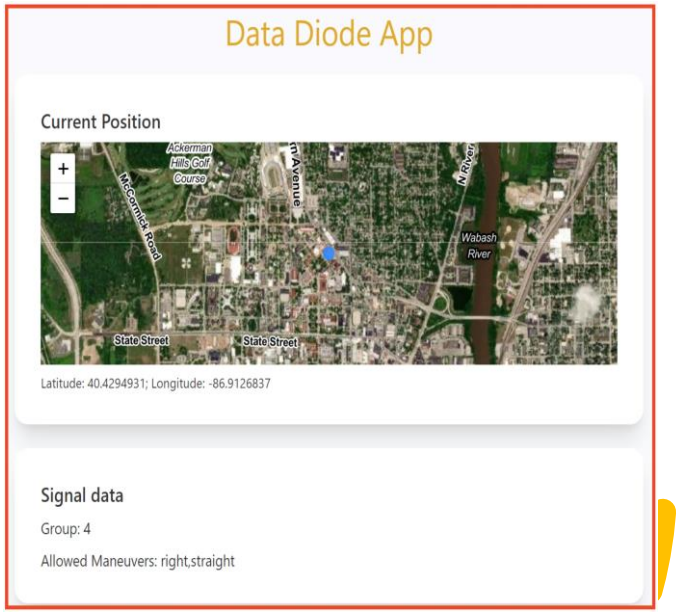
Secured Acquisition of Intersection Data for Connected Vehicles Operations

Walton Fehr
Mark Goodfriend
Samuel Labi
James V. Krogmeier
Montasir Abbas
Andrew Balmos
Manish Kumar
Richard Ajagu
David Hong

