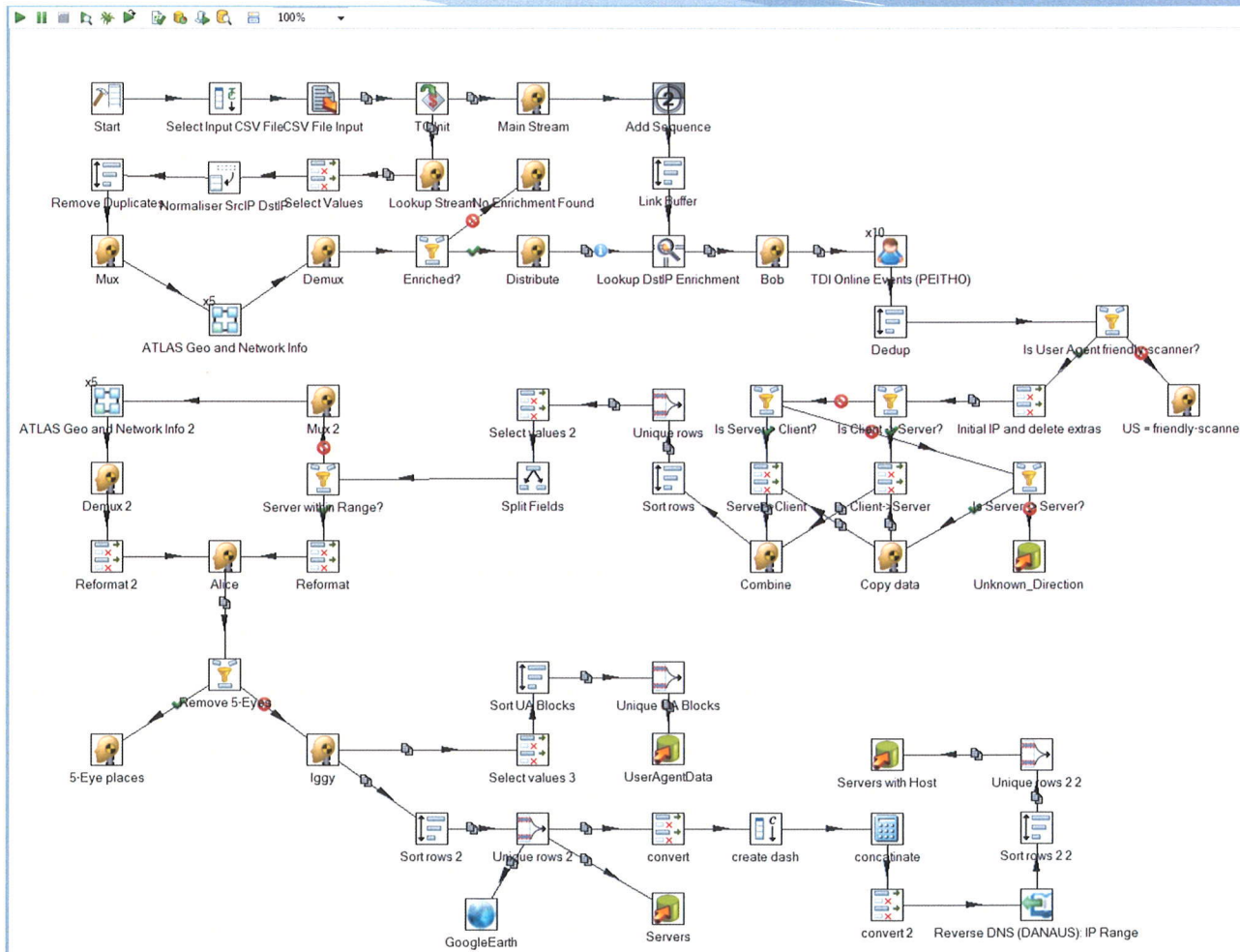
CRAFTY SHACK - "It's not tradecraft until it's documented" - [redacted] CSEC

