**ID Deliverable - Conceptual Design**

Team 7

October 12th, 2024

**Abstract**

*This deliverable presents preliminary drafts visualizing the SIM swapping detection program. The system comprises several interconnected subsystems: detection, location, bandwidth monitoring, alert generation, and administrative access. These subsystems are designed to communicate with each other, forming a comprehensive framework for identifying fraudulent SIM cards. Data exchange between subsystems will occur via Shabodi’s API integration. This document offers a project overview, detailed descriptions of each subsystem, and a comprehensive block diagram illustrating the overall system.*

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# **1** **Introduction**

The objective of the deliverable is to develop a set of conceptual designs for an application for enterprises that will detect SIM Swaps based on previous deliverable user benchmarking, technical benchmarking and a list of prioritized design criteria.

# **2** **Task Distribution**

This week’s project task plan was to discuss which subsystems our team believed were involved in this project and to select one for each of us to work on over the course of the week. After that, they were compiled into a larger IPO (Input-Processing-Output) diagram and all of the subsystem charts and their drafts were shared among the team members. The plan was outlined as follows:

**Task list:**

* Design at least 2 drafts of each of the following subsystems:
  + Estimated duration of all tasks: 4-5 days.
    - Detection of SIM Swap
      * This was assigned to Abby.
    - Location
      * This was assigned to Gill.
    - Bandwidth management
      * This was assigned to Nava.
    - Alert detection
      * This was assigned to Neyssa.
    - Administrative access
      * This was assigned to Aadi.
* Compile all of the final drafts into a master diagram
  + Estimated duration: 1 day.
  + This was assigned to Nava.
* Complete the technical document as a team, splitting individual parts as needed
  + Estimated duration: 1 day.
  + This was to be completed as a team.

The tasks were selected for distribution on Tuesday during our first team meeting of the week and were to be completed by Saturday. During the second team meeting of the week, the document was finalized and prepared for submission. All tasks were achieved within the time frame.

# **3** **Subsystems**

The subsystems in this deliverable were selected based on the procedure that our group wanted the entire application to follow. From our previous project deliverables and our knowledge of the client’s needs, the SIM Swap application will follow the following subsystems: detection, location, bandwidth management, alert detection, and administrative access subsystem.

## **3.1** **Detection subsystem (Abby)**

The detection subsystem's primary function is to assess whether a SIM card is being swapped, duplicated, or used fraudulently. It accomplishes this by utilizing previously established user information to verify identity through machine-to-machine communication, eliminating the need for additional user input and analyzing the SIM card's identification.

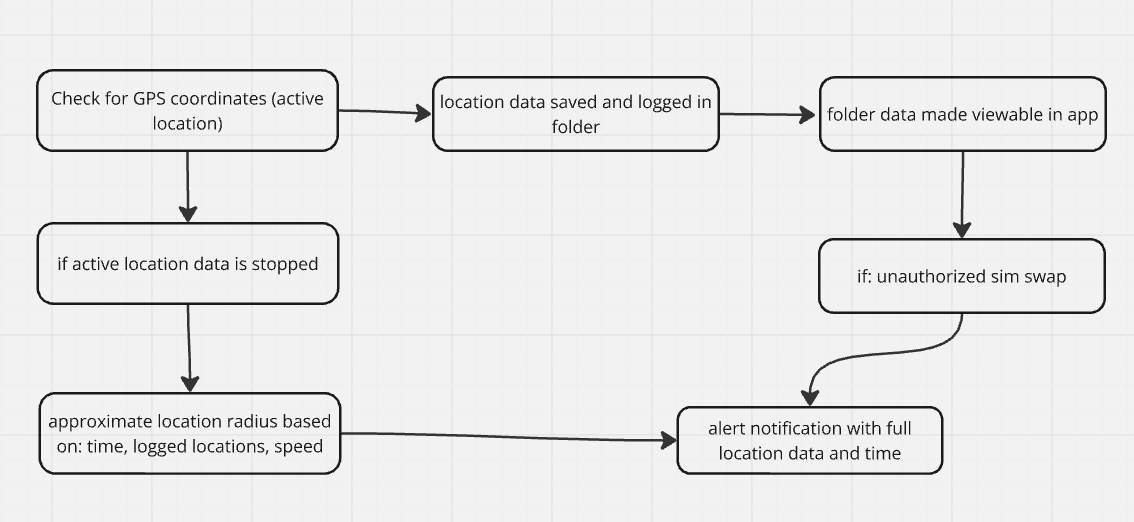
The system then incorporates the Shabodi API and links it to the user's SIM card. It conducts a SIM Swap check by processing the information through the API and examining the response to determine whether the SIM card matches and if any changes are necessary.

