INDIO NETWORKS

FundoTV

WiFi based Enterntainment System

Technical

Overview

www.indionetworks.com

FundoTV – WiFi Based Entertainment Solution

Introduction

Infotainment system like those seen on airplanes are very popular among air travelers. One would like almost 80-90% passengers using the infotainment system while flying on long-haul flights. The infotainment system provides a personalized TV screen to each passenger so he can choose the entertainment to watch during the flight. The user is given complete control to choose the content, navigate through the content, fast-forward or backtrack the videos, etc. The content is neatly organized into various genres so flyers will be able to easily locate the right content to watch.

With the advent of smartphones, it is easily possible to provide the same experience to passengers in trains, buses, taxis and other vehicles. Each smartphone comes with WiFi on-board which make it possible to stream the video content on WiFi to the user's smartphones.

FundoTV is a complete, end-to-end solution that provides the technology for operators to enable WiFi based entertainment on vehicles or any other public place. The technology consist of both hardware and software so operators can easily deploy the solution on thousands of vehicles and manage them from a central console.

FundoTV Architecture:

FundoTV is based on a distributed architecture in which the FundoTV hardware is installed at the remote site (usually a vehicle) and is centrally controlled through a cloud-managed software. In addition, there is a mobile app which is used by the passengers to connect to FundoTV hardware over WiFi and stream the content. The mobile app makes it easy for the end users to use the service.

The FundoTV hardware consist of following components –

- WiFi module (single or dual band)
- Processor Module
- Power Supply
- On-board storage (SSD)

All the above components are packaged in a sealed, weather proof and vibration-proof enclosure so it can be easily installed in the vehicle. The hardware is powered from the vehicle battery and accepts between 12V – 30V power supply.

The FundoTV firmware software resides on the hardware and is responsible for accepting connections from end users and provide a smooth streaming service.

The management software usually resides on AWS or similar cloud infrastructure so it provides the scaling and flexibility when deploying the solution in thousands of vehicles. The management software is responsible for uploading content, tracking the content consumption, registering users and generating analytics and reports for the management.

FundoTV - Features

User Registration

The end users must register with FundoTV service to get access to the content. The registration can be done through a web browser or by downloading the mobile application.

Content Streaming

Users can connect to FundoTV hardware over WiFi and stream the video and audio content. The content can be viewed either in Internet browser or a mobile app. The content needs to be formatted correctly so end users get a consistent and smooth user experience. Special algorithm are implemented to stream the content correctly to the end users.

Branded Captive Portal

FundoTV provides a completely branded captive portal for the end users to interact with the FundoTV hardware. The captive portal will be loaded automatically when the user connects to the WiFi and tried to access any website.

The captive portal displays the stored content in separate groups categorized by languages, genre, type, etc.

Content Upload

The FundoTV content residing on the hardware needs to be updated periodically. The cloud software is responsible for uploading the content on the FundoTV router.

FundoTV Mobile App

FundoTV mobile app is designed to provide a user friendly and simple access to content stored on the FundoTV router. The mobile app can be installed on any Andriod smart phone and enables users to connect and browse content without opening the mobile browser.

Video Advertisement

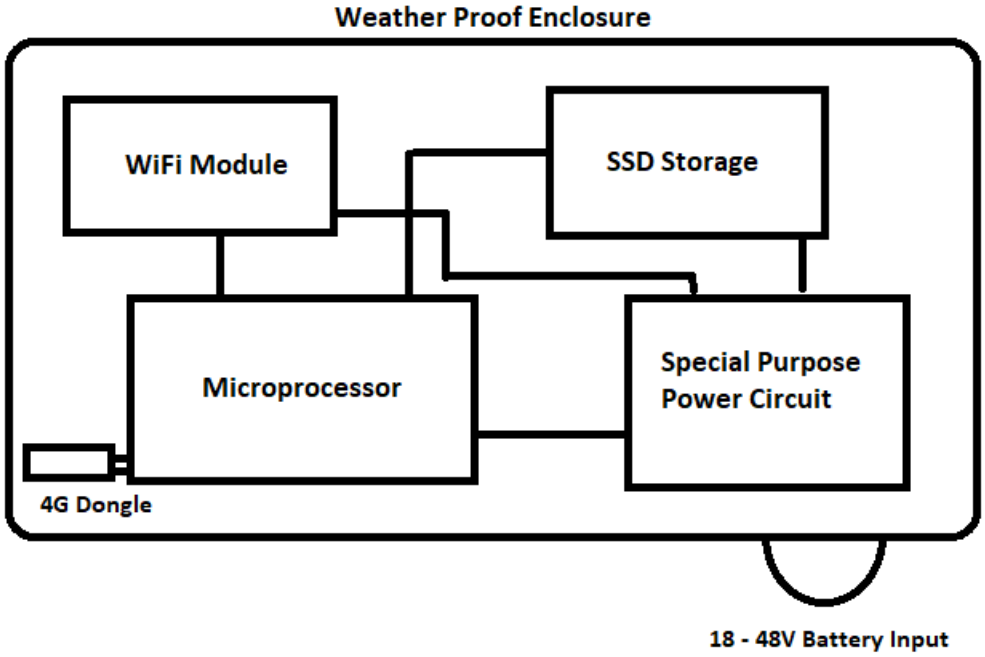
The software on the FundoTV router enables operators to embed video advertisement inside the entertainment content. Mobile ads appear to the users periodically while they are watching the content. This allows operators to generate extra revenue from the service.