[edit]

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Identifying servers communicating with an MNO

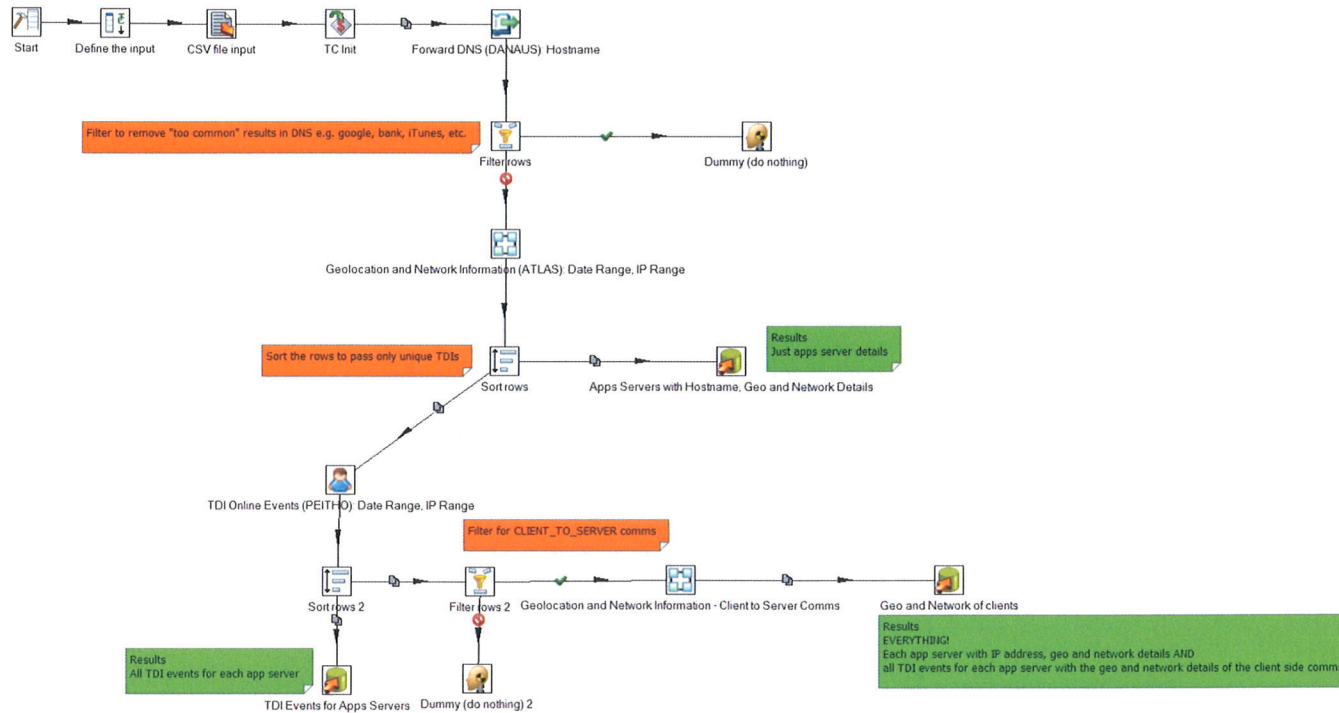


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Profiling mobile application servers

