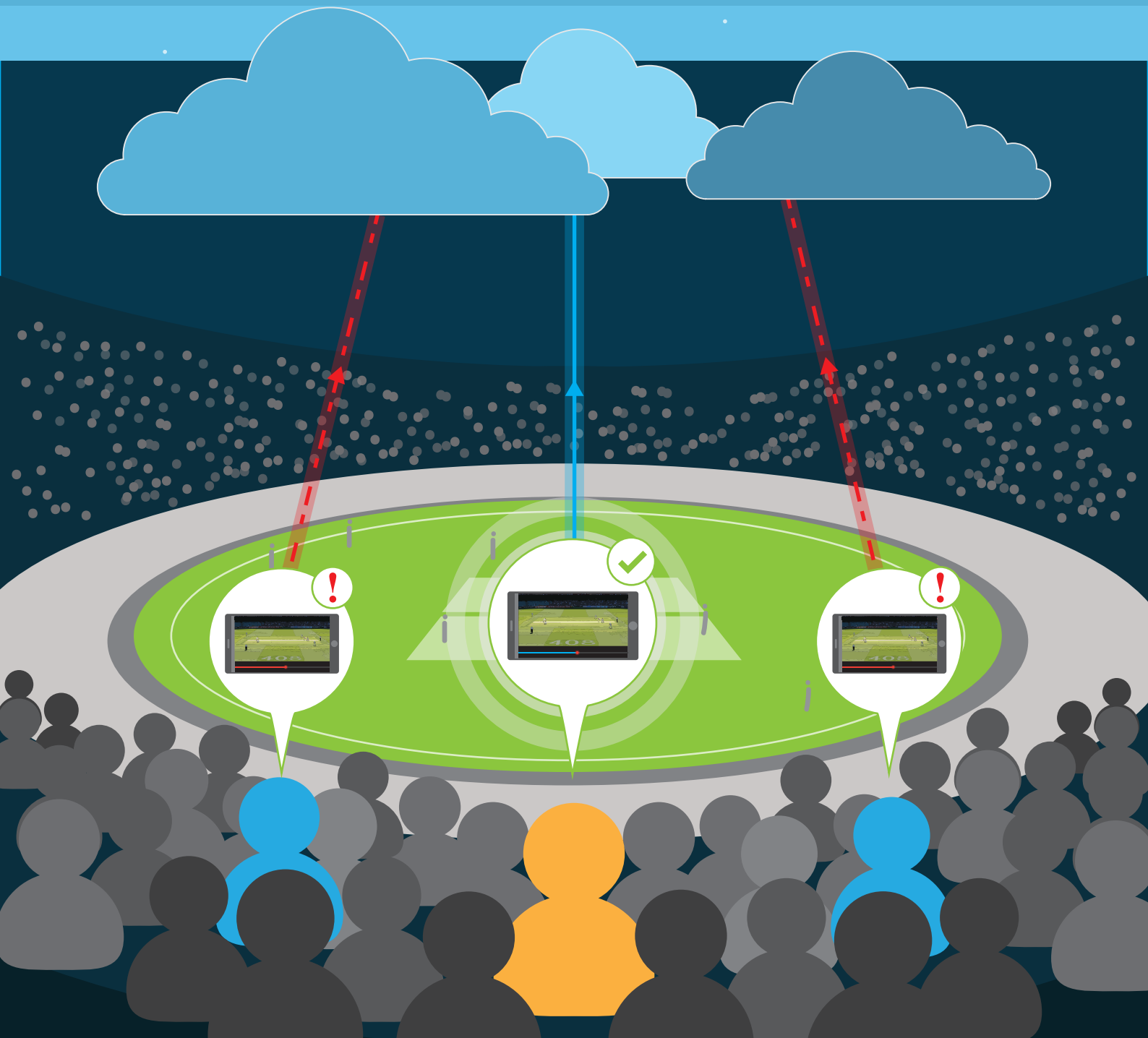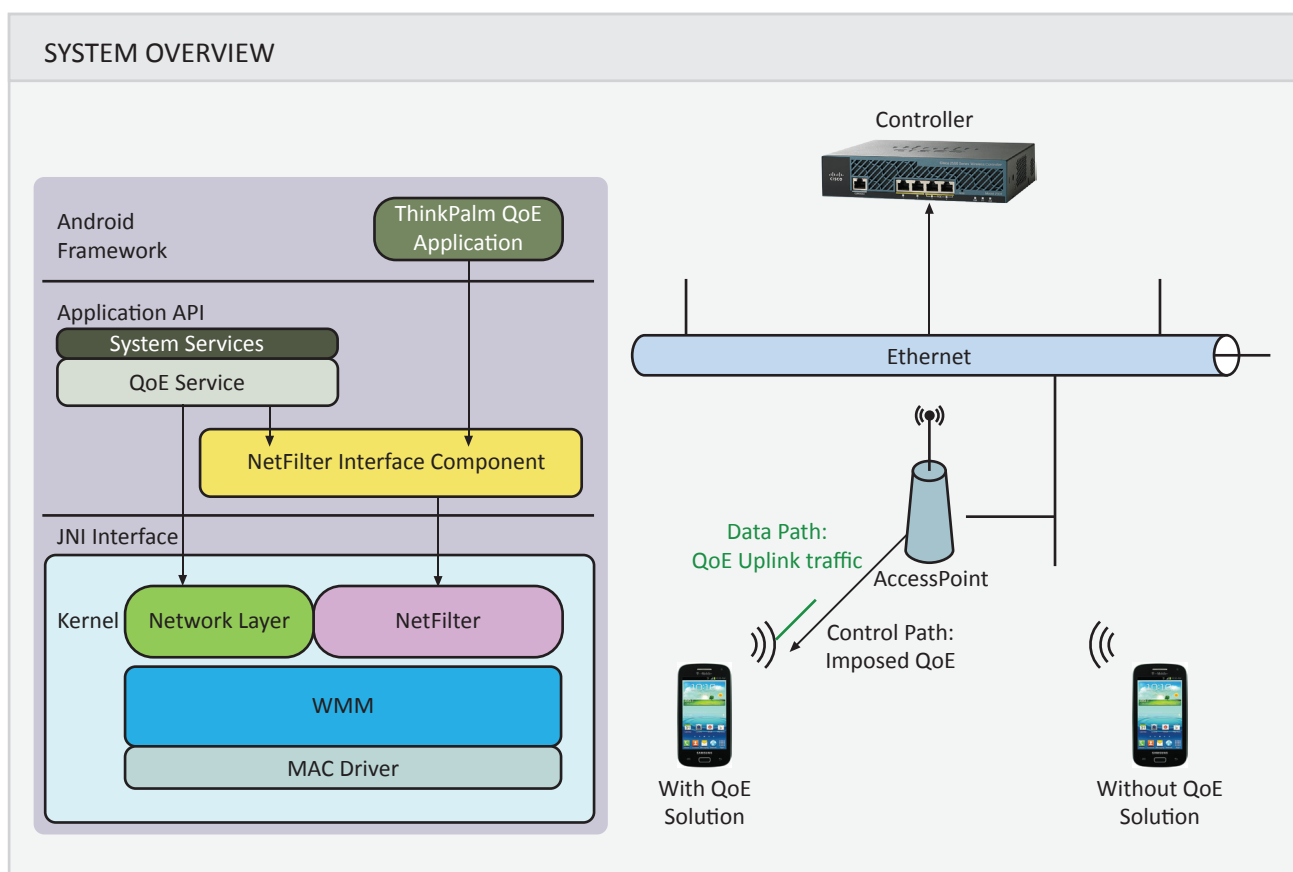# Uplink QoE