Following this, a risk assessment is performed, evaluating the status from the SIM card check to determine the level of risk. The final outcome is recorded and continuously monitored as per the client's request to ensure ongoing security.

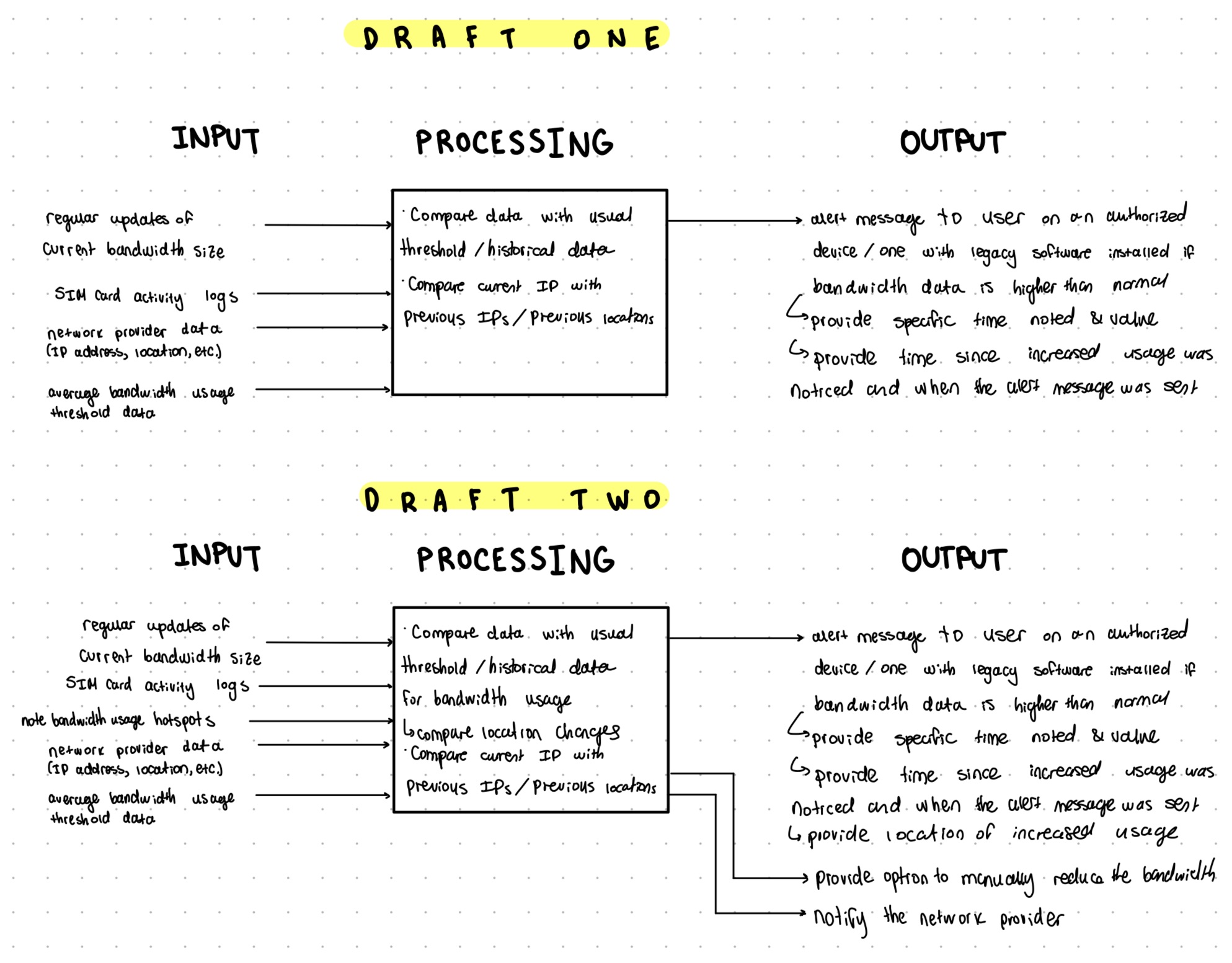
## **3.2** **Location Subsystem (Gill)**

The role of this subsystem is to constantly check the location of a SIM card at regular intervals and be able to save this data for later use. This data is then made viewable from the user's connected device. If an unauthorized SIM swap is detected, the location subsystem must then be able to use the stored location data to send a custom alert notification containing the full location data and time to the user.

