NYWIC Project

New York State Department of Health

WIC Program Services

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Deliverable: WIC2Go & CARA Application

Mobile Application Capacity and Infrastructure Plan

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Revision History

Date	Version	Revised By	Description
12/8/2017	0.1	Jay Saunders	Draft version
12/19/2017	0.2	Jay Saunders	Added AKANA, transactional volume estimates, context diagram, and participant security documentation.
1/24/2018	0.3	Jay Saunders	Responded to comments
3/5/2018	0.4	Jay Saunders	Updated diagrams
11/28/2018	1.0	Jay Saunders	CARA Updates
2/25/2019	1.1	Jay Saunders	Change medium to high

Deliverable Description

The mobile application capacity and infrastructure plan outlines the anticipated capacity and infrastructure requirements needed to support the NYWIC WIC2Go Application and the CARA Mobile Application.
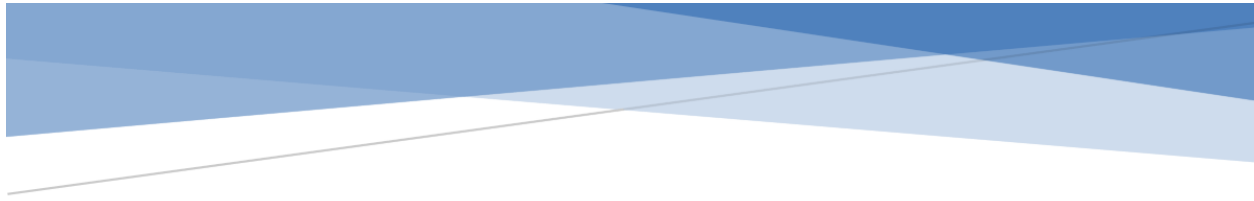
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NYWIC Mobile Application Capacity and Infrastructure Plan

1   Overview

This document is intended to document the database capacity and hosting requirements for the NYWIC WIC2Go Application (WIC2Go) and the Case Activity Reporting Application (CARA) Mobile Application. Three Sigma is proposing both applications be hosted at CNSE using a shared set of virtual machines. Each mobile application will expose a web service infrastructure hosted in Internet Information Service (IIS). Each application will be configured with its own web site running under a dedicated worker process.

The figure below describes a reference hosting architecture for the WIC2Go application currently in use by a WIC program in another state. The WIC2Go application will utilize WCF Restful services to support all communications between the mobile device and the NYS application servers. The hosting infrastructure will require access to the NYWIC Oracle database, SMTP mail services, and Conduent web services.
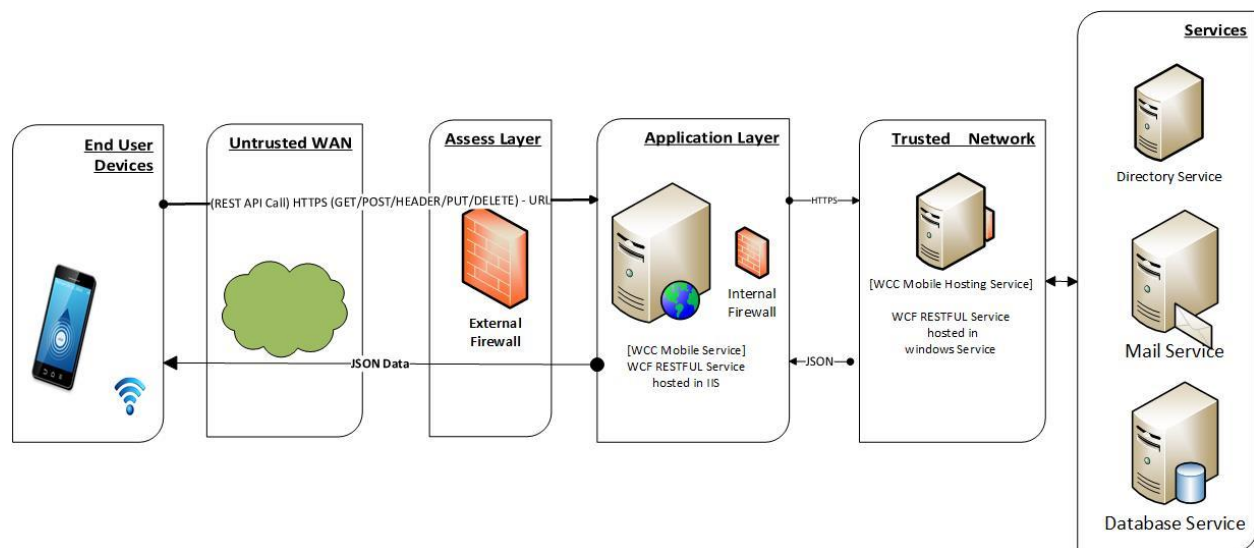