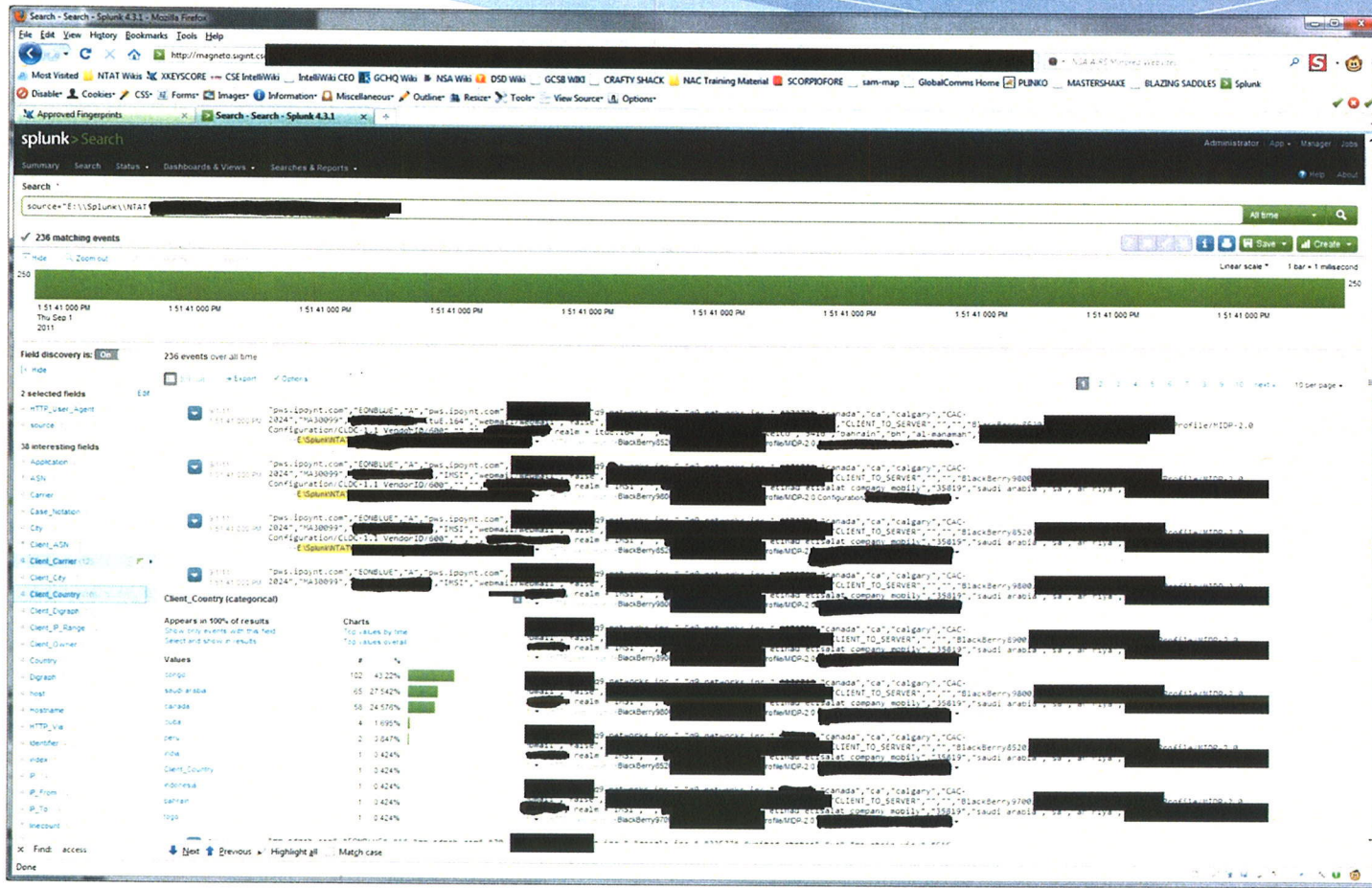
This tradecraft will accept a CSV file of known apps server hostnames. It will then perform reverse DNS queries to obtain the IP addresses of the apps servers. With the IP addresses, geolocation and network provider queries will be performed on all app server IP addresses. The IP addresses are then used to search for TDI events associated with those IP addresses. The result is a list of the apps servers with IP addresses, geolocation and provider details, as well as TDI events seen connecting to those apps servers. The TDI events are also queried to determine their geolocation and provider details.