Reports & Statistics

The data from all remote FundoTV hardware is compiled centrally for analysis and report generation. This requires 3G or 4G connectivity on the FundoTV router. The analytics and reports are generated centrally on the cloud software. The software generates report on number of views, registered users, content-wise consumption, etc.

FundoTV Hardware

FundoTV Router Assembly



The schematic above shows the composition of the FundoTV hardware. The router is housed in a weather-proof, plastic (ABS) enclosure. The enclosure is IP-65 certified to protect the inner circuits from water, dust and other environmental conditions. The power to the circuit is provided through a gland that accepts 18 – 48V power input from the battery source.

Inside the enclosure, there are 4 separate components interconnected using data and power cables. The main processor which is responsible for pre-processing the streaming content and also provides a web server for the end users. The processor needs to have sufficient CPU to handle the processing load from multiple streaming clients. It is connected to a data storage unit (typically a SSD) where the content is stored.

The processor is also connected to the WiFi module which is responsible for providing connectivity to the mobile clients. Depending on the number of clients, a single or dual band WiFi module is supplied. The dual band WiFi module operates on both 2.4 and 5 GHz while the single band operates only on 2.4 GHz. The clients also need to support 5 GHz band to utilize the bandwidth available for dual band WiFi module.

The special power circuit is responsible for regulating the power received from the battery and also protecting the inner circuits from power fluctuations and surges.

Lastly the microprocessor is also connected to a 4G or 3G dongle so it can communicate back to the cloud server for downloading configuration, updates and reporting the statistics of the router.

Components of FundoTV solution

The FundoTV solution consists of the following components –

1. FundoTV Content Router
2. WiFi Network
3. Mobile App / Mobile Browser
4. Content Manager

FundoTV Content Router

The content router is the main component of this solution. The router is a combination of various components and is responsible for storing and streaming the content to the users. It consists of a WiFi router, main processing board, power circuit, storage device like Solid State Drive (SSD) and related circuitry. All the above components are housed in an IP-65 casing to ensure that the unit is weather and dust proof.

The content router may also have connectivity to the Internet to download the content from the central storage and for syncing the data and analytics from the device to the cloud. The connectivity can be provided using a 4G-Dongle or regular Internet broadband connection.

WiFi Module

This component is responsible for broadcasting the WiFi signal to the end users. The Wifi module comes with internal 3 DBi antennas which is sufficient for covering a radius of around 25-30 meters. WiFi module supports both 2.4 GHz and 5 GHz radio. The end user devices that support 5 GHz will automatically utilize the wider frequency spectrum. Each WiFi module is capable of handling around 40 – 45 streaming users when both frequency bands are utilized.

It is possible to add an additional WiFi module to handle additional 30-40 users. Both WiFi module will be designed to operate in non-overlapping channels to provide good connectivity to the end users.

Main Processor

This board is responsible for running the management and streaming software. It is also responsible for interfacing with the data storage to retrieve the content and stream it. The board needs to have sufficient memory and CPU to handle the concurrent audio-visual streams from multiple end users. It is also responsible for running special algorithms that ensure optimal WiFi channel utilization.

Storage

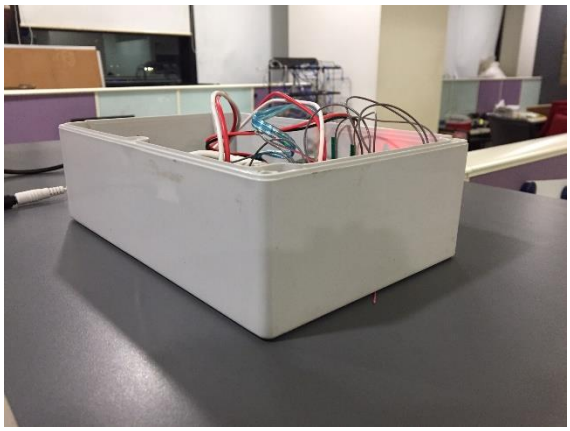
The SSD or storage is responsible for storing the content and providing fast data retrieval. It also needs to be reliable and sturdy to handle the vibrations and harsh vehicular and outdoor environments. Generally we recommend using reliable Solid State Drives with high read-write cycles. The storage should be large enough to store all the content locally.Power Circuit

Vehicles provide power through their battery which is often unregulated and unreliable. It also is susceptible to voltage spikes and fluctuations. The power circuit is responsible for regulating the power from the vehicle batteries and providing a reliable and constant power supply to the internal components. The power circuit should be able to handle variable voltages and currents from the battery and have surge protection circuit to handle sudden spikes in voltages. It also needs to ensure that it provides adequate current to power all the components during their peak performance.

