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Goal Oriented Pentesting

Getting the most value out of Penetration Testing

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About me

- Joshua “Jabra” Abraham
  - Joined Rapid7 in 2006 as a Security Consultant
  - Extensive IT Security and Auditing experience
  - Worked as an enterprise risk assessment analyst for Hasbro Corporation
- Specializes in…
  - Network Pentesting, Web Application Audits and Custom Code Development
- Open-source code development projects
  - Contributes to BackTrack LiveCD, BeEF, Nikto, Fierce, and PBNJ
- Past speaking engagements
  - BlackHat, DefCon, ShmooCon, Infosec World, CSI, OWASP Conferences, LinuxWorld, Comdex and BLUG
- Twitter: http://twitter.com/jabra
- Blog: http://spl0it.wordpress.com

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Breaking through a misconception

How many times during a scoping call have you heard the customer say the goal of the assessment is to “Hack Us?”

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“Hack Us” – Is NOT good enough

- “Hack Us” is subjective
- What do you mean by “Hack”?
- How do you know when you are done?
- What is the success criteria for “Hacking” the customer?
- How do you measure the “Hack”?

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Agenda

- **The need for a better approach**
- Goal Oriented Overview
- Defining SMARTER Goals
- Methods for Success
- Examples from the Field
- Summary/Q&A

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Background Information

- The primary objective of all assessments is to demonstrate risk
- Difference between a risk rating from a vulnerability scanner and a business risk is that a business risk takes into account the value of each asset
- Vulnerabilities are found by automated tools
- A threat does not have to be demonstrated in order to constitute a risk.

Background Information

- Vulnerability Management
  - Identify vulnerabilities (False positives / False negatives)
  - Risk of 10 Vulnerabilities compared to 1000
  - Assign value to assets and data
- Penetration Testing
  - Demonstrating Risk
- Methodology
  - OSSTMM, OWASP etc

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The need for a better approach

- How do you know what is MOST important?
- Achieve Domain Admin access on 1st day
- Access to all data
- Maybe get lucky and guess right
- Shouldn't need to guess
  - data X more valuable/important than data Y ?

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Which Data or Systems would you go after?

- With Control of
  - The entire network
  - OR .. all windows systems
  - OR .. all *nix systems
- Evil Attacker - Destructive
- Evil Attack – Financially motivated
- Consultant - Pentester
- Malicious System Admin
- Malicious Employee
- Malicious Executive

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Raising the bar on penetration testing

- There are several technical methodologies
  - Define what and how to test
  - OWASP, OSSTMM and vulnerabilityassessment.co.uk
- Industry lacks a common process
  - Outline a method to facilitate the testing process
  - Ensure assessment/project completion

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Real-World Pentesting

- Evil Attackers - Blackhats
  - Financially Motivated
  - Not limited by amount of time and/or resources
- Pentesters – Whitehats
  - Context / Goal Focused (experience, 6th sense, etc)
  - Demonstrate real world risks, but limited by the time of the engagement
  - A snapshot of the network/ application at a point in time