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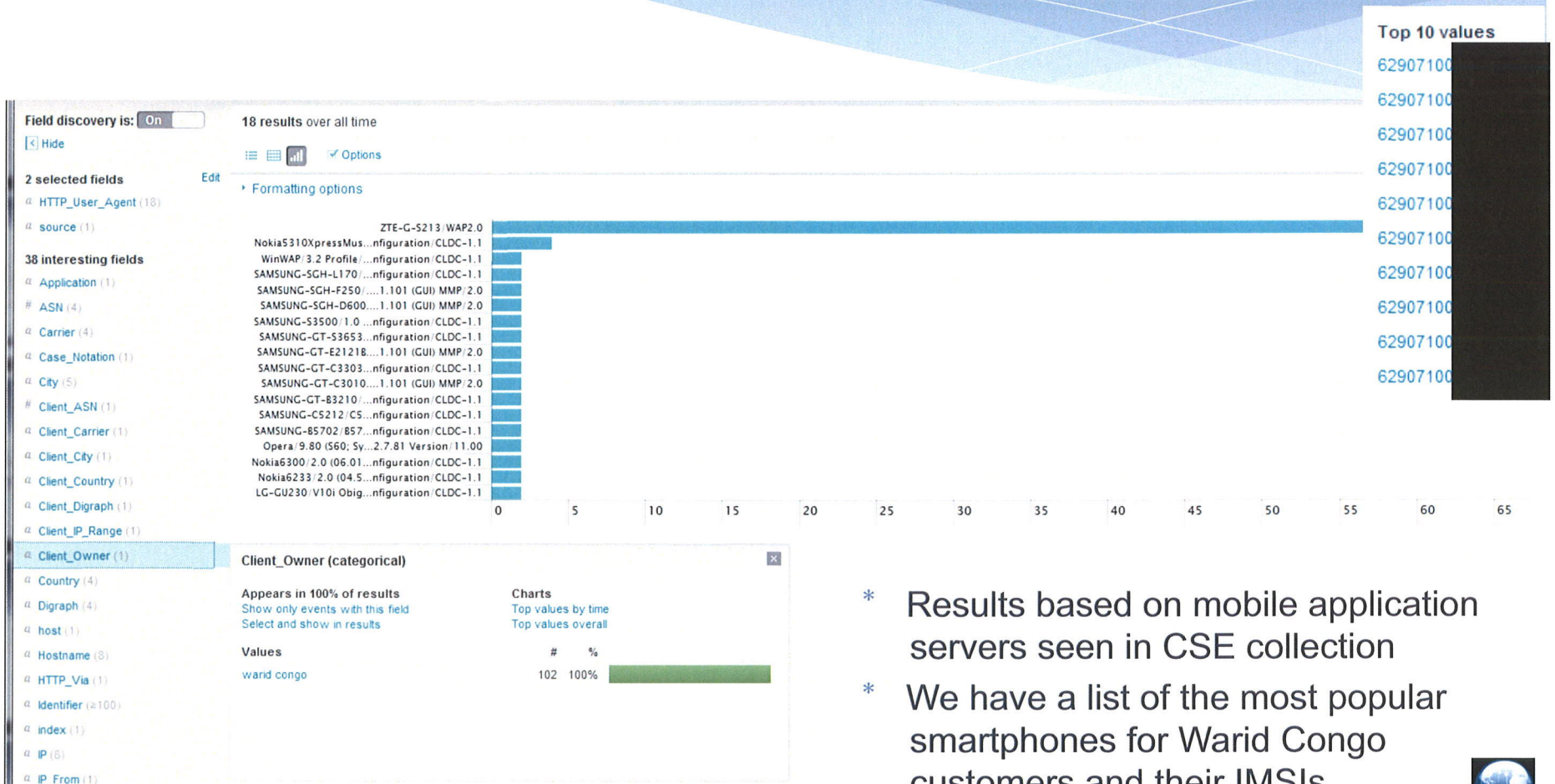
Profiling mobile application servers



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Profiling mobile application servers



- * Results based on mobile application servers seen in CSE collection
- * We have a list of the most popular smartphones for Warid Congo customers and their IMSIs