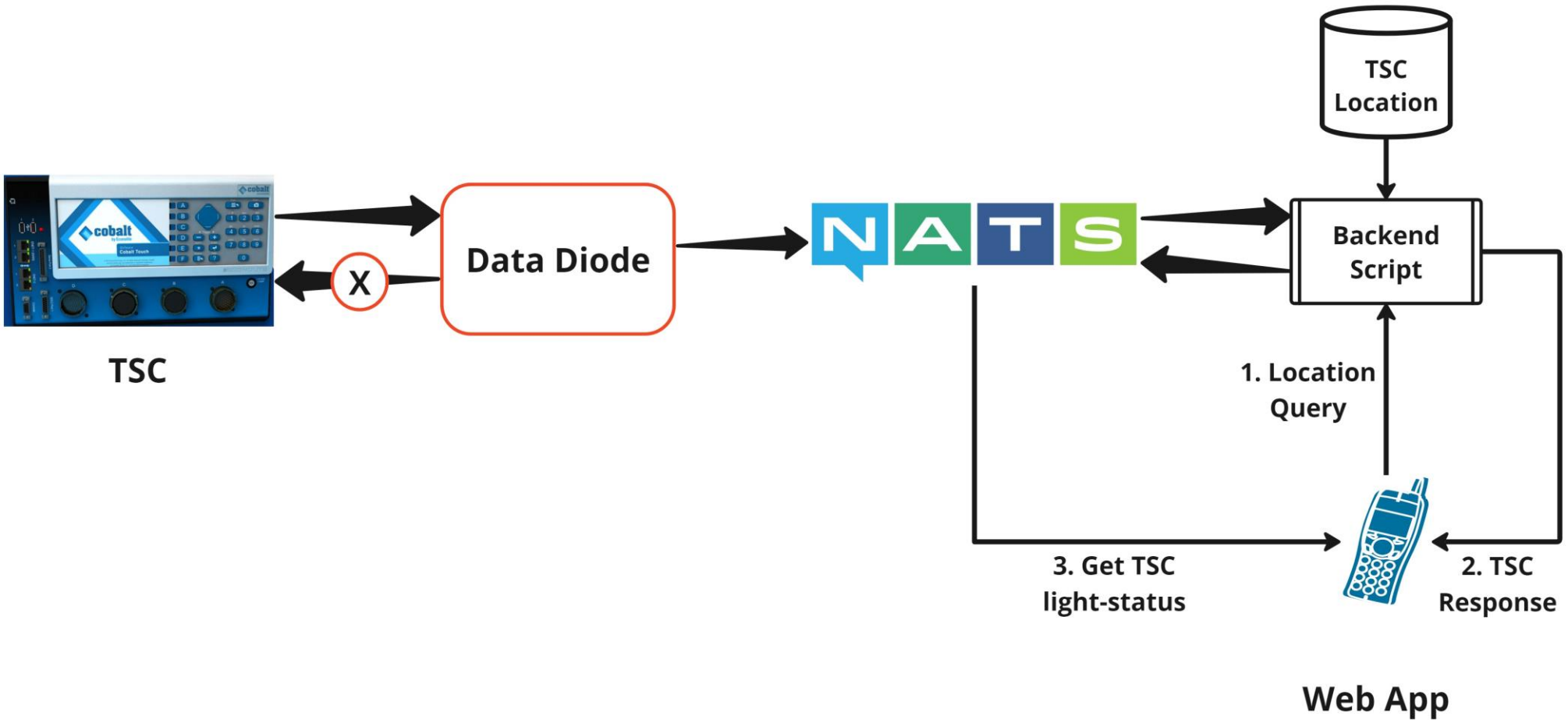


Secured Acquisition of Intersection Data for Connected Vehicles Operations

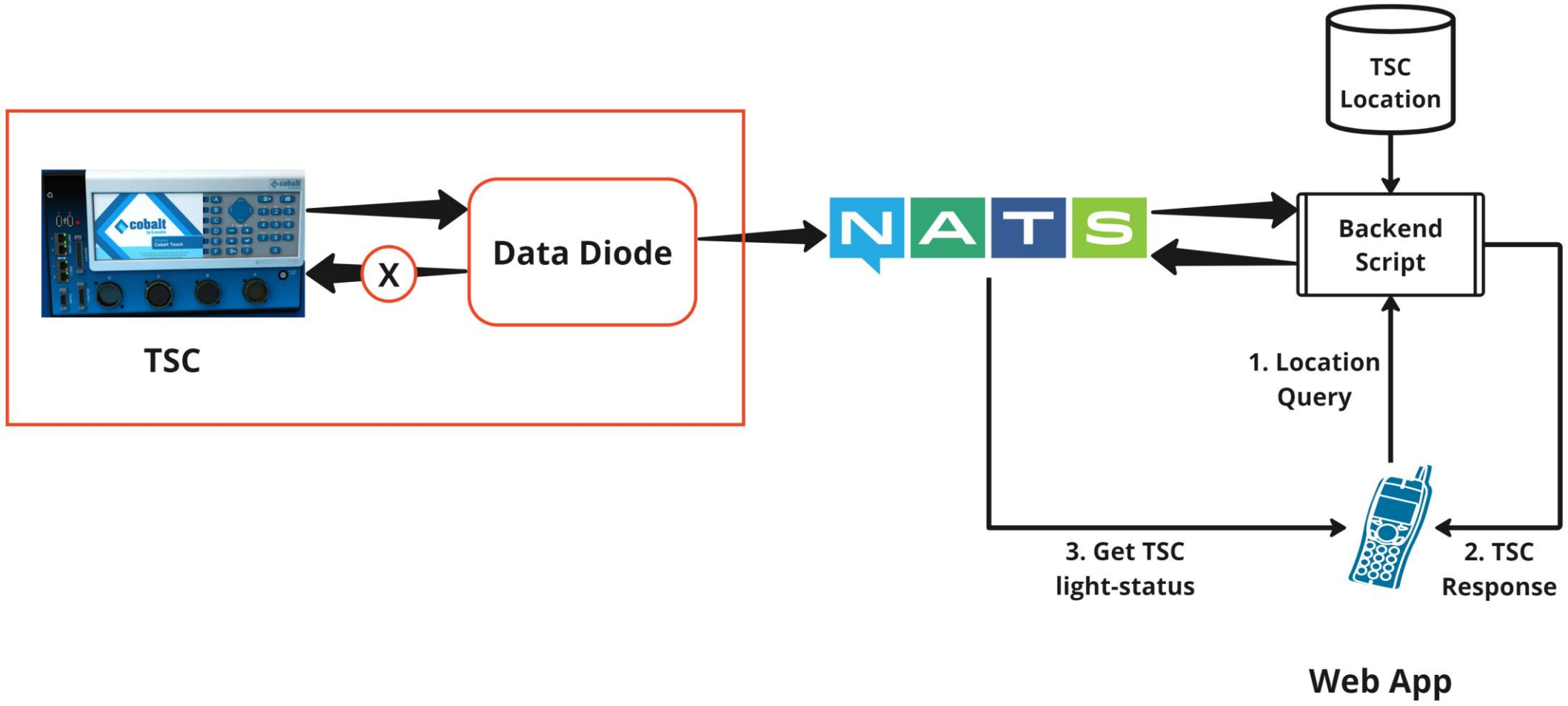
- Objective is to extract Signal Phase and Timing (SPaT) data from a Traffic Signal Controller (TSC) cabinet
- Solution uses an economical Data-Diode housing two microcontrollers linked via simplex connection
- Diode data is routed to different channels through NATS and stored in Postgres database
- Utilize SPaT data to provide precise timing on driver’s phone
- Backend script detects user location and finds nearest intersection
- User's phone shows TSC lane's light status