Clear Motivation

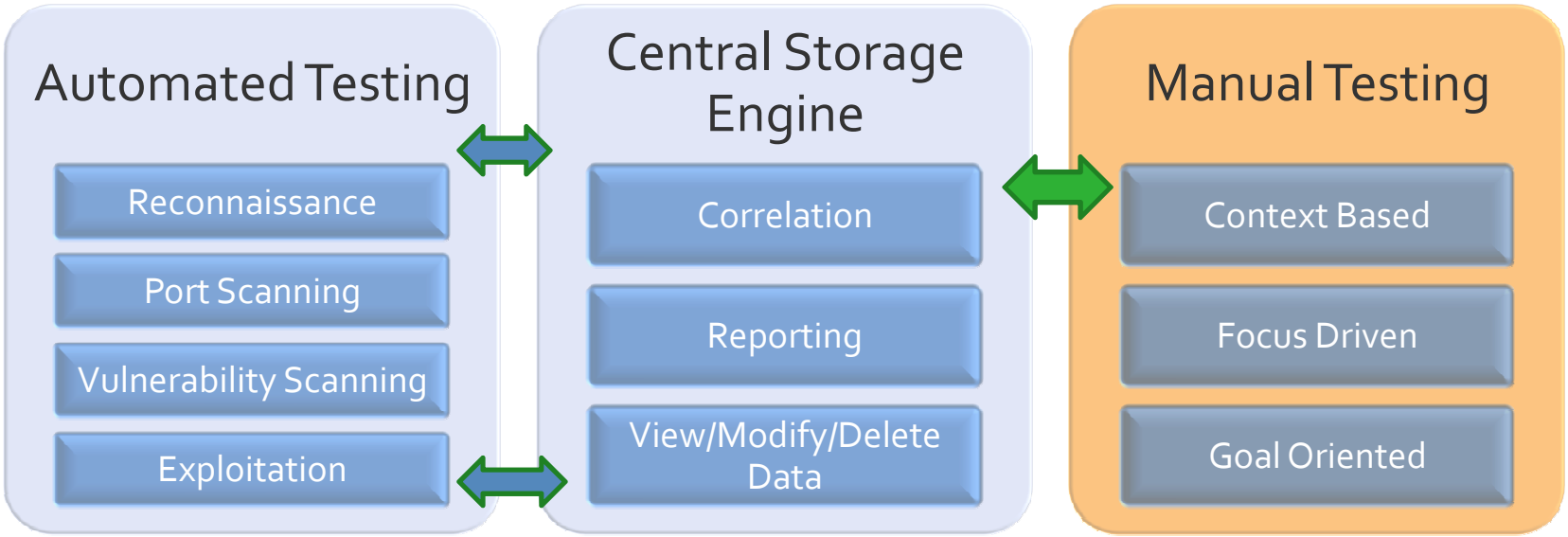
- Emulate a Blackhat, by using Goals as motivation
- Doesn’t decrease the experience / 6th sense elements
- Allows the pentesting team to focus efforts on critical weaknesses

Goal Oriented Pentesting

- Non-technical methodology in which the process is the central focus
- Goals are focus points (drivers) for the assessment
- Provides the best (ROI) for organizations when they conduct a penetration assessment

Goals 101

- Goals can be achieved in parallel or a serial process
- Each goal may have a number requirement for unique paths verified
  - Discussed during scoping call



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SMARTER Goals

- **S – Specific**
- **M – Measurable**
- **A – Attainable**
- **R – Relevant**
- **T – Time-Bound**
- **E – Evaluate**
- **R – Reevaluate**

- "Hack us" is NOT sufficient!
- S.M.A.R.T.E.R. Goals
  - PM technique
  - Saves Time!
- Customers should demand that consultants use a Goal Oriented Approach

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SMARTER Goals (S – Specific)

- What is involved?
  - Sharing of Data (customer and pentest team)
  - Completeness w/ Recon
- Internal Pentest
  - Access to Oracle database
- External Pentest
  - Access to the internal network via social engineering

SMARTER Goals (M – Measurable)

- How do you know when a goal is achieved?
- Focus on systems that can lead to achieving the goal
- Gain RW privileges
  - AAA table
  - BBB database
- Gain access to 1+ domain admin accounts

SMARTER Goals (A – Attainable)

- Define goals based on the perspective of the assessment
  - Limit goals to the most important areas
- Example of a goal that is NOT attainable:
  - Identify all risks within an application

SMARTER Goals (R – Relevant)

- Every goal in a penetration assessment should be focused on either:
  - Achieving access to sensitive data for the business
  - Demonstrating real world risks
- Example:
  - Gain access to the corporate ERP database containing sensitive information
- Keep in mind, that not all goals are data-centric
  - Create a DoS condition against the IPS or WAF
  - Deface a website

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SMARTER Goals (T – Time-Bound)

- Nearly all assessments are time-bound
  - 1 day, 1 week, 1 month etc
- Limit the amount of time spent to achieve a goal
- Example:
  - Gain access to the internal network via wireless (limited 1 day).
- Time constraints may need to be adjusted
  - Goal is achieved sooner
  - Constraints are limiting progress

SMARTER Goals (E – Evaluate)

- Discuss the status after amount of time.
  - Time bound (x days or x weeks)
  - Nothing is preventing progress (modify goals as needed)
- Unique methods
  - Sometimes there is a requirement for specific number of unique paths
  - Demonstrate ease of exploitation and attacker's flexibility

SMARTER Goals (R – Reevaluate)

- Discuss the status after goal completion
  - Event bound
- Access to the database was achieved, but SQLmap and SQLninja failed.
- How long would it take to create a tool script kiddies could use?

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Scoping

- What type of data is most sensitive?
- What data would put the organization on the front-page of the New York Times?
- Data-classifications should be provided to the Pentesting team
- Goals can be data-centric (but not always!)