Uplink QoE is a high-tech, policy based Quality of Service (QoS) solution developed by ThinkPalm Technologies. The project was targeted at providing Quality of Experience (QoE) to selected users in a Wi-Fi basic service set. Uplink QoE extends the existing QoS system running in the wireless distribution network of Access Points to the egress traffic of wireless stations such as Android smartphones as per the IEEE 802.11e standard, resulting in an end to end QoS network.
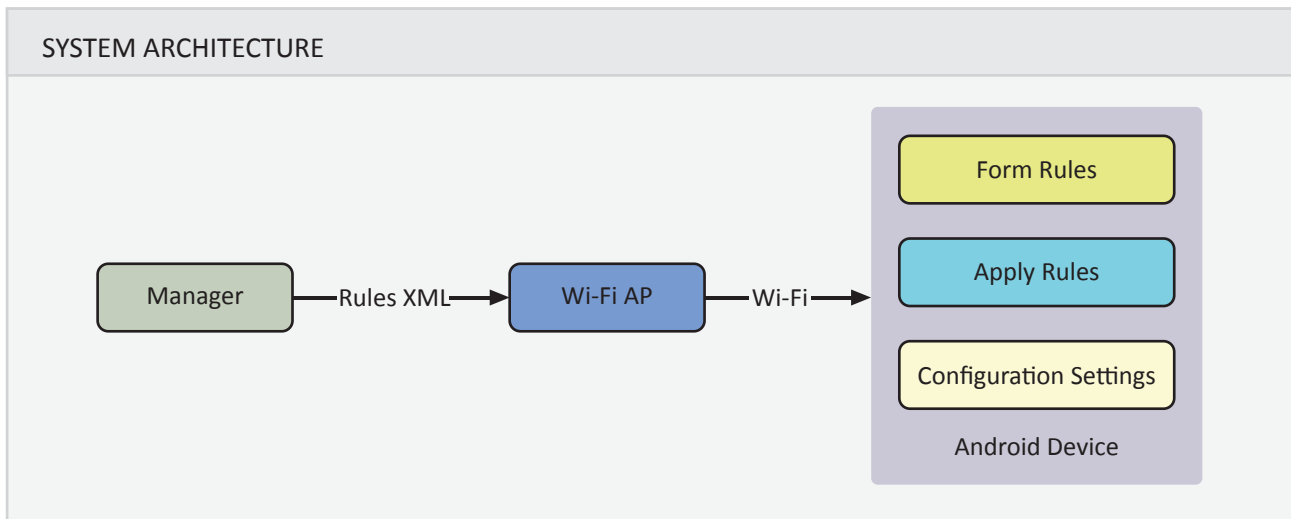
BUSINESS NEED