In addition, if the active location is no longer detectable, the approximate location radius of the SIM is evaluated using the previous logged locations, time and speed. This subsystem is meant to seamlessly work as part of a larger system allowing the location to be utilized effectively.



## **3.3** **Bandwidth Management Subsystem (Nava)**

The primary objective of the bandwidth management subsystem is to regularly monitor the enterprise’s network bandwidth and note any changes that could potentially indicate a fraudulent SIM swap. The input into this specific section of the overall application would be regularly updated notes on current bandwidth capacity and usage (preferably measured in gigabytes, but adjustable based on the enterprise’s preferred metric). This bandwidth measurement would be repeated on a cyclical basis, likely at least once every minute. The network provider data, such as any relevant IP addresses or locations, would also be inputted. The application would compare current data with historical data in order to note suspicious activity. The output would then be a display of the specific data, a notification to the network provider, and providing the option to manually reduce the network’s bandwidth to prevent fraud. The bandwidth subsystem will make use of Shabodi’s Bandwidth API, with the limitations of this subsystem primarily being focused on the capacities of Shabodi’s existing Bandwidth API since it is oriented towards their NetAware programming and may not be compatible with all legacy IT software systems. Based on benchmarking from past deliverables, this IPO clearly outlines the idea that we have for the benchmarking subsystem to make the most of the API without having any of the drawbacks of existing benchmarking platforms such as limited administrative access and alerts. 

## **3.4** **Alert Detection Subsystem (Neyssa)**

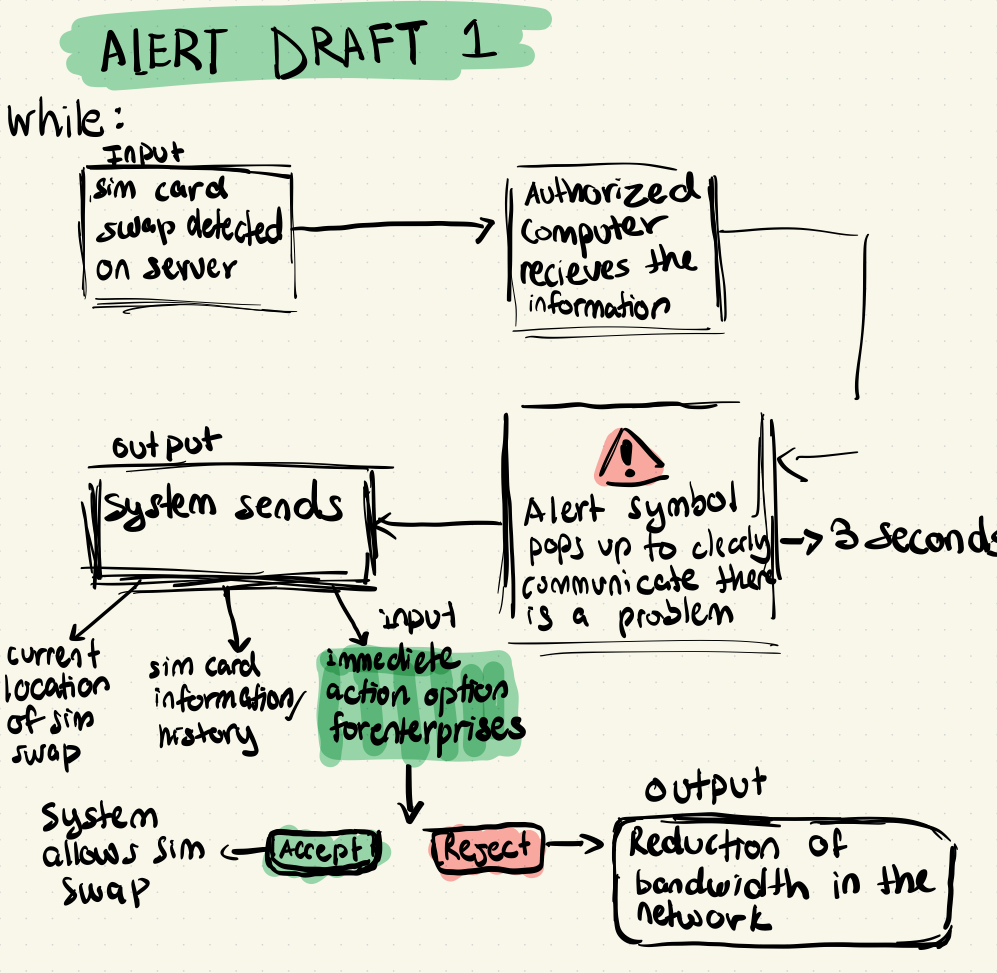
The objective of the alert detection subsystem is to send a notification to an authorized device that a SIM Swap is happening. 