TSC Cabinet

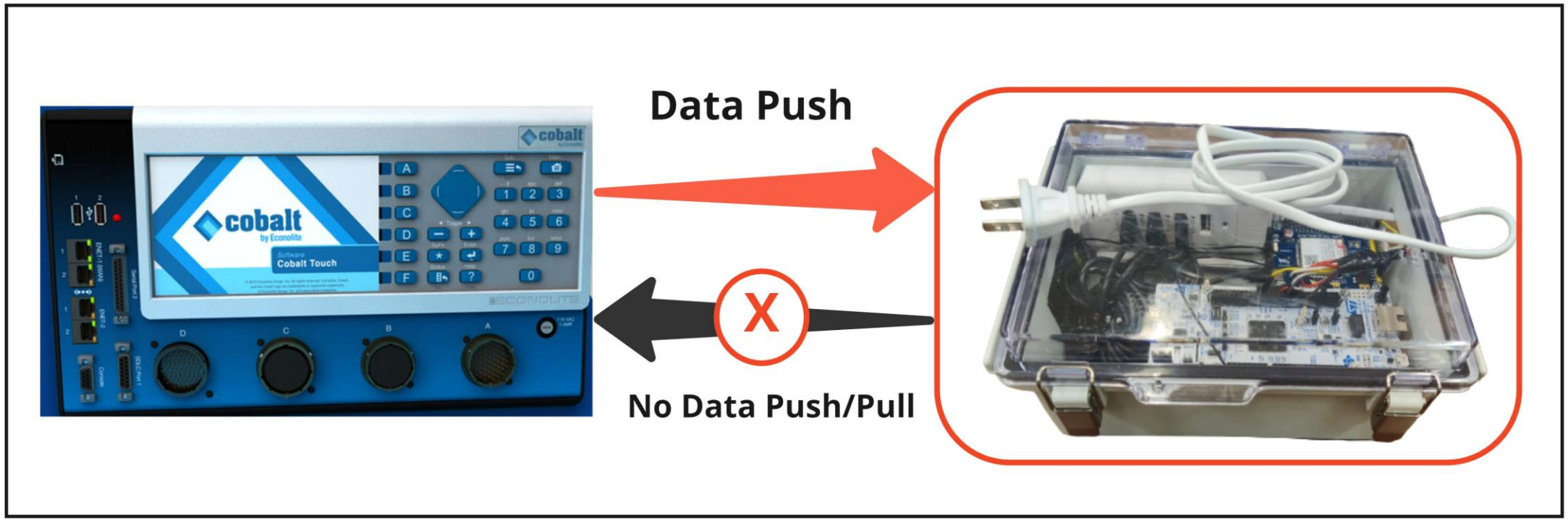
System Workflow



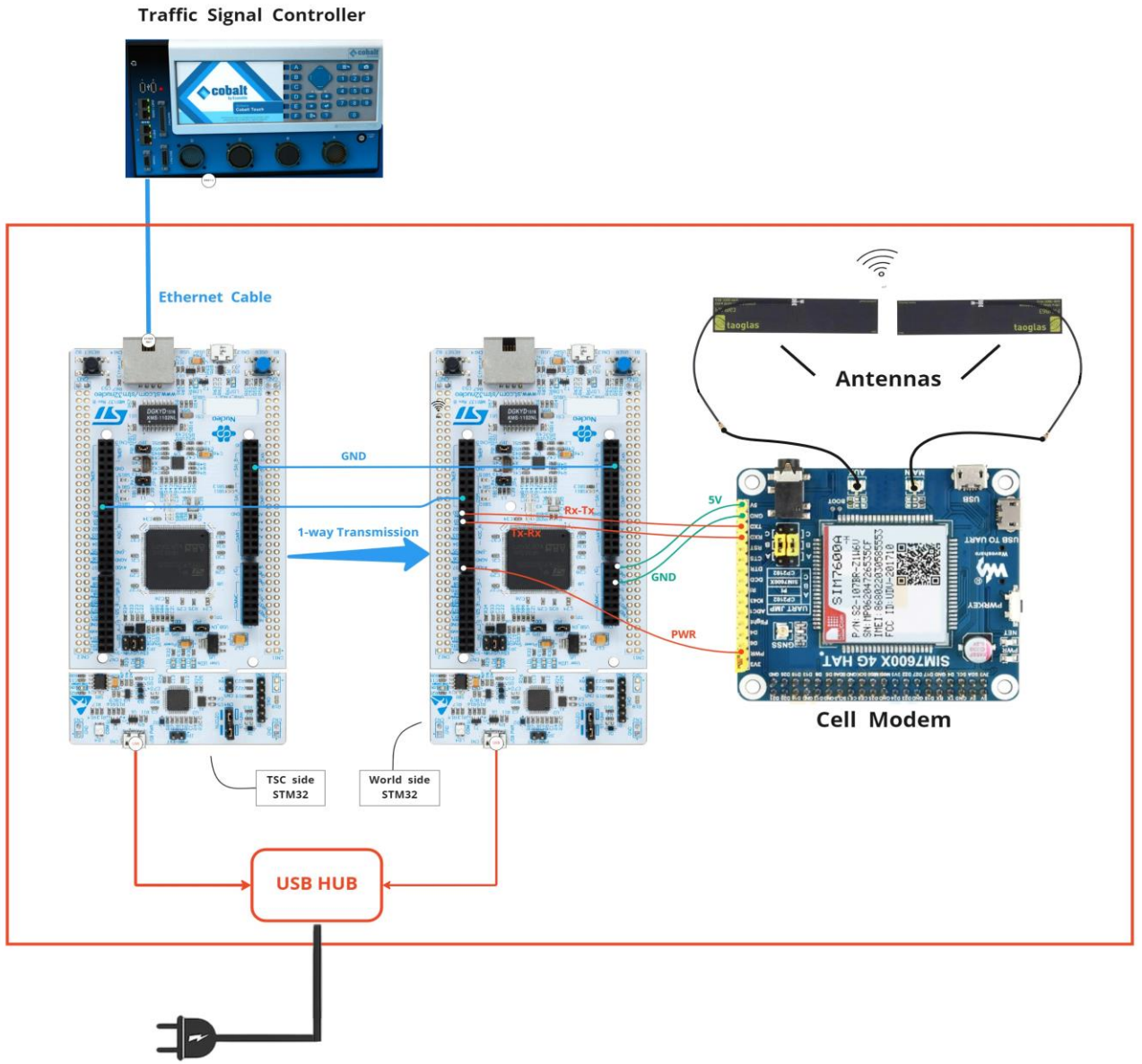
Data-Diode


TSC Location
Backend Script
Data Diode
X
TSC
1. Location Query
3. Get TSC light-status
2. TSC Response
Web App

