

TESTING THE AP1 BEACON'S FUNCTIONALITY AND CAPACITY TO TRANSFER DATA IN REAL-TIME

AP1 leverages beacon technology through their ApBeacon gateway device to create an all-in-one proximity platform. Through private wireless networks and a suite of software solutions, the AP1 product generates valuable analytics, creates direct marketing opportunities, and connects social networks to a physical location. AP1 and CENG carried out a proof-of-concept project to validate the functionality and conduct stress testing on the ApBeacon gateway device.

PROJECT OVERVIEW

CHALLENGE

The increase in IoT devices has led to a demand in real-time user location data transfer. In order to collect the data in real-time, IoT devices transfer data through a gateway device to a cloud server for processing. One major obstacle to the communication between IoT devices and a cloud server is ensuring that the gateway device has enough capacity to maintain efficient traffic flow.

SOLUTION

AP1 uses beacon technology to pinpoint user locations and collect data through customer applications. IoT information is sent to AP1's ApBeacon, which functions as a gateway device to the cloud. The ApBeacon aggregates data from multiple beacons and efficiently transfers the IoT traffic to a cloud server. The data is then available for analysis and can be used to create immediate business opportunities.

THE PROJECT

CENG worked with AP1 to validate its beacon technology through functionality and stress testing of the ApBeacon gateway device. The CENG lab provided the cloud resources (virtual machines, network, internet connection, etc.) and hardware hosting necessary to deploy the project. Testing traffic was generated using a virtual traffic generator from IXIA called IXVM. This virtual traffic generator was launched in CENG's cloud platform.

AP1 IN ACTION

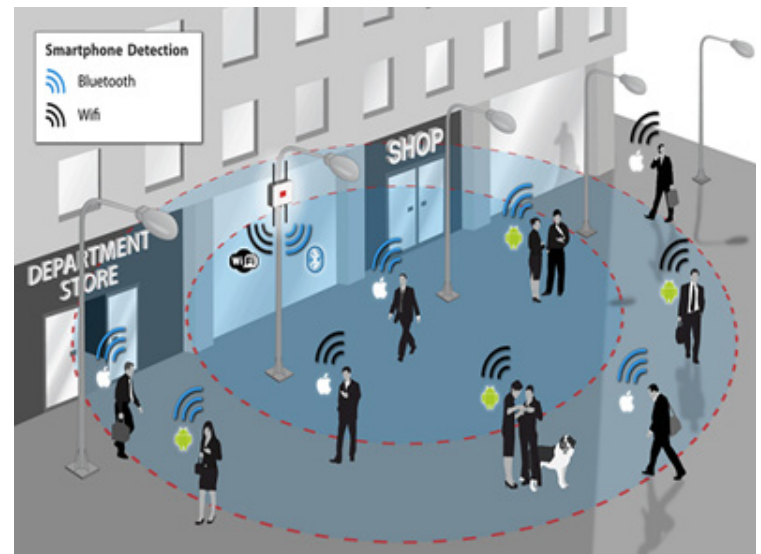


Figure 1. AP1's beacon technology shown in shopping centre

AP1 utilizes small beacons that leverage Wi-Fi and Bluetooth to detect user devices (such as cell phones) and transfer location information to the gateway device. In the image above, AP1 beacons are deployed in a shopping centre to provide immediate business opportunities for stores and customers. The beacons enable targeted notifications based on customer device position.