Figure 1: Draft 1 for the alert detection subsystem completed by Neyssa in group 7.

The idea of the first draft was to have the application on an authorized computer to detect the SIM card swap. As soon as the authorized device receives the information an alert symbol should pop up to communicate there was a violation. The alert would be on the screen for 3 seconds while the system gathers information using the Shabodi location API and SIM swap API to send the current location of the SIM swap, the SIM card personal information and history and a provided option for approval or refusal of the swap through buttons. Clicking the accept button will allow the SIM swap to proceed, clicking the Reject button will reduce the bandwidth in the network so that data loss will be reduced. An issue with the model is that there is still human-to-machine interaction which Shabodi the client wants to limit or avoid.

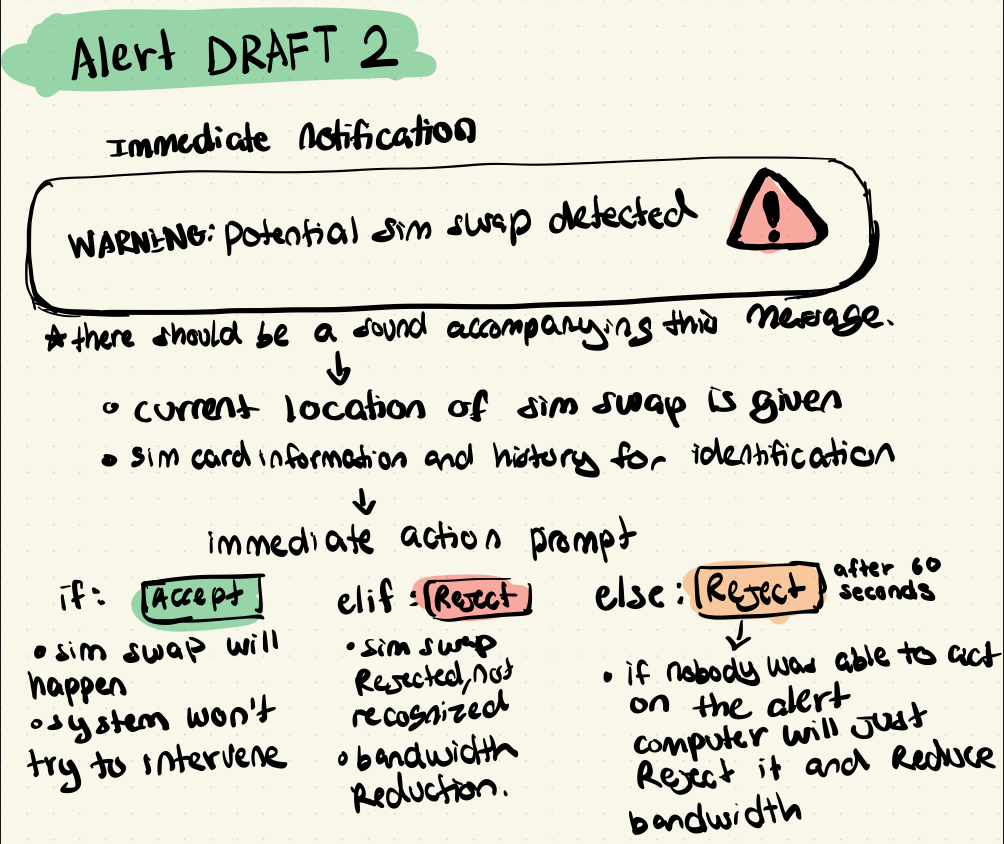


Figure 2: Draft 2 for the alert detection subsystem completed by Neyssa in group 7.