Leveraging Unique Paths

- Success criteria for goals is to achieve them
- Demonstrating a specific number of unique paths
  - Provides a clear-view that weaknesses exist in many areas
- Will a pentest find all unique paths?
  - Not necessarily
  - Hit a point of diminishing returns
- Number of unique paths should be agreed upon with the scope

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External Network Penetration Assessment – Sample Goals

- Identify all of the externally accessible IPs
- Gain access to
  - Internal network (remotely) –
    - Via network or application based vulnerability
    - Via social engineering
  - Production MSSQL database
- Achieve and maintain undetected access for 24 hours

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External Network Penetration Assessment – Customer X

- Found a system external that contained network diagrams (test.company.com)
- Diagram of All internal and external systems!
- Detailed how the network was configured
- Contained several root passwords for the internal network!
- Publicly accessible + No authentication needed
- Used Fierce v2 to find it

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Application Assessment – Sample Goals

- Gain access to:
  - A user's account
  - An administrator's account
    - Elevate the privileges of a user's account
  - The application's backend database
- Achieve and maintain undetected access for 24 hours

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Application Assessment – Customer X

- SQLninja and SQLmap failed me.
  - This is pretty sad!
- How long would it take to develop a PoC to pull data from the database?

- ... Approximately 6 hours.
- Had a working PoC.

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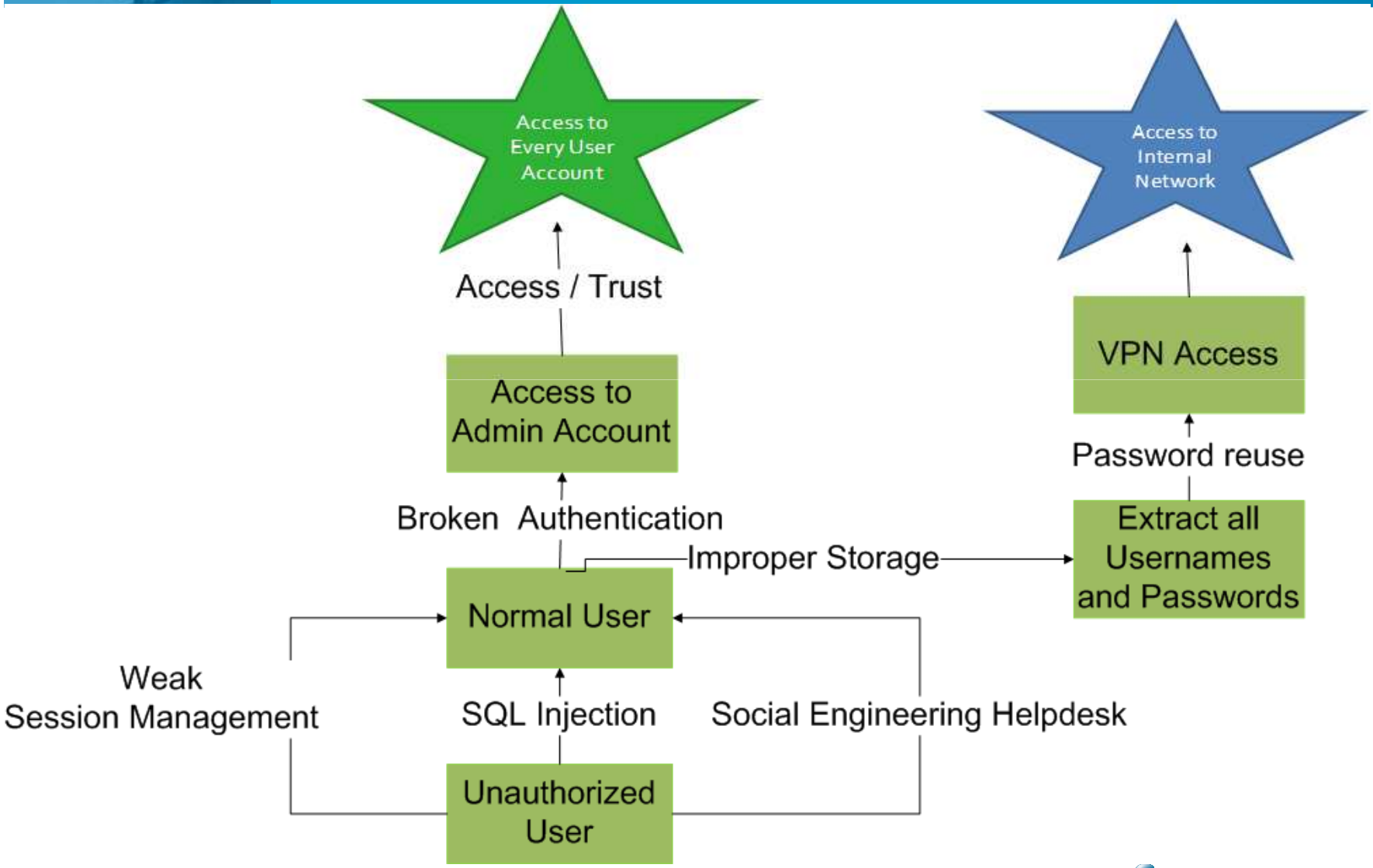
Application Assessment – Customer Y