Figure 1 - WIC2Go Application Standard Deployment

2   Hosting Architecture

The web service infrastructure for the mobile applications can be hosted using a variety of configurations. The web services can be deployed in two primary configurations:

1) Web services on the application tier with business services located on the same server

2) Web services deployed in the presentation tier accessing Windows Communication Foundation (WCF) business services located in the application tier

Based on data from Maryland, we anticipate that all NY mobile application usage can be supported on a single server. NYS may prefer to maintain a load balanced pair of servers to allow for higher redundancy. Three Sigma has provided server sizing for both a single server and load balanced configuration.

The diagrams below show the possibility of SMTP functions being supported from the Application Server tier. At this time, not email functions have been enabled in either WIC2GO or CARA. Connectivity to Conduent via the AKANA gateway is necessary for both applications.
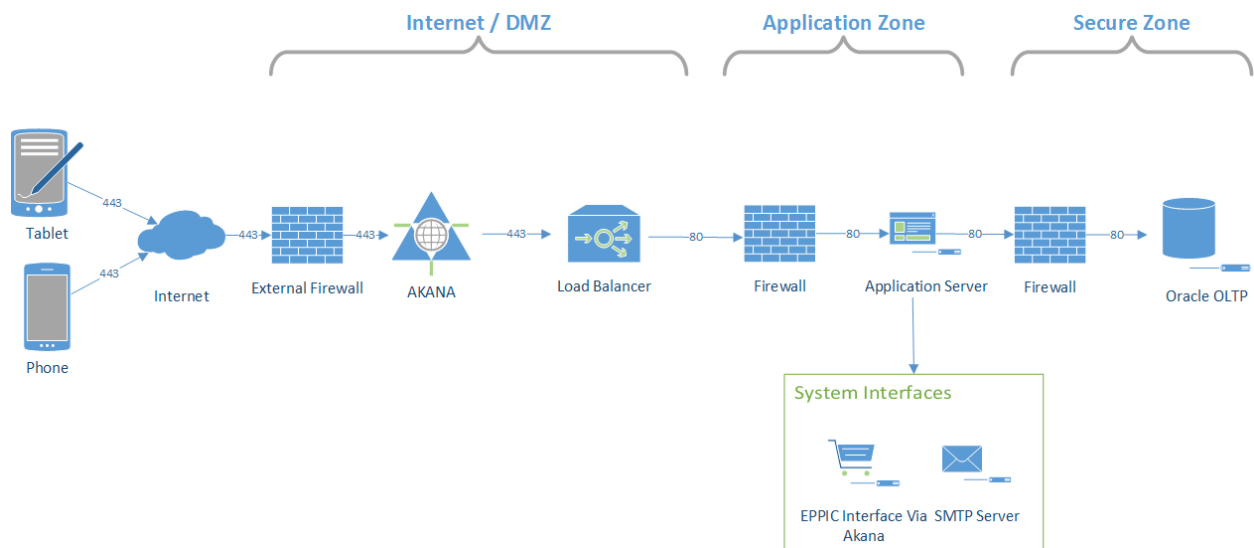