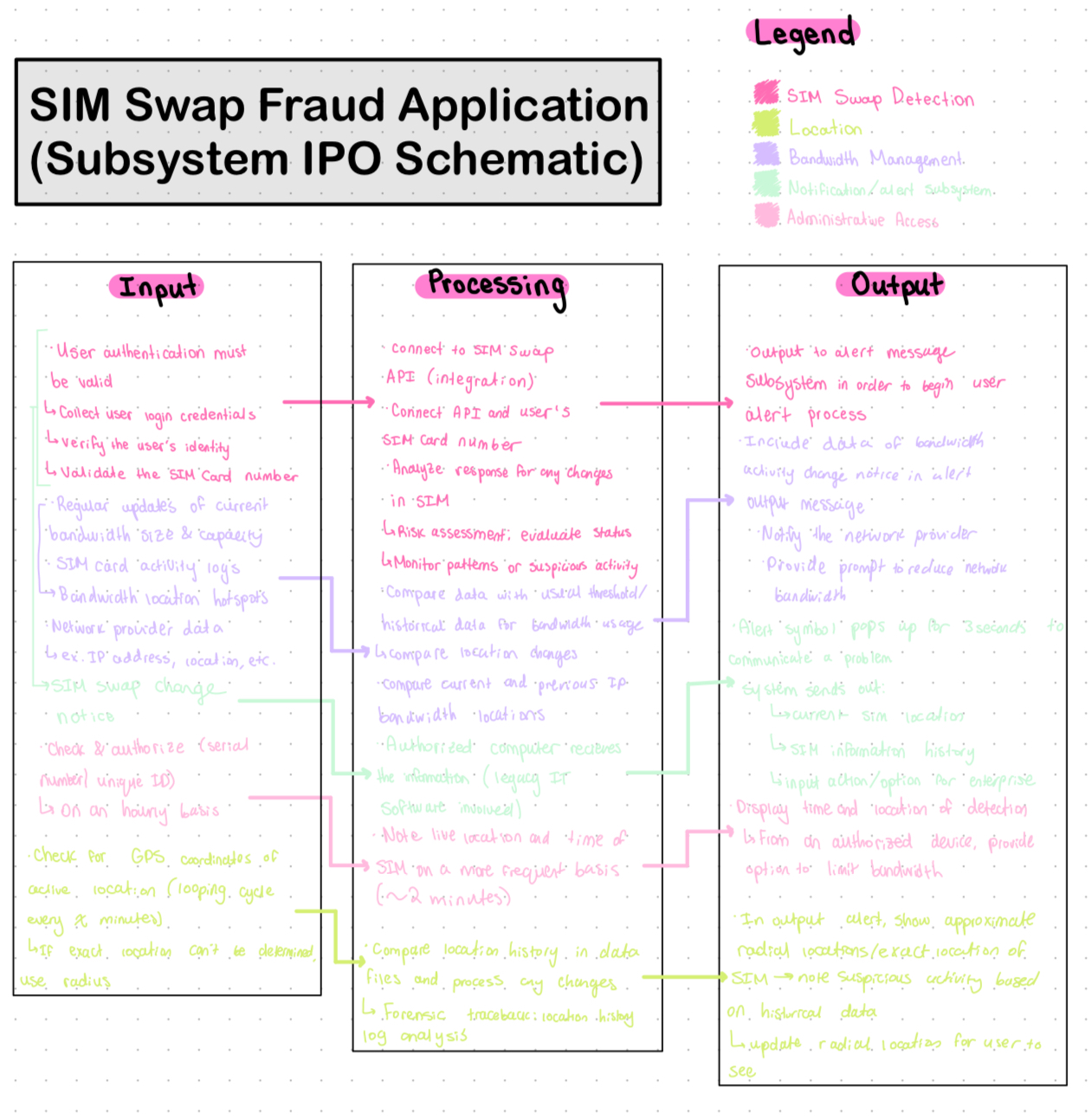
The Second draft is very similar to the first draft but with a focus on grabbing the attention of the individuals in the nearest vicinity to the authorized device.

An immediate and obvious notification, warning the administration will come up on a screen. Accompanied by a sound alarm to get their attention. This should go on for about 5 seconds. The current location of the SIM swap will be given on the screen as well as the SIM card information and history for facilitated identification. Afterwards, there will be an immediate action prompt. Where they can accept the SIM swap, Reject the SIM swap, otherwise to remove the need for physical human-to-machine interaction. If none of the options have been selected after 30 seconds, the system will automatically reject the SIM swap and reduce the bandwidth.