Our customer, a giant in the networking industry, aspired for the inclusion of two critical components in the solution - Base QOS and Policy Integration. Base QOS realizes the classification of egress traffic into IEEE 802.11E categories, uniquely identified by the 5-tuple fields. Policy-integration facility at the client side receives the QoE policy pushed from the Access Points.
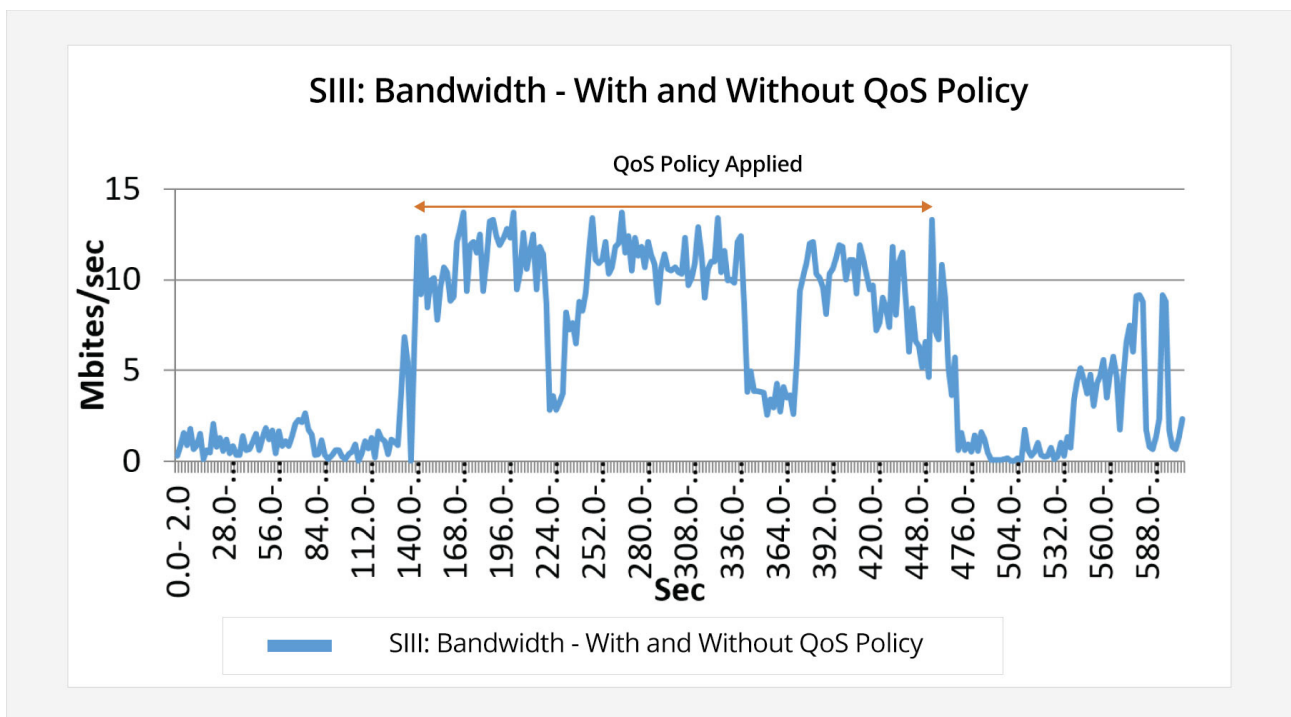
THINKPALM SOLUTION