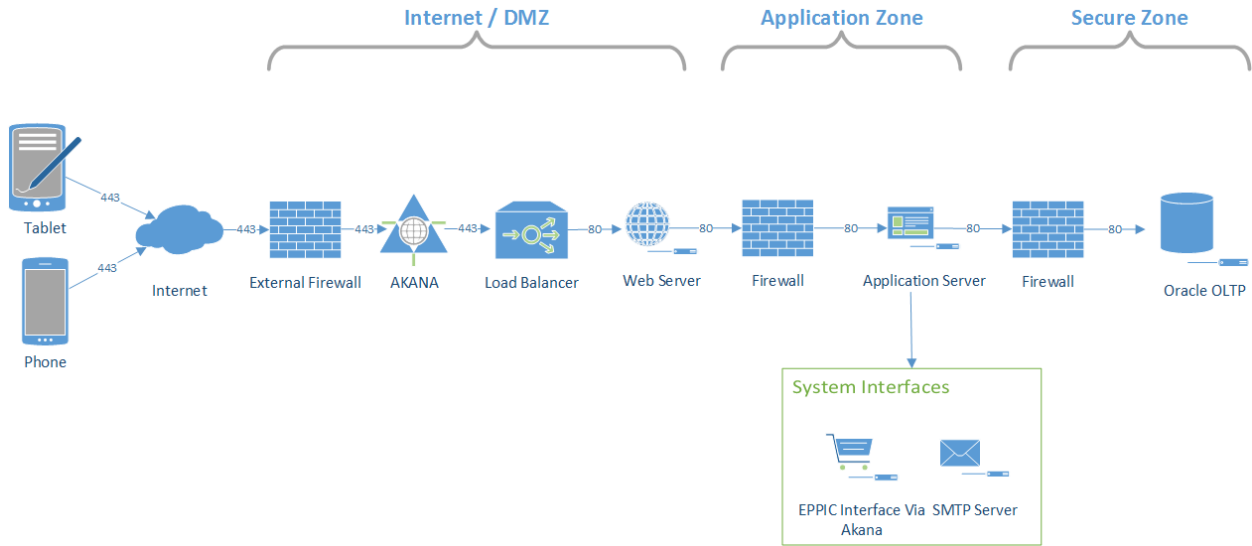**Figure 2 - Single Tier Non-Load Balanced Configuration**

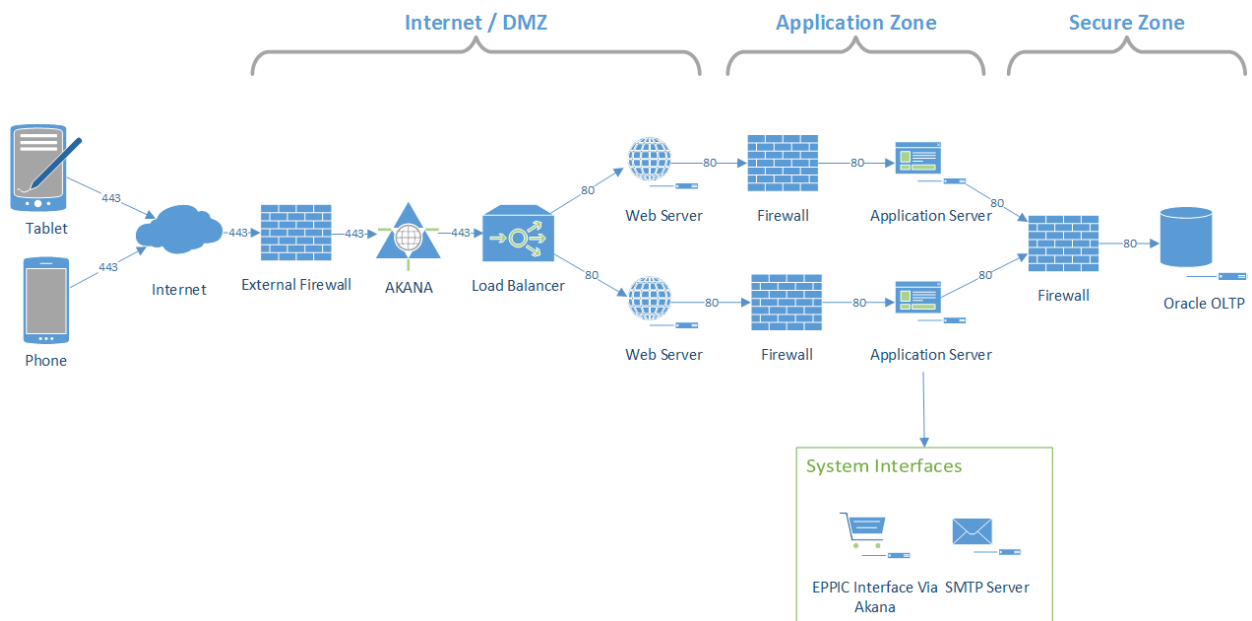**Figure 3 – Two Tier Non-Load Balanced Configuration**

Figure 4 – Two Tier Load Balanced Configuration

3   Database Requirements

The WIC2Go application will require minimal data storage. The purpose of the application is to allow participants to view existing data within the NYWIC system. The WIC2Go application schema will primarily contain user and logging tables needed to authenticate users and monitor their activity.