## **3.5** **Administrative Access Subsystem (Aadi)**

The block diagram illustrates a security process for managing a SIM card across multiple devices. It begins with checking and authorizing the SIM using a unique identifier. If authorization fails, the user is notified on all devices and given the location and time of detection. If successful, the system performs regular checks. In case of SIM alterations, the user is asked to authenticate across devices. If not confirmed, access is limited to a master device for bandwidth control. The system can also provide live SIM location updates and silently notify the user of any suspicious activity, ensuring secure management of the SIM card.

## **3.6** **Overall Subsystems Diagram**



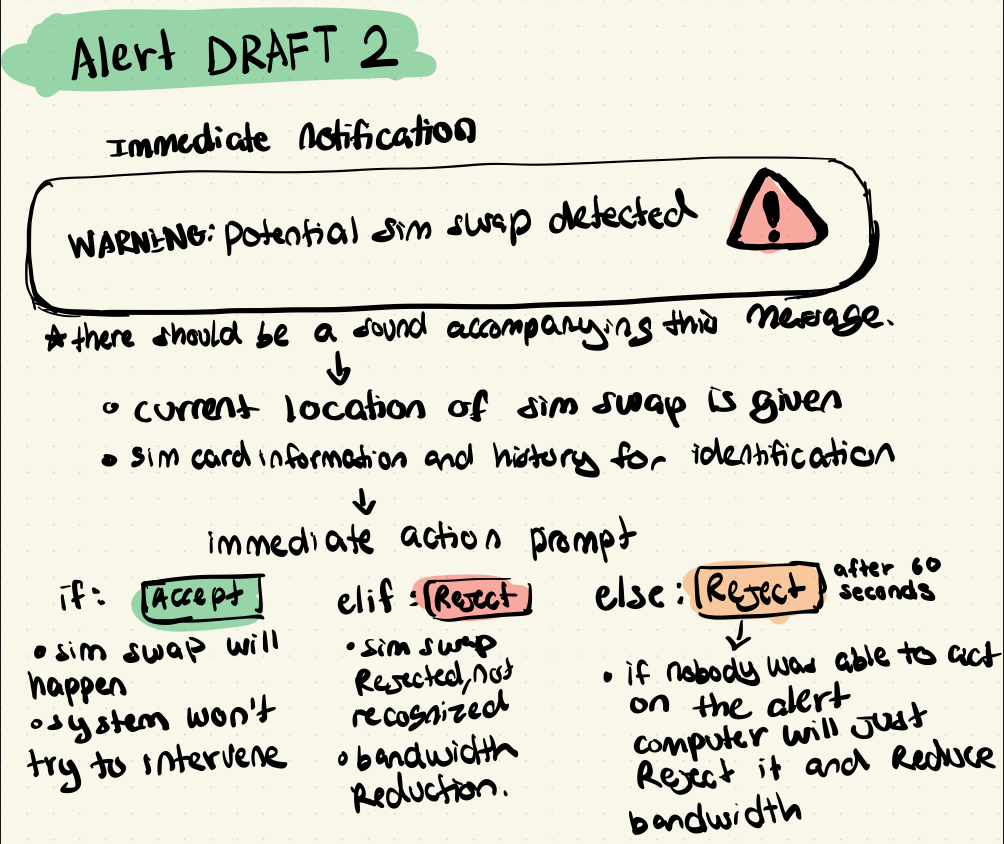
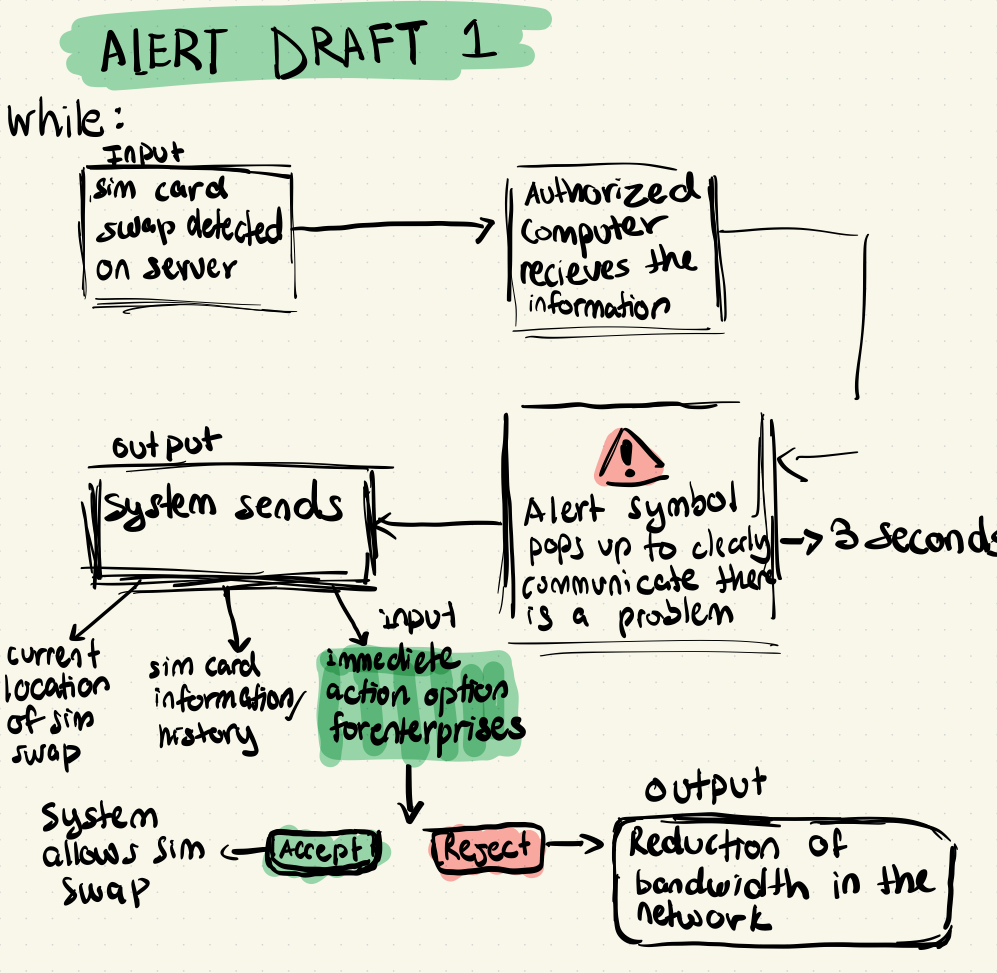
# **4** **Conclusions and Future Work**