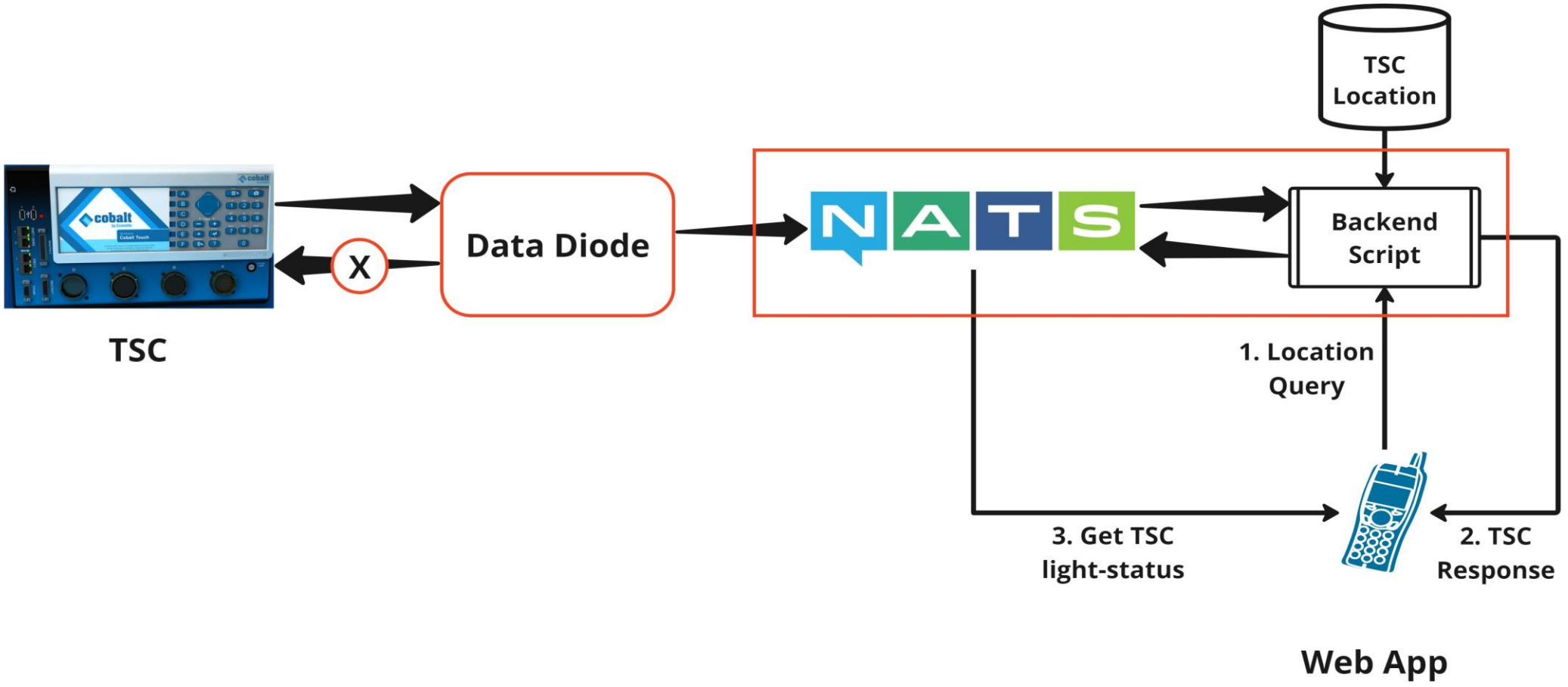
Data-Diode

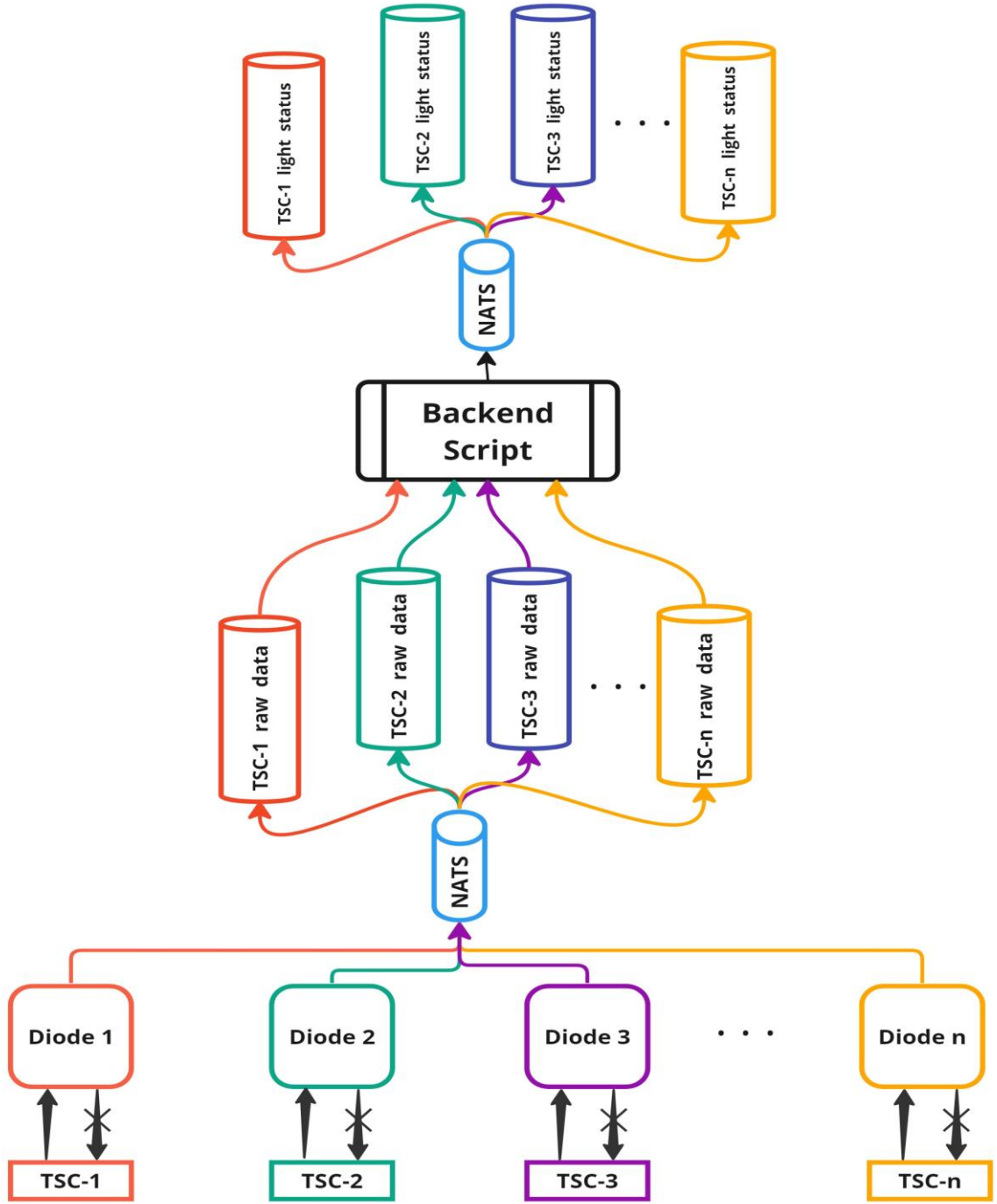

cobalt
by Econolite
Cobalt Touch
Data Push
X
No Data Push/Pull