CARA is primarily intended to allow users to download, update, and upload data to the NYWIC application. The primary data storage impact will be the storage of images captured using the CARA mobile application. This plan includes an estimate of additional document storage needed to support photos uploaded via the CARA mobile application.

The NYWIC database will be expanded to include two new schemas to house WIC2Go and CARA tables. These tables will primarily be used for storing user data and logging information.
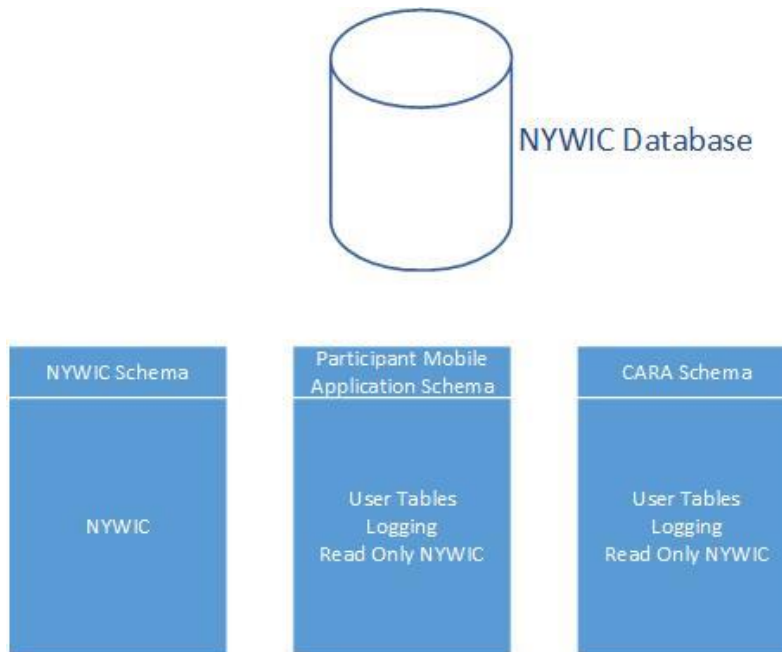
Figure 5 - NYWIC Schemas

The anticipated storage required for logging data is very limited. We currently anticipate this data will be less than 1 gigabyte per year. BSI anticipates needing to store approximately 500 images per week. This would result in approximately 25,000 images per year. Assuming that image quality is relatively high at 1 megabyte per image, another 25 gigabytes of storage will be required per year.

Program staff will need to test capturing images of various sizes and identify methods to control image size captured on the iPad. We assume a higher quality image will be required as the image will be used as evidence for administrative and potential legal action. A summary of anticipated storage requirements per year is shown below:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Production Database	1	2	3	4	5	6	7
Document Storage (GBs)	25	50	75	100	125	150	175
RMAN Backups (GBs)	5.2	10.4	15.6	20.8	26	31.2	36.4
Exports (GBs)	1.7	3.4	5.1	6.8	8.5	10.2	11.9
TOTAL (Gigabytes)	32.9	65.8	98.7	131.6	164.5	197.4	230.3

Figure 6 - Database Storage

4 Hardware Components

4.1 Non-Load Balanced - Single Server

The following are the recommended minimal specifications for the production virtual machines in a non-load balanced single server configuration:

Hardware role	Hardware Configuration
Application Servers (If Load Balanced 2X 2 vCPU, 8 Gig)	• Virtual Server • 2.7 GHz processor • 4 vCPU • 16 GB RAM • 50 GB OS Disk Space
Database Server	Covered in NYWIC Plan

4.2 Non-Load Balanced – Separate Web and Application Servers

The following are the recommended minimal specifications for the production virtual machines in a non-load balanced configuration:

Hardware role	Hardware Configuration
Web Servers	• Virtual Server • 2.0 GHz processor • 4 vCPU • 16 GB RAM • 50 GB OS Disk Space
Application Servers	• Virtual Server • 2.0 GHz processor • 4 vCPU • 16 GB RAM • 50 GB OS Disk Space
Database Server	Covered in NYWIC Plan

4.3 Load Balanced Configuration

The following are the recommended minimal specifications for the production virtual machines in a load balanced configuration:

Hardware role	Hardware Configuration
Web Servers	• Virtual Server • 2.0 GHz processor • 2 vCPU • 8 GB RAM • 50 GB OS Disk Space
Application Servers	• Virtual Server • 2.0 GHz processor • 2 vCPU • 8 GB RAM • 50 GB OS Disk Space
Database Server	Covered in NYWIC Plan

4.4   UAT Hosting

If NYS wants to maintain a set of test services to allow for HockeyApp testing against a NYS based UAT instance there are two primary hosting options:

1) Create additional web sites on the existing UAT/Training environment to host services that point to the UAT database instance. The workload added for mobile application testing will be minimal and rarely performed. This should have no impact on the hosting infrastructure.

2) Host services on small web servers (1 or 2 vCPU, 4-8 GB RAM) in a non-load balanced configuration.

5   Software Components

The following table lists the software needed based on Server Type.

Server Type	Software Configuration
Web server	- Windows Server 2012 R2 Enterprise Edition - IIS .NET Framework 4.0 - Antivirus software - Backup software (for VM not per machine)
Application server	- Windows Server 2012 R2 Enterprise Edition .NET Framework 4.0 - Antivirus software - Backup software (for VM not per machine) - Oracle Client
Database server	Covered in NYWIC Plan

6   Transactional Volumes

6.1   WIC2Go Application

Usage of the WIC2Go Application is difficult to estimate. The following estimate was developed based on discussions with WIC program staff.

The estimate is that across roughly 300,000 WIC Households (Active) an average of 40% will utilize the application twice per month. This would result in 240,000 application uses per month. Using an estimate of 20 web service calls per use, the total estimate is 4,800,000 web service calls per month.

This estimate results in a fairly modest transactional load on servers. User activity will not be evenly distributed but will occur 7 days a week across most business hours. Using a 16 hour day, the anticipate transaction volume is 167 transactions per minute or roughly 3 per second.

6.2   CARA

The CARA application is primarily designed to work in offline mode. Web services support searching for cases, checkout of case data, and check in of case data. Users may check in/out daily or weekly. The number of web service calls will be low but the volume of data transported may be high as a result of the transfer of images and compressed data.

The number of transactions will vary based on the final design of the CARA application. A conservative initial estimate is that up to 40 users would require 1,000 web service calls per week. This would result in up to 40,000 web service calls per month.

7   Security

7.1   WIC2Go Application

The WIC2Go Application (PMA) has been identified as a Low Security (No PPSI) application. The application has only one user type, WIC participants, and all users have access to the same features and functions. The application will only write data to the PMA schema in order to create user accounts and to record logging information. All other functions are limited to accessing WIC Program approved data element related to the participant's records.

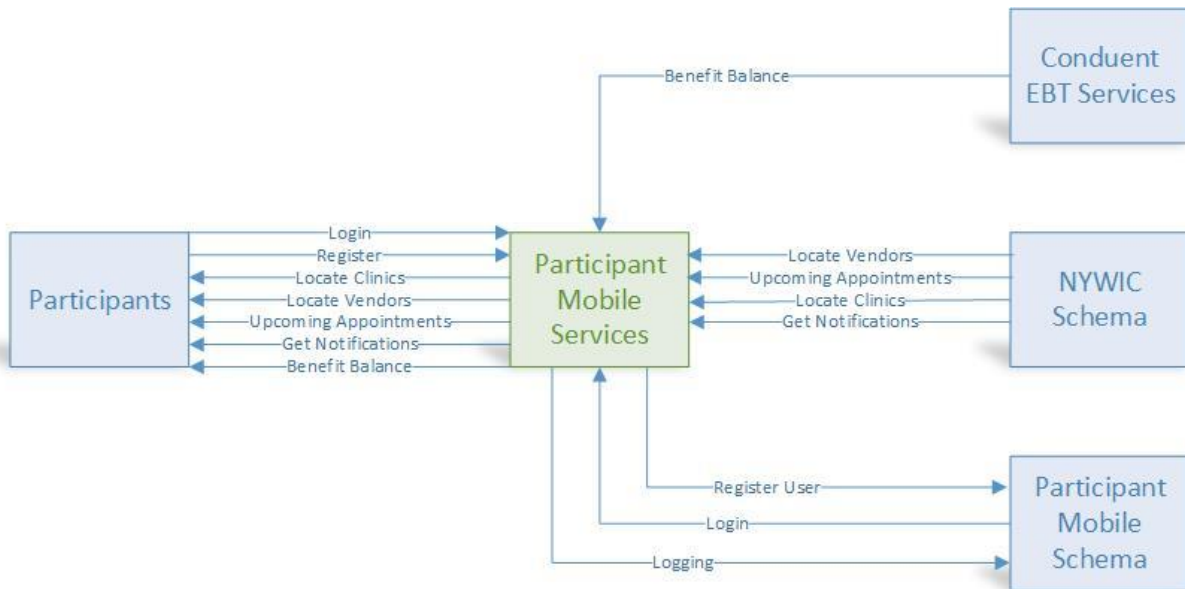A simple context diagram is provided below:

Figure 7 - WIC2Go Context Diagram

The PMA application will utilize an Oracle user account separate from the NYWIC application. The account will only require access to a set of stored procedures that will read/write/update tables in the PMA Schema and read from selected tables within the NYWIC schema. No direct table access will be required. Synonyms will be used to make specific tables available within the PMA schema.

Users will have the ability to create accounts and to assign passwords by verifying several identifying pieces of information on their WIC record. Once created, they will be able to log in using their email address and password. Following successful login, the PMA Rest API will issue a temporary token that will grant access to the service library. The service infrastructure will enforce a timeout period following a configurable number of login or identifying information failures to prevent brute force attacks against the service infrastructure. Three Sigma also recommends that all foreign and blacklisted IP addresses be blocked by firewall rules.
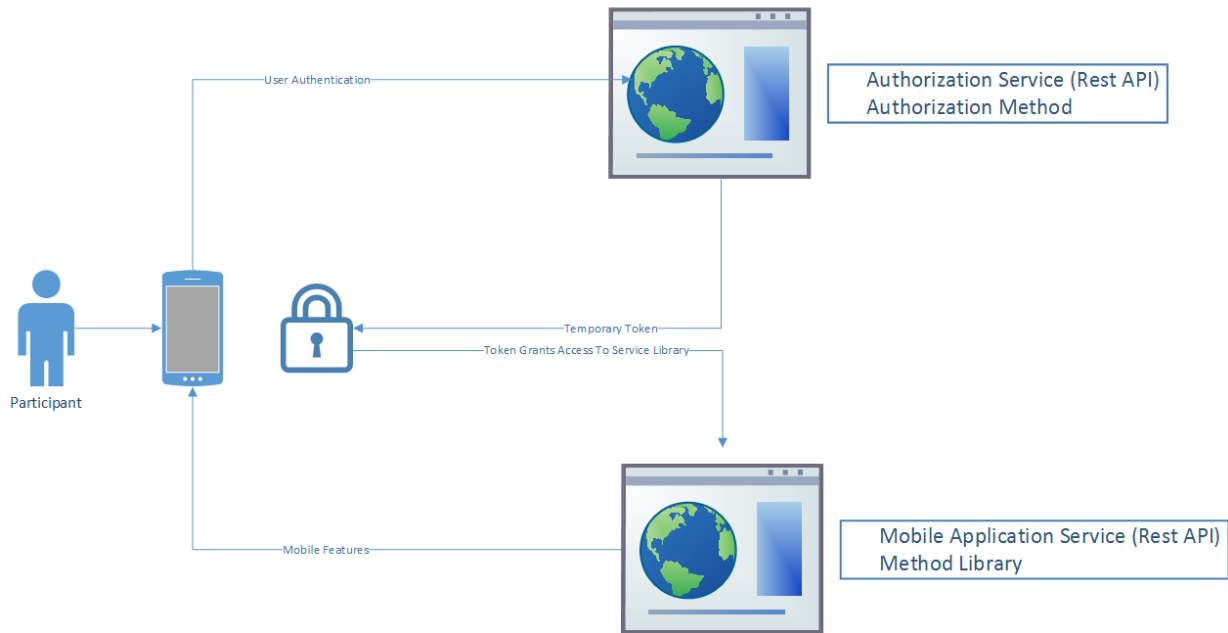
Web Service Security

Figure 8 - WIC2Go Security

7.2 CARA

The CARA Application has been identified as a High Confidentiality application. The application has only one user type, Bureau of Special Investigations employees, and all users have access to the same features and functions. The application allows users to download limited information about current vendors and participants under investigation. Identifying information other than the entities name, case number, and state assigned WIC vendor number is not downloaded.