The subsystem cycles that have been designed by our team will be used to determine our pseudocode later on in the process of this project as we begin our application development for Shabodi. In creating them, we considered both the problem statement itself for the client and user/technical benchmarking that we completed in a previous deliverable. We will make sure to adjust the cycles as we continue if we see areas where alterations are necessary for feasibility or to maintain alignment with the client’s needs. Moreover, if the client decides that they would like us to add or remove something from our subsystems, those changes can be made as well and reflected in our schematic IPO diagrams accordingly.

# **5** **Appendix**

## **5.1** [**Notification/Alert**](#_z540n8qwopzg) **Subsystem Drafts**

**Neyssa**



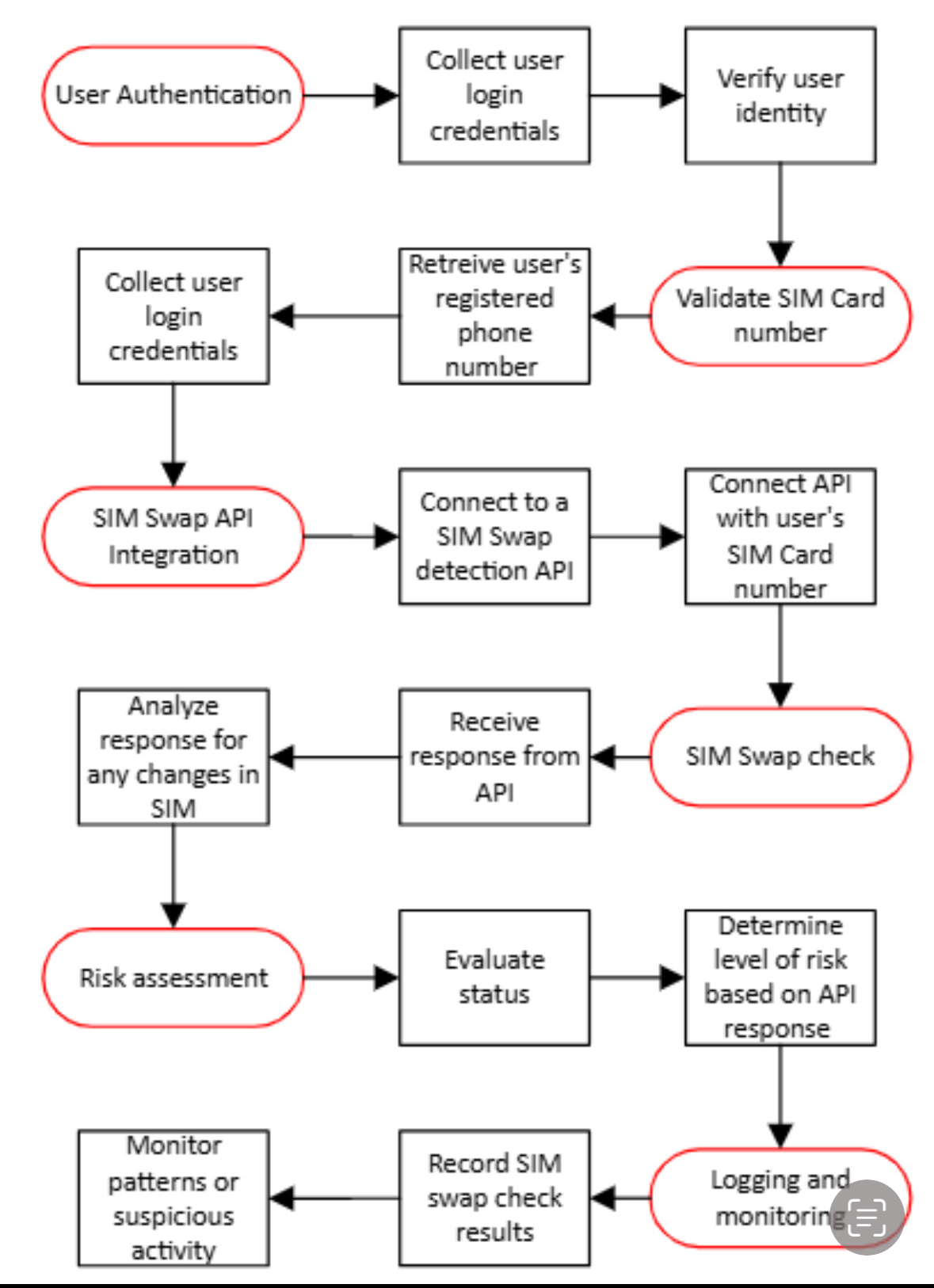
## **5.2** **Bandwidth Management Subsystem Drafts**

**Nava**

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## **5.3** **SIM Swap Detection Subsystem Draft**

**Abby**



## **5.4 Administrative Access Subsystem Drafts**

**Aadi**

**Draft 1**

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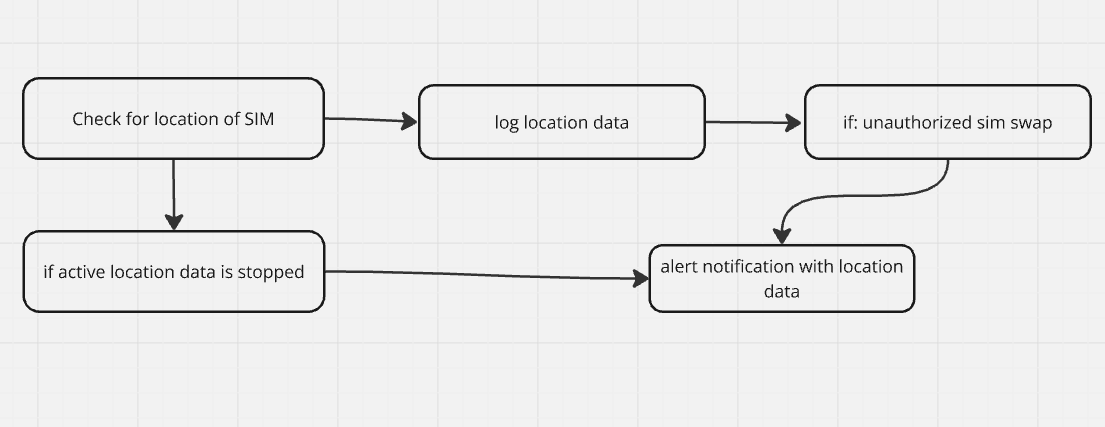
**Draft 2**

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## **5.5 Location Subsystem Drafts**

**Gill**

Draft 1 :

  
Draft 2 :