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Success Stories

- * UCWeb mobile browser identification
 - * Discovered by GCHQ analyst during DSD workshop
 - * Chinese mobile web browser – leaks IMSI, MSISDN, IMEI and device characteristics



UCWeb

* Led to discovery of active comms channel from [REDACTED]

*(S//SI//REL TO USA, FVEY) The CONVERGENCE team helped discover an active communication channel originating from [REDACTED] that is associated with the [REDACTED] [REDACTED] as they are known within the [REDACTED] hierarchy area of responsibility is for covert activities in Europe, North America, and South America. The customer [REDACTED] leveraged a **Convergence Discovery capability that enabled the discovery of a covert channel associated with smart phone browser activity in passive collection.** The covert channel originates from users who use UCBrowser (mobile phone compact web browser). **The covert channel leaks the IMSI, MSISDN, Device Characteristics, and IMEI back to server(s) in [REDACTED]** Initial investigation has determined that perhaps malware can be associated when the covert channel is established. [REDACTED] covert exfil activity identifies SIGINT opportunity where potentially none may have existed before. Target offices that have access to X KEYSCOPE can search within this type of traffic based on their IMSI or IMEI to determine target presence*

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UCWeb – XKS Microplugin

State	ID	Datetime	Highlights	Datetime End	Browser Version	Email Address	Handset Model	IMEI	IMSI	Global Title	Platform	Active User/	Casenotation
1	1	2012-05-13 02:29:20		2012-05-13 02:29:23	8.0.3.107	@123movies	nokiae90-1			9379900100	java		E9DHL00000M0000
2	3	2012-05-13 06:00:59		2012-05-13 06:01:00	8.0.3.107	@123movies	nokiae90-1			9379900100	java		E9DHL00000M0000
3	4	2012-05-13 19:39:11		2012-05-13 19:39:11	7.9.3.103		HTC A510e				android		E9BDE00000M0000
4	2	2012-05-14 12:29:53		2012-05-14 12:29:53	8.0.4.121	@djgol	NokiaE72-1				sis		E9DHL00000M0000
5	5	2012-05-14 17:46:46		2012-05-14 17:46:46	8.0.4.121	@mobimasti	NokiaX6-00				sis		H5H125221450000
6	6	2012-05-15 18:28:19		2012-05-15 18:28:19	8.0.4.121	@mobimasti	NokiaX6-00			93781090013	sis		H5H125221450000
7	7	2012-05-15 20:02:58		2012-05-15 20:02:58	8.0.4.121	@mobimasti	NokiaX6-00			93781090013	sis		H5H125221450000

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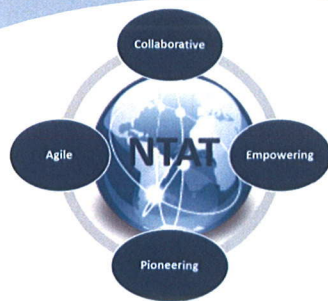
Vision of Success

- * Shared convergence database with numerous different sources, methods & tradecraft feeding into it
- * Ultimately correlating telephony and Internet TDIs with some degree of confidence



Synergising Network Analysis Tradecraft

Network Tradecraft Advancement Team
(NTAT)



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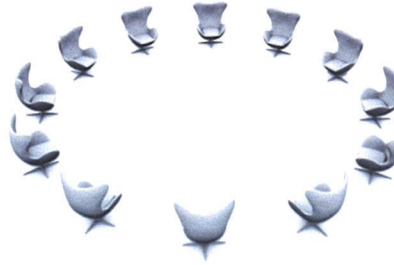


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[REDACTED]

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Winter Nirvana

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The Reality!



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- ⊙ *Scenario to test the tradecraft and analytics – Op IRRITANT HORN*

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Op IRRITANT HORN



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Op IRRITANT HORN Does the tradecraft work?