CARA will allow the collection of investigative notes, employee names, employee descriptions, pictures of noted non-compliance, attestations, and digital signatures. CARA will be operated on state owned Apple iPads used exclusively for CARA field data collection. The units will be protected using MobileIron software. Only the single authorized user will have access to the iPad hardware. Device password management, device encryption, and other security measures are based on NYS ITS security standards and are outside the scope of this document.

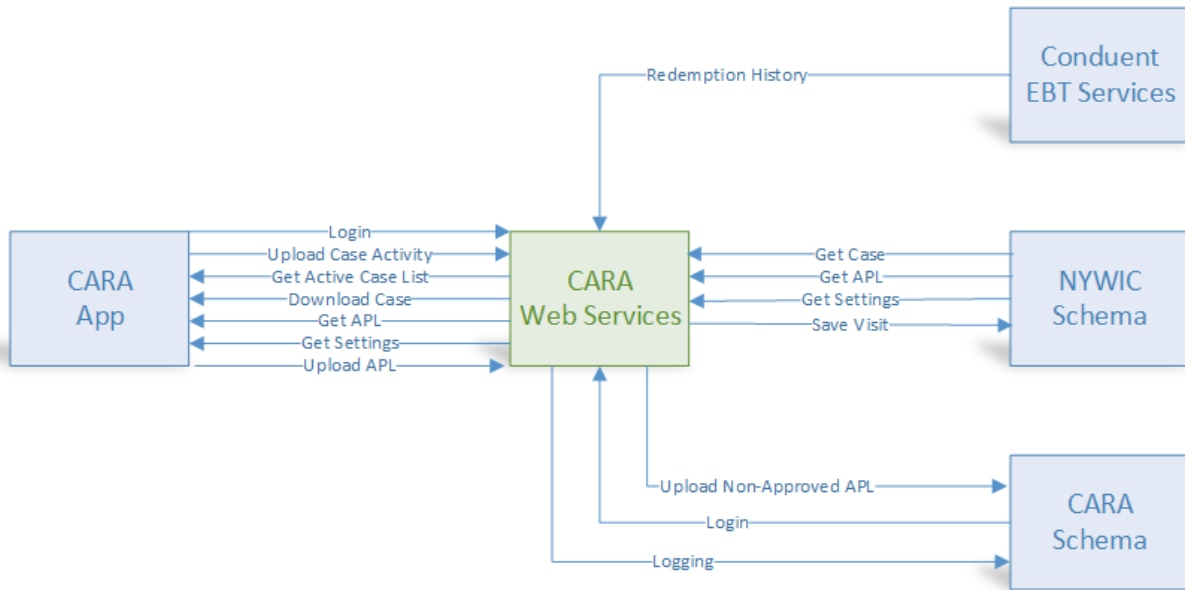A simple context diagram is provided below:

Figure 9 - CARA Context Diagram

The CARA application will utilize an Oracle user account separate from the NYWIC application. The account will only require access to a set of stored procedures that will read/write/update tables in the CARA Schema and read/write/update selected tables within the NYWIC schema. Synonyms will be used to make specific tables available within the CARA schema.

Users will have no ability to create user accounts within the CARA application. Users will authenticate to the mobile device using the MobileIron enforced security. The user will then need to log into NY.gov via the CARA application before being granted access to download or upload data from the NYWIC system. Additionally, the user will only be granted access to data in NYWIC that is specifically assigned to their user id. Users with no NYWIC user role or assignment will have no access to data.

Users without a valid security token will be directed to the NY.gov login portal. A login link specific to CARA will only allow login to access CARA functions. Once the user has successfully authenticated in NY.gov, the SAML token will be passed directly to a NYS hosted CARA web server and to a dedicated SAML consumption page. This page will verify the token and if verified, return a temporary application generated token to the mobile device. All subsequent communications to the web services will be validated using the generated application token.