Components of Data Diode

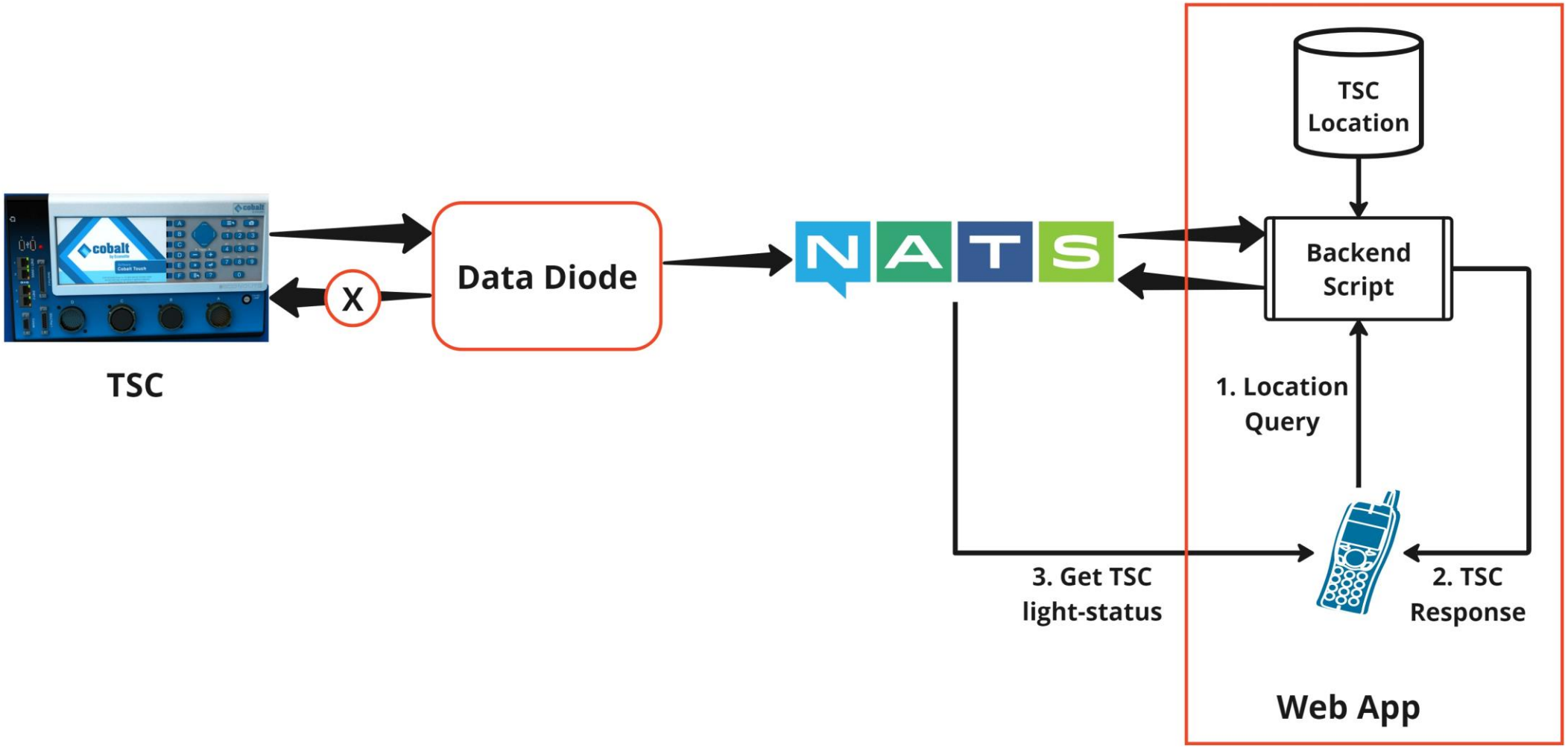


NATS Data Routing

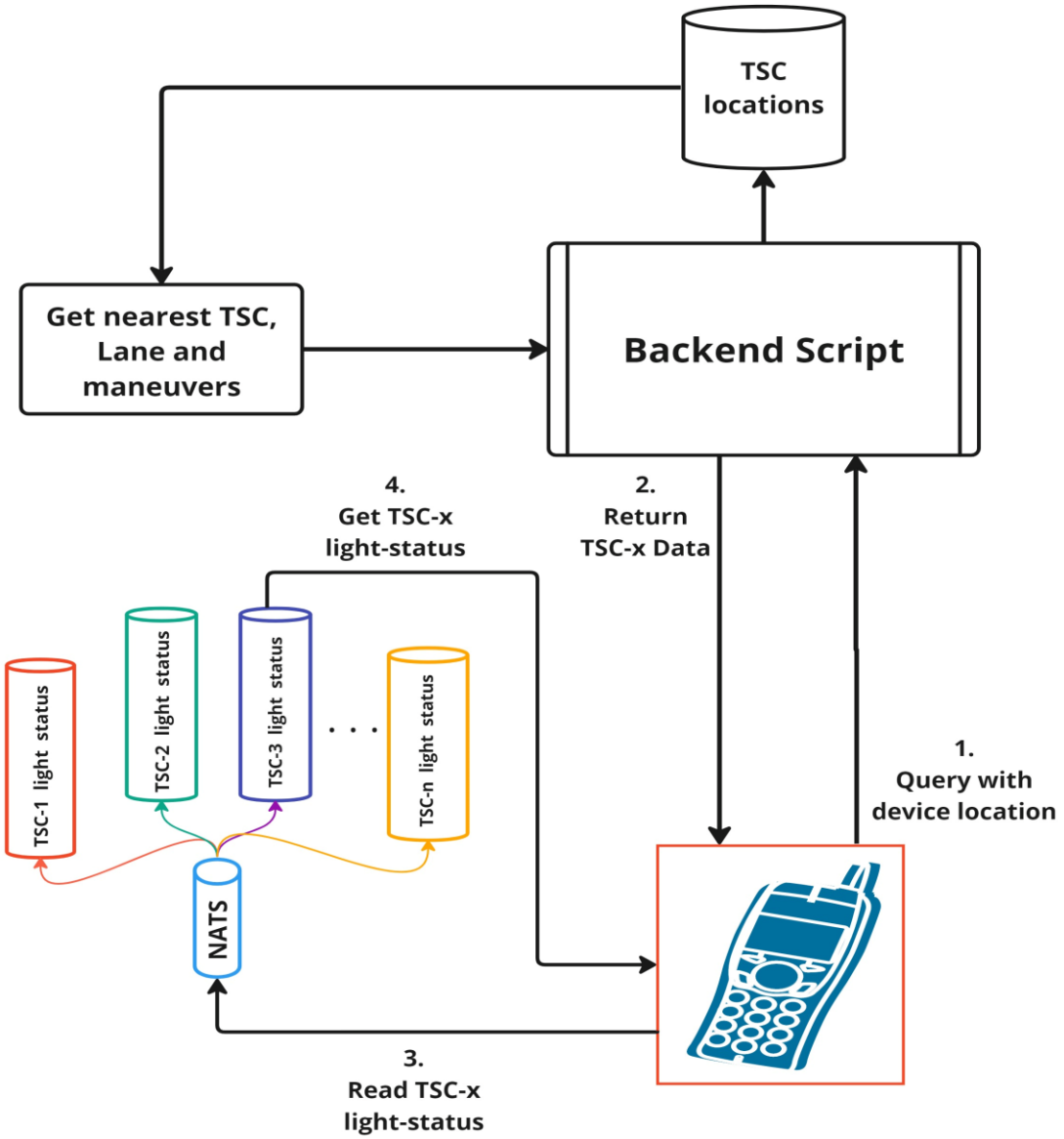



TSC-1 light status
TSC-2 light status
TSC-3 light status
TSC-n light status
NATS
Backend Script
TSC-1 raw data
TSC-2 raw data
TSC-3 raw data
TSC-n raw data
NATS
Diode 1
Diode 2
Diode 3
Diode n
TSC-1
TSC-2
TSC-3
TSC-n