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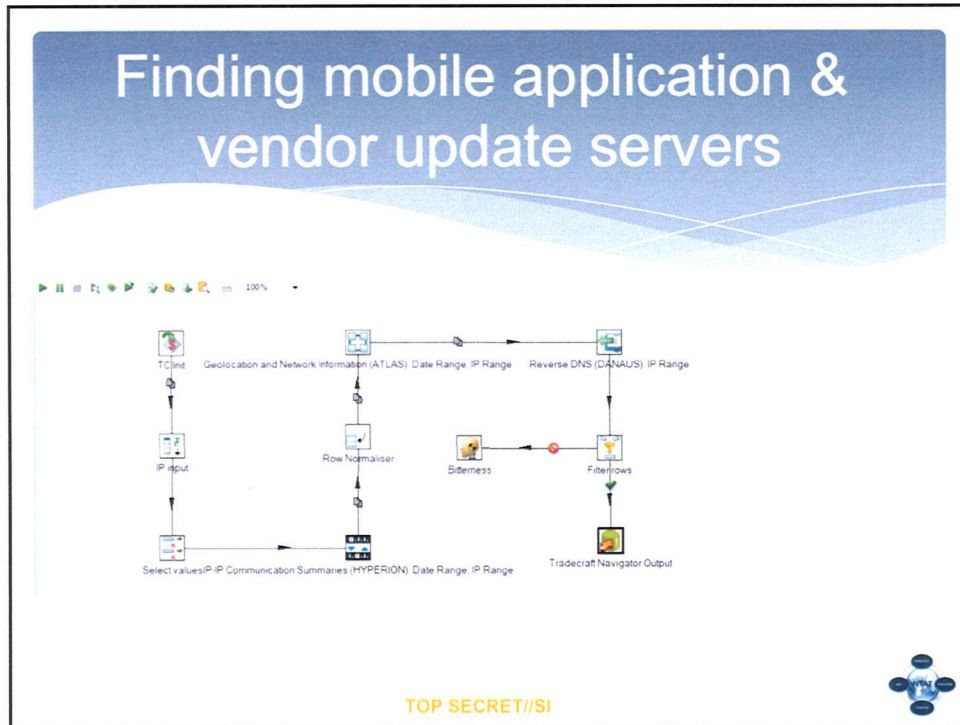


MiTM – exploit the application server and use it as a MiTM platform for handset exploitation

Effects – exploitation of the application servers could make it possible to provide selective misinformation to the targets handsets

Harvesting data at rest – exploitation of the applications servers could provide access to a wealth of information at rest. The amount and usefulness of this information depends on the application in question

Harvesting data in transit – mobile applications servers often send and receive data that SIGINT agencies find useful (e.g. the Samsung protocol sending client and handset details to a server in Germany)



The results above are from a tradecraft to find servers of applications and vendor updaters servers from given countries, The rationale behind this is to identify servers that target within those countries might visit which could be exploited by CNE to push a phone implant capability.

The tradecraft relies upon 5 tuple data seen from the mobile gateways from target countries and to servers which have matching 'key words' in the hostname. The results above could then be scoped for CNE to see if they would be valid boxes to use an access platform.


Finding mobile application & vendor update servers

Country	Server Domains
France	android-market.l.google.com
France	android-market.l.google.com
France	android-market.l.google.com
France	android-market.l.google.com
France	android-market.l.google.com
Cuba	store.cubava.cu
Cuba	store.cubava.cu
Senegal	srv_applis.sar.sn
Morocco	bougeontelesphone.com
Switzerland	download-force.com
Bahamas	support.apple.com
Cuba	store.cubava.cu
Netherlands	mobile.ero-advertising.com
Russia	lady.marketgid.info

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Identify servers communicating with a Mobile network

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Identify Servers communicating with a Mobile network

SEVES CSC DSD GCHQ GCSB NSA TROJAN

Metadata

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In what situations would this tradecraft be most useful?