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Internal Network Penetration Assessment – Sample Goals

- Gain physical access to the network
- Gain access to the:
  - Corporate wireless
  - Production MSSQL database
  - Domain controller (within the PCI environment) as an administrator
- Achieve and maintain undetected access for 24 hours

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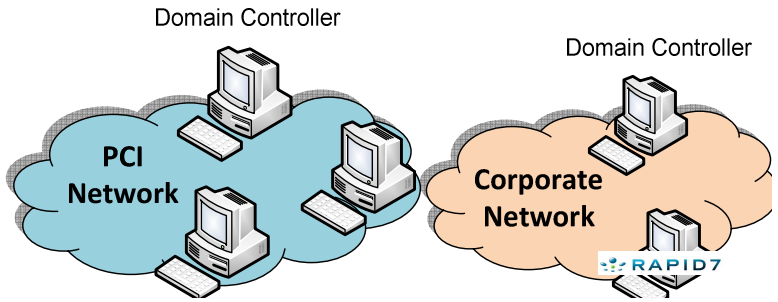
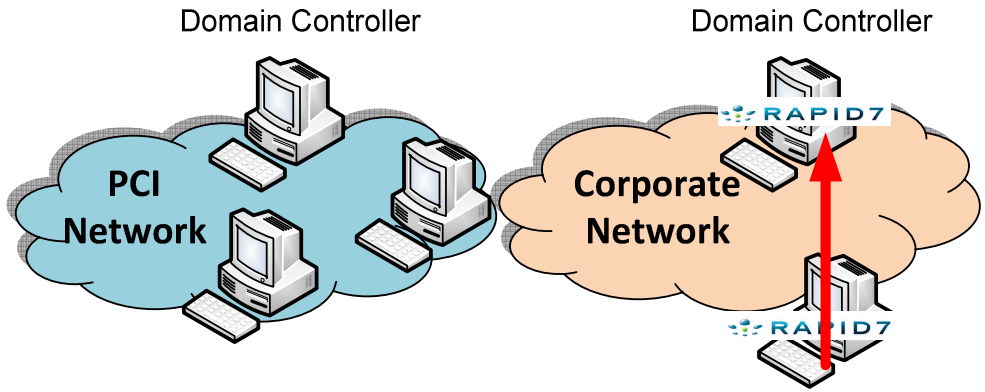
Internal Network Penetration Assessment – Customer X





- Pass-The-Hash + Token Impersonation
- ARP Spoofing
  - Unclear-text protocols
- Weak passwords
- Unpatched systems
- Workstation Network was easy
- PCI Network was well protected

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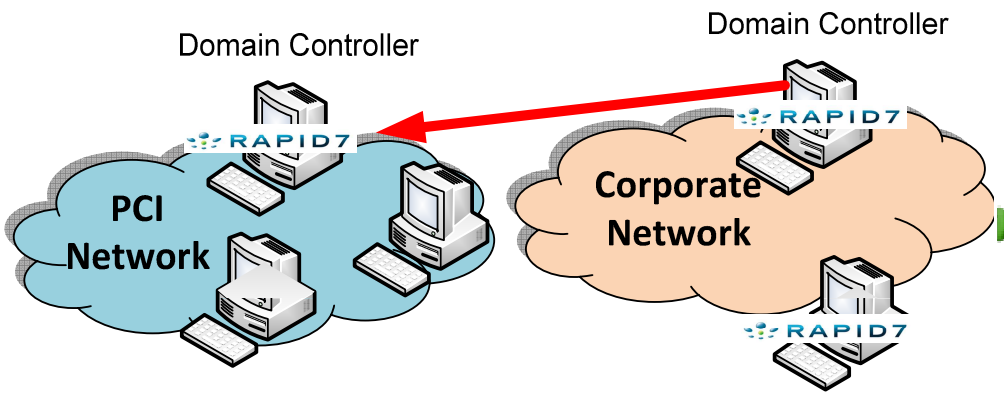
Internal Network Penetration Assessment – Customer X