A mobile based application was developed to ensure that egress traffic from mobile devices using Wi-Fi connection always followed WMM QoS classification. Egress traffic classification is derived from policies set from Access Points. A typical policy contains the 5 tuple fields- Source IP Address, Destination IP address, Source Port, Destination Port and IP protocol of IP packets, definition of flow and its required priority in WMM context. A policy service responsible for receiving policies issued by authorities and imposing received policies in the egress traffic, was also undertaken at the mobile side.
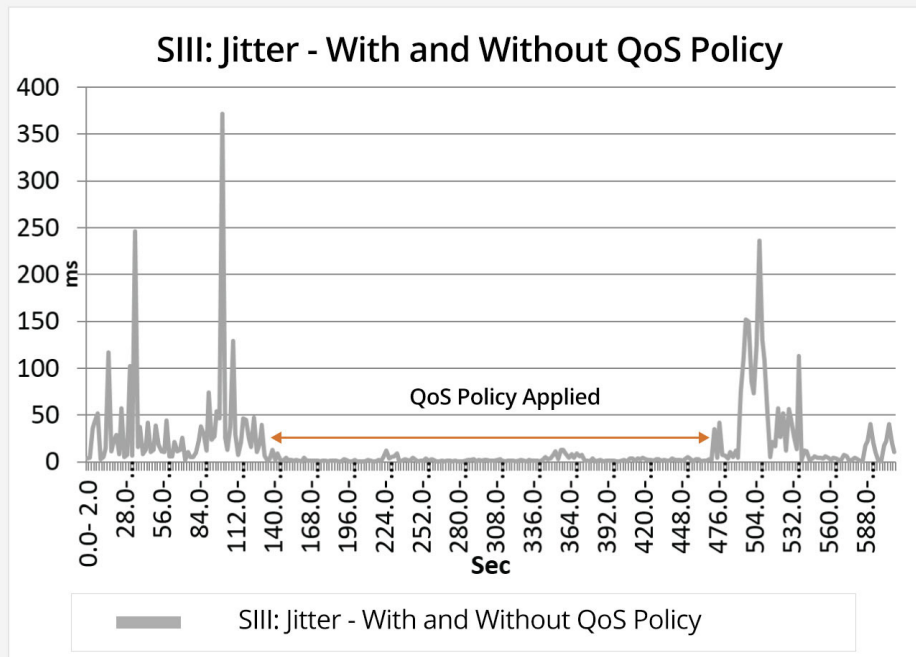
SYSTEM OVERVIEW

The system consists of components that coordinate to apply the rules into the Android device. The "Manager" is an entity, the IP address of which is allowed to send Rules XML files into the system. The XML file contains the rules, which are formed by the Manager using a predefined XML schema. Rules in the XML files are processed in the Android system by the rule processing service. After processing, the egress classification defined by the rule will be reflected.

SYSTEM ARCHITECTURE

```
┌──────────┐              ┌──────────┐            ┌─────────────────────────┐
│ Manager  │── Rules XML ─▶│ Wi-Fi AP │── Wi-Fi ──▶│   ┌──────────────────┐  │
└──────────┘              └──────────┘            │   │   Form Rules     │  │
                                                  │   └──────────────────┘  │
                                                  │   ┌──────────────────┐  │
                                                  │   │   Apply Rules    │  │
                                                  │   └──────────────────┘  │
                                                  │   ┌──────────────────┐  │
                                                  │   │Configuration Settings│ │
                                                  │   └──────────────────┘  │
                                                  │     Android Device      │
                                                  └─────────────────────────┘
```

Detailed testing was carried out using different testing tools to prove the end to end QoS solution.

SIII: Bandwidth - With and Without QoS Policy

SIII: Jitter - With and Without QoS Policy

BENEFITS

Uplink QoE is a breakthrough solution from ThinkPalm due to its capacity to establish an end to end QoS network by extending the existing QoS to end devices such as smartphones. Providing IEEE 802.11e stated real time QoS to mobile stations connected to the Access Points makes it a top-notch solution to look out for!