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Describe any problems, constraints or things to watch out for

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Links that can help you to implement this tradecraft

Created by: [redacted]

Agency: [redacted]

Email Address: [redacted]

Difficulty: ★★☆☆☆

Acceptance status: Limited

Inputs: [redacted] [redacted] [redacted]

Outputs: [redacted] [redacted] [redacted]

Inputs:

- [redacted]
- [redacted]
- [redacted]

Outputs:

- [redacted]
- [redacted]
- [redacted]

Inputs:

- [redacted]
- [redacted]
- [redacted]

Outputs:

- [redacted]
- [redacted]
- [redacted]

Inputs: [redacted] [redacted] [redacted]

Outputs: [redacted] [redacted] [redacted]

Inputs:

- [redacted]
- [redacted]
- [redacted]

Outputs:

- [redacted]
- [redacted]
- [redacted]

Inputs:

- [redacted]
- [redacted]
- [redacted]

Outputs:

- [redacted]
- [redacted]
- [redacted]

SEVES Tradecraft:

- Find public IP ranges used by Mobile Devices and Related Servers on the Internet
- Find Mobile Internet Gateways

SEVES Tradecraft Steps (document underlying analysis, do not include tasks)

The IP ranges utilized for the initial implementation of this tradecraft were the listed IP Ranges (derived from MIT documents). For other methods of identifying mobile IP Ranges, see the associated tradecraft listed above.

Step 1: Take IP ranges or individual addresses identified as being related to mobile network communications

Step 2: Obtain geolocation information and network ownership information for each IP address. This should include: Network Name, Carrier Name, ASN, Continent, Country, Region, City, IAS, Org, and any other related details that your system can obtain

Step 3: Obtain related geolocation details related to the IP addresses. These details should minimally include: source information, To, IP, From, TCP, UDP, and HTTP User Agent

Step 4: Sort the results and display them. This may depend on your collection sources

Step 5: Filter out great communications that are not useful. Further analysis is needed to identify the most useful user agents (if that is needed). (a) Identify location

- Check for Server: grab the To IP information
- Check for Server: grab both the To and From IP information
- Customize: adjust as necessary

Step 6: Sort and display again based on Server IP information. TCP Direction offers no insight needed

Step 7: Obtain geolocation information and network ownership information for each Server IP. This is done for the servers that were not in the original IP Ranges

Step 8: Eliminate any servers that are not useful. This may include: (a) geo servers

Step 9: Input:

- List of Servers
- Geographical Area Agency
- List of Related Hostnames

Comments (2)

Comments

Comments

CRAFTY SHACK - "It's not tradecraft until it's documented" [redacted] SEC

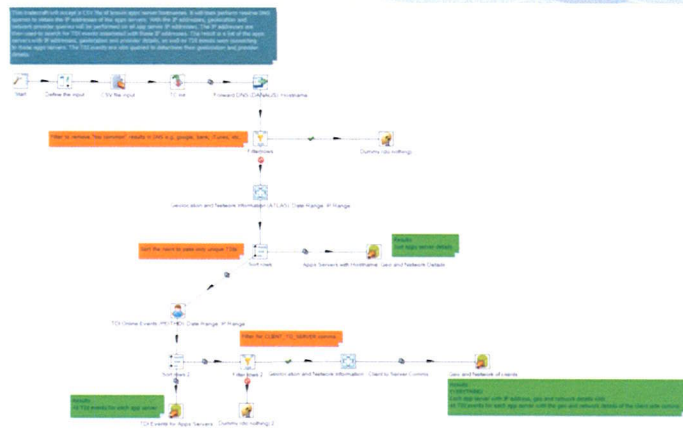
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Identifying servers communicating with an MNO