- Added Admin Account onto PCI Network Domain Controller
- Inter-Domain Trust

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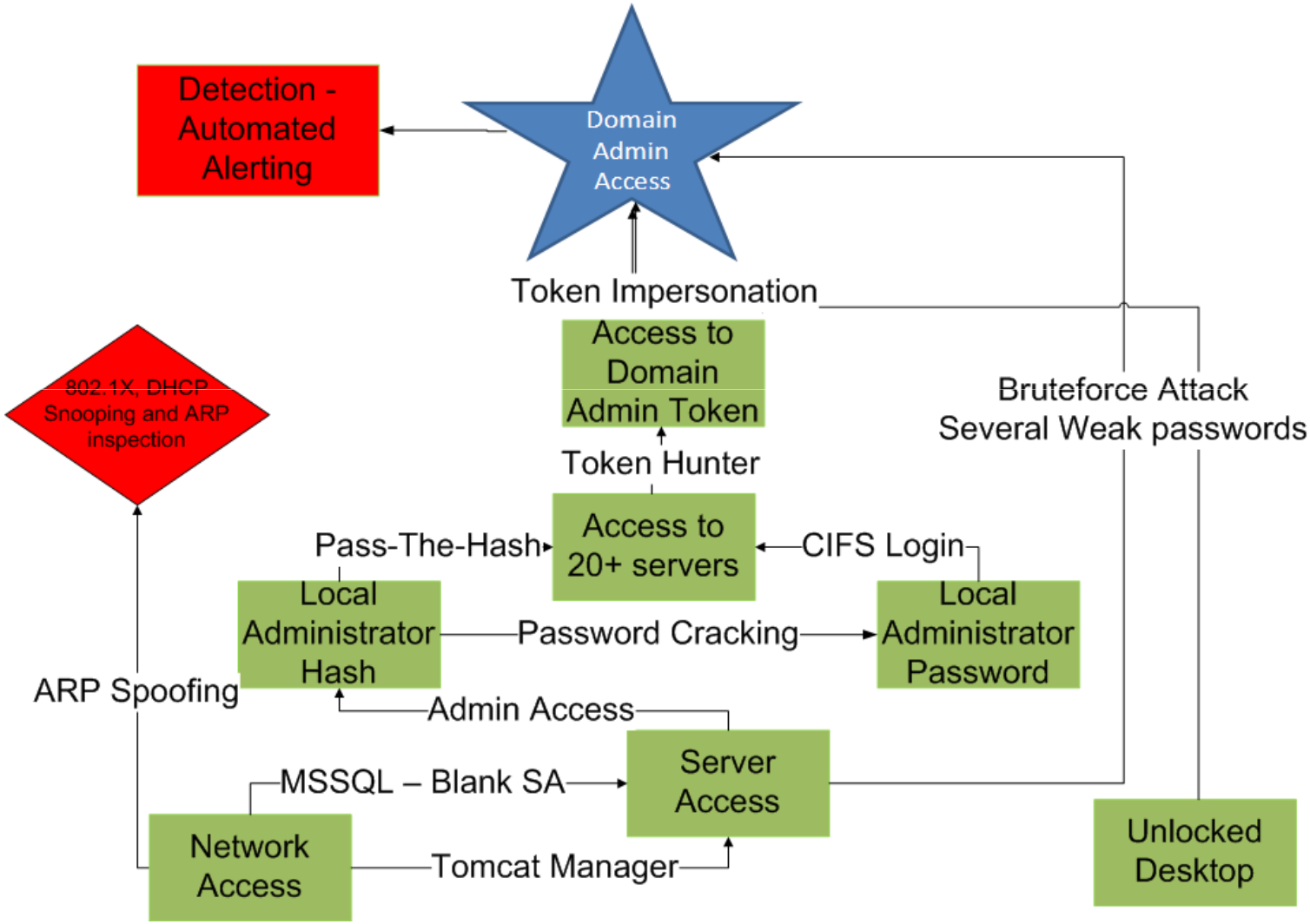
Internal Network Penetration Assessment – Customer Y



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Summary

- Strategic and Practical Methodology for Improving the ROI of any security assessment
- Leverages project management ideals
- Goals are not the only element of testing, only a place to start
- Whitepaper still in the works…
  - It will be released at Rapid7.com

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