NY.gov redirects to SSO Auth Page, authentication and timeout controlled by web server
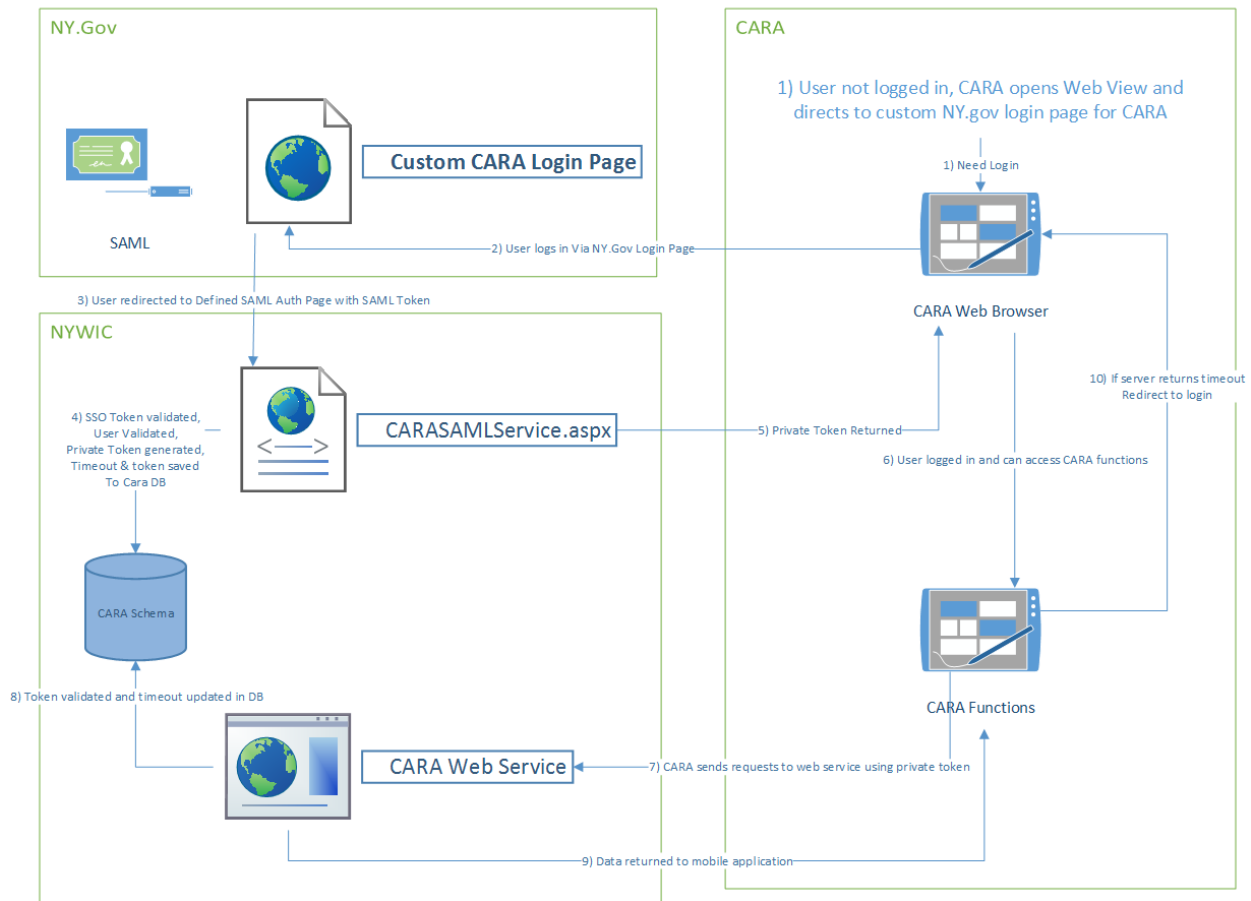
Figure 10 - CARA SAML Authorization Model

8   Mobile Hardware Support

8.1   WIC2Go Application

The WIC2Go Application will be designed to work on a broad variety of Apple and Android mobile phones. The application will operate on a tablet but will be designed for mobile phone use. Considerations will be made to ensure that the mobile application will display on older model phones, but the primary emphasis will be on the support of iPhone 5 and later models. The WIC2Go application will be distributed via the Apple App Store and Google Play Store.

8.2   CARA

The CARA application will be designed specifically for a single model of Apple iPad selected by the WIC program. New York has purchased Apple iPad Pro model A1709 (2017) with a 10.5" display. The CARA application will be distributed via a private NYS app store. All iPads will be secured using MobileIron in accordance with NYS and ITS mobile device security management policies.

9   Other Considerations

Other specifications and recommendations found in the NYWIC Capacity and Architecture plans remain unchanged.