CENG MEMBERS



Test Demo

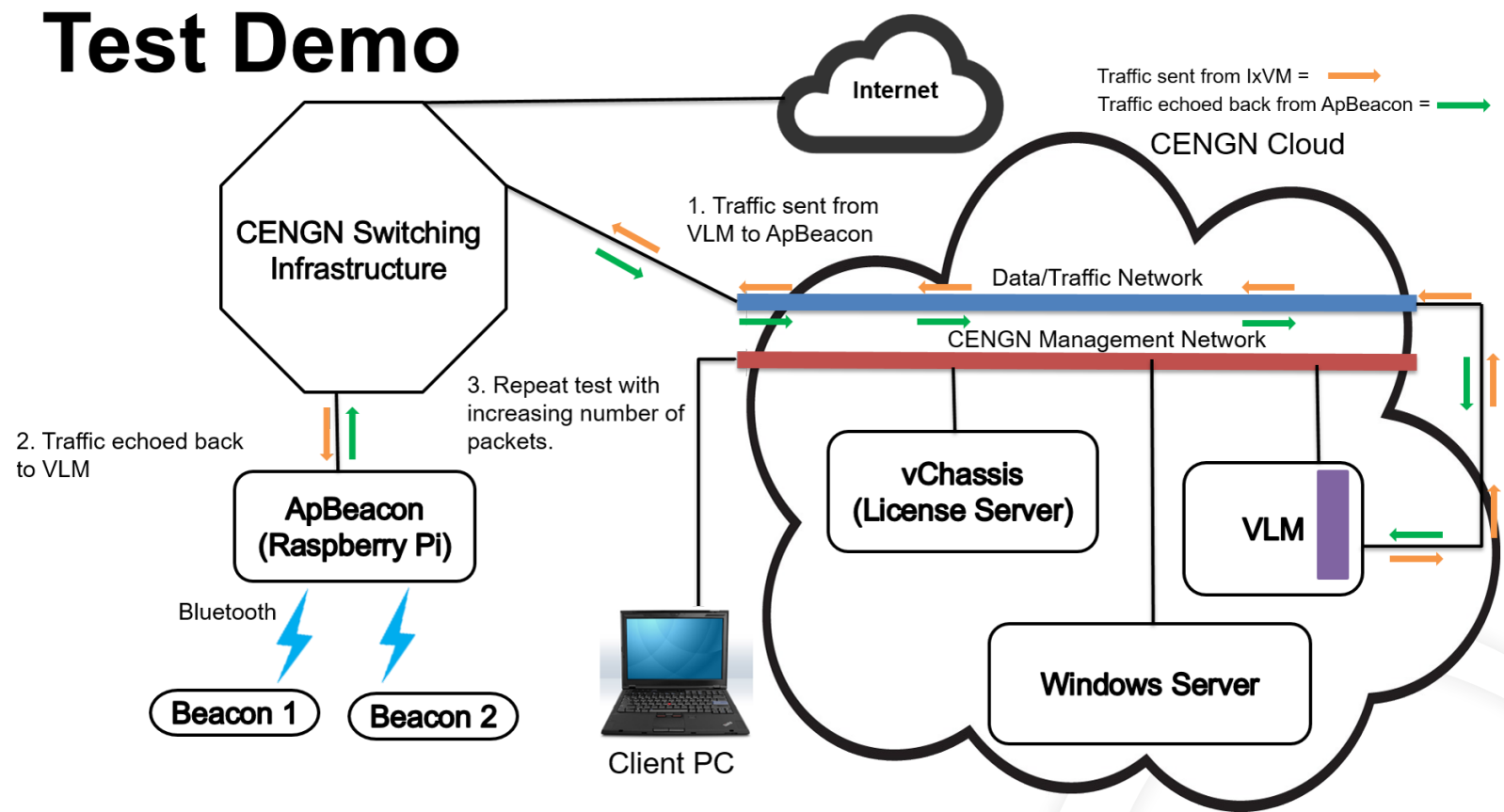





Figure 2. Proof-of-concept testbed setup

CENG's proof-of-concept project performed both functionality and stress tests on the ApBeacon device. The functionality testing included three stages. Stage one and two were concerned with reading packets sent to the device and establishing bidirectional communication. In these stages, packets were sent from the IXVM traffic generator to the ApBeacon, where they were read and displayed in the ApBeacon console. A bidirectional communication link was then established between the IXVM in the CENG cloud and the ApBeacon. The IXVM sent an echo-request to the ApBeacon, which in turn read the packet and sent back an echo-reply to the ApBeacon. The third stage of testing focused on the emulation of the beacon packet. In this stage, a sample beacon advertisement was included in the ICMP traffic payload in the IXVM and sent to the ApBeacon.

The fourth and fifth stages of testing were stress tests. During the fourth test, the traffic handling capacity of the ApBeacon was tested. To do this, the amount of HTTP traffic was gradually increased from the IXVM to the ApBeacon to measure any possible traffic loss. The fifth stage tested the traffic handling capacity of the processing server. For this stage, traffic was sent from the IXVM to the ApBeacon, which then forwarded the traffic to the AP1 influx database server located in the AP1 campus in Toronto. The purpose of the testing at this stage was to determine the efficiency of the influx server to successfully register the data from the ApBeacon.

Contributions

	Beacon device
	IXVM (which consists of three different VMs: vChassis, VLM, Windows server)
	Cloud resources (virtual machines, network, Internet connection etc.) Hardware hosting