iOS Device Analytics: Detect and Display Patterns of Network Behavior

Overview
Networked hardware provide an array of sensors which can be monitored. The goal of this project is to combine the monitoring of these sensors with machine learning algorithms to detect anomalous data from monitored sensors. These anomalies are displayed to technicians using iOS devices. Technicians can then quickly respond and replace potentially failing hardware before it reaches the point of failure.

Objectives
The main objective of our iOS Device Analytics project is to detect anomalies of network behavior and device failure. We are leveraging the ubiquitous human machine interface of iOS to provide ongoing operational insight into networked devices (routers, access points, APC) and overall system health.

Approach
We are expanding existing capabilities from the 2015 Capstone project to include machine learning leveraging Simple Network Management Protocol (SNMP) to collect information on device Management Information Base (MIB) data from the connected devices, monitor device health and status, and use network behavior and device status information to predict failures.

- The data will be sent to a Linux server for storage and analysis.
- After data gets processed on the Linux server, results will be sent to an iOS device for display.
- In the backend, we have been using Python, an SNMP library, and Flask.
- Some of the device failure experiments included overheating, traffic flooding, package loss, etc…
- We implemented machine learning techniques for modeling data.
- A simple example have been maintaining an average baseline of the data, notify user if the data is far from the average.
- In the end, we have an application that receives the results of different network and device statuses, and it will notify the user if some abnormal behavior occurred.

Outcomes
- The project produced a data collection server, a web server, and iOS app which the sponsor can directly utilize.
- The machine learning model can be applied to the sponsor’s real data.
- The software we developed will be adapted by Raytheon for future projects.