Web App


TSC Location
Backend Script
Data Diode
X
NATS
TSC
1. Location Query
3. Get TSC light-status
2. TSC Response
Web App

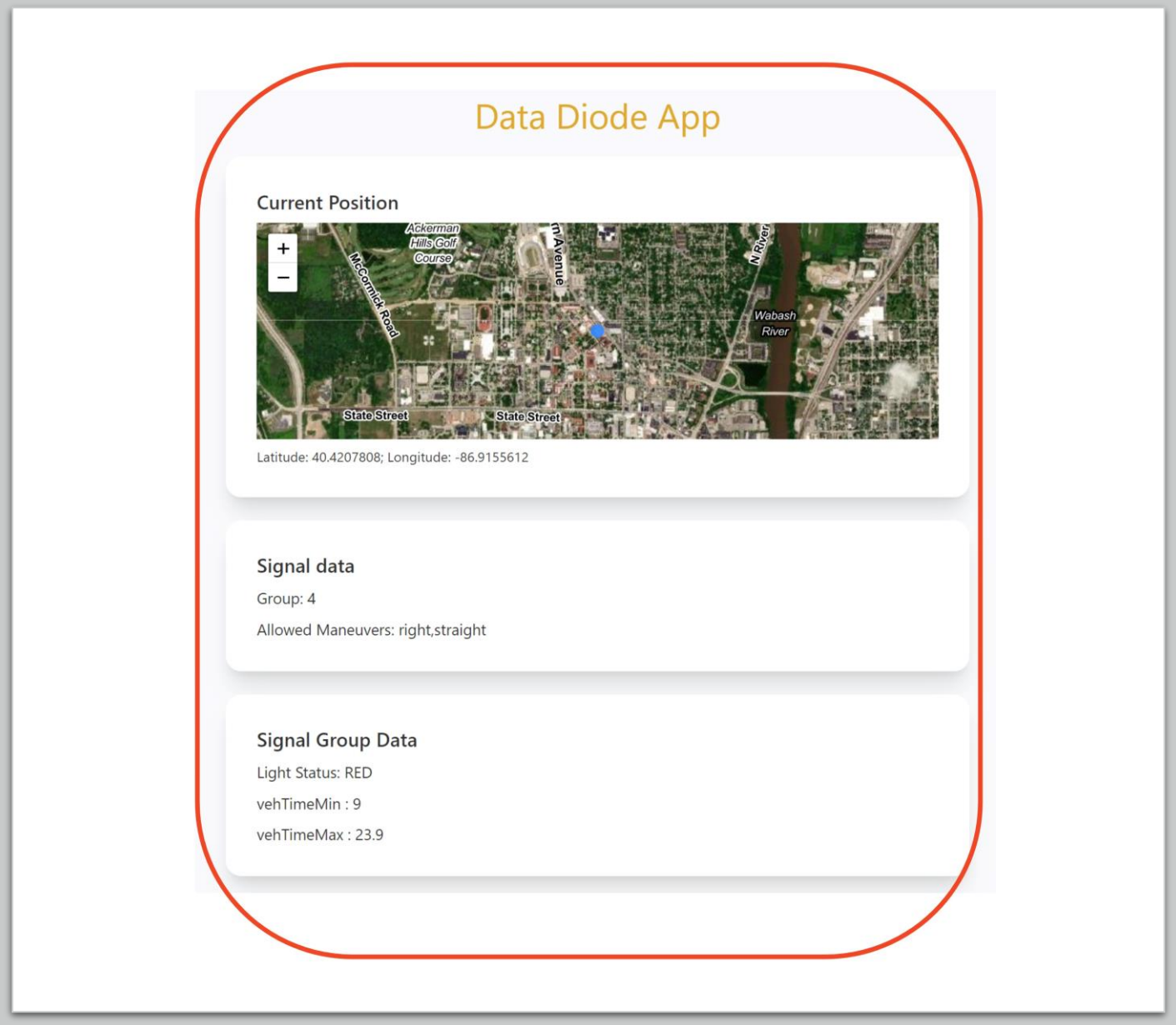
Web App - Backend



Web App - Frontend

https://diode.oatscenter.org/

1. Query the server with coordinates
2. Obtain the Traffic Light status in its lane
3. Display the Light status



Installation – Plug n Play!

1. Connect Ethernet cable from TSC to Data Diode's Ethernet port
2. Plug in the power cable and power the system
3. Broadcast TSCBM
4. Obtain TSC data using web app

Data Diode Goals

System Integrity

Economical Data Acquisition

Ease of Installation

Data Visualization

Real Time Response

Demo & Questions