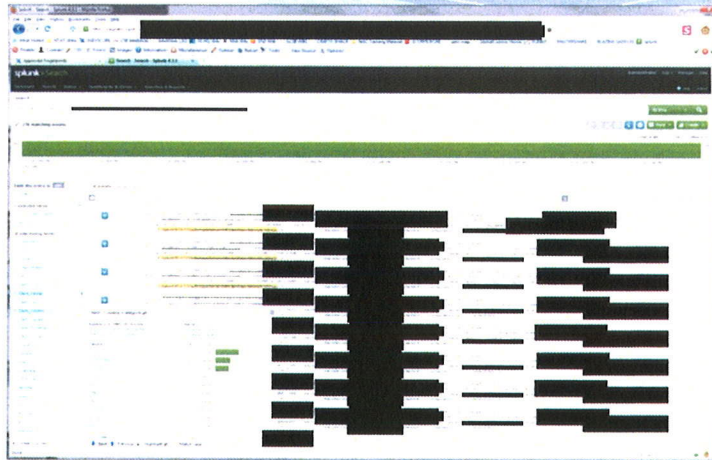
Profiling mobile application servers



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Profiling mobile application servers



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Profiling mobile application servers



- * Results based on mobile application servers seen in CSE collection
- * We have a list of the most popular smartphones for Warid Congo customers and their IMSIs

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Success Stories

- * UCWeb mobile browser identification
 - * Discovered by GCHQ analyst during DSD workshop
- * Chinese mobile web browser – leaks IMSI, MSISDN, IMEI and device characteristics

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UCWeb

- * Led to discovery of active comms channel from [REDACTED]

(S//SI//REL TO USA, FVEY) The CONVERGENCE team helped discover an active communication channel originating from [REDACTED] that is associated with the [REDACTED] as they are known within the [REDACTED] hierarchy area of responsibility is for covert activities in Europe, North America, and South America. The customer [REDACTED] leveraged a **Convergence Discovery capability that enabled the discovery of a covert channel associated with smart phone browser activity in passive collection.** The covert channel originates from users who use UCBrowser (mobile phone compact web browser). **The covert channel leaks the IMSI, MSISDN, Device Characteristics, and IMEI back to server(s) in [REDACTED]** initial investigation has determined that perhaps malware can be associated when the covert channel is established [REDACTED] covert exfil activity identifies SIGINT opportunity where potentially none may have existed before. Target offices that have access to X-KEYSCORE can search within this type of traffic based on their IMSI or IMEI to determine target presence.



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UCWeb – XKS Microplugin

UCWeb

Help Actions Reports View Map View

ID	Date	ID	DateTime	Highlights	Category End	Browser Version	Address	Hardware Model	OS	Device Title	Platform	Active UserID	Cookie/Session
1	1	1	2012-05-13 02:29:20		2012-05-13 02:29:23	8.8.3.187	[REDACTED]	22movers	NOIAER90.1	3279900100	java		ESOML0000000000
2	1	3	2012-05-13 06:00:58		2012-05-13 06:01:00	8.8.3.187	[REDACTED]	22movers	NOIAER90.1	3279900100	java		ESOML0000000000
3	1	4	2012-05-13 19:39:11		2012-05-13 19:39:11	7.9.3.102	[REDACTED]	HTC_A510e			android		ESOML0000000000
4	1	2	2012-05-14 12:29:52		2012-05-14 12:29:52	8.8.4.121	[REDACTED]	hghpl	NokiaXE-00		s60		ESOML0000000000
5	1	3	2012-05-14 17:46:46		2012-05-14 17:46:46	8.8.4.121	[REDACTED]	hghpl	NokiaXE-00		s60		HSHT25221460000
6	1	5	2012-05-15 18:28:19		2012-05-15 18:28:19	8.8.4.121	[REDACTED]	hobimast	NokiaXE-00	32781000013	s60		HSHT25221460000
7	1	7	2012-05-15 20:02:58		2012-05-15 20:02:58	8.8.4.121	[REDACTED]	hobimast	NokiaXE-00	32781000013	s60		HSHT25221460000

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Vision of Success

- * Shared convergence database with numerous different sources, methods & tradecraft feeding into it
- * Ultimately correlating telephony and Internet TDIs with some degree of confidence



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Synergising Network Analysis Tradecraft

Network Tradecraft Advancement Team
(NTAT)