4G Dongle

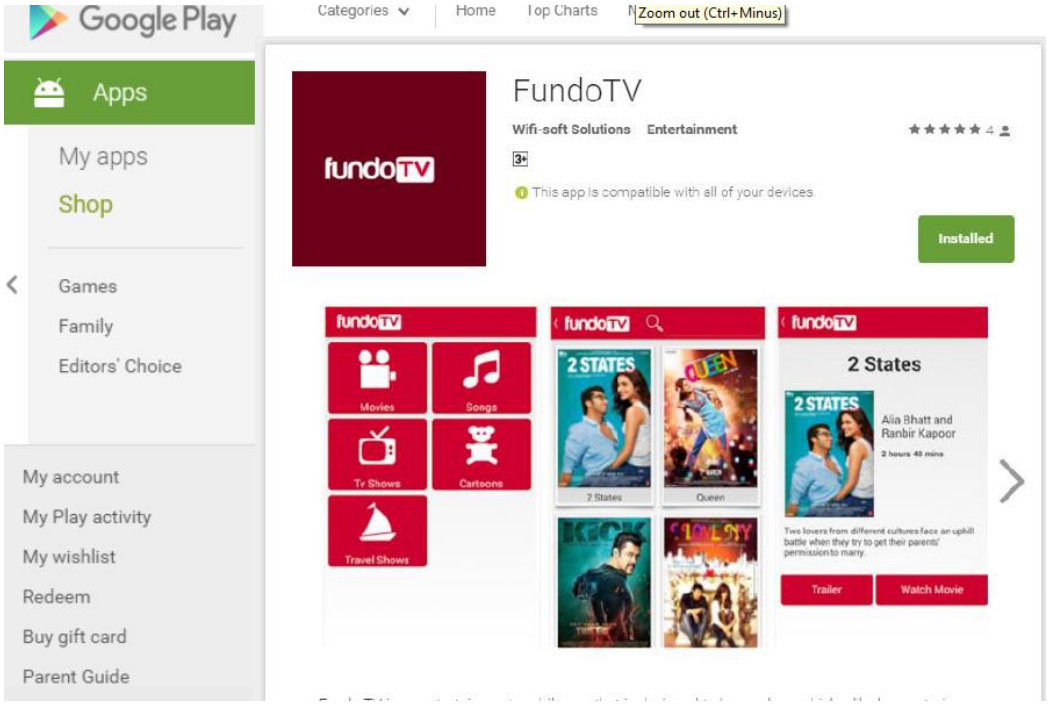
This is an optional component. The 4G dongle can be connected to the main circuit to provide Internet connectivity to the unit. The Internet connection can be used for syncing the content on the storage and for transferring the data and statistics from the unit to the central cloud.

The actual picture of the complete kit are as shown below:



Mobile App

The end user interacts with the FundoTV solution using a mobile app. The mobile app can be downloaded from Andriod Play store or Apple App Store. The mobile app contains a media player that is responsible for communicating with the FundoTV router and download the audio-visual content for streaming.



End users can also view the content using their web browser if they don't want to install the mobile app or don't have Internet connection to download the app.

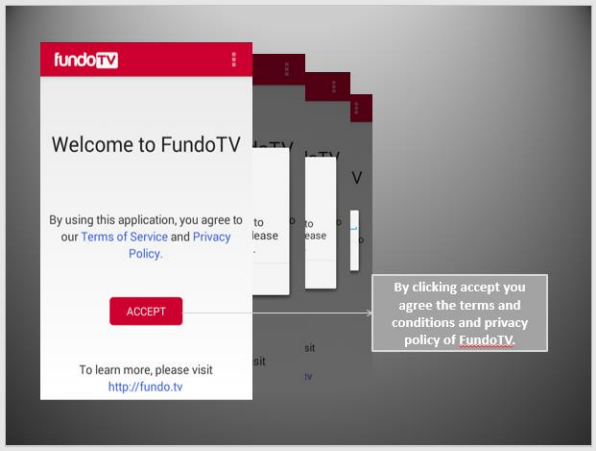
User On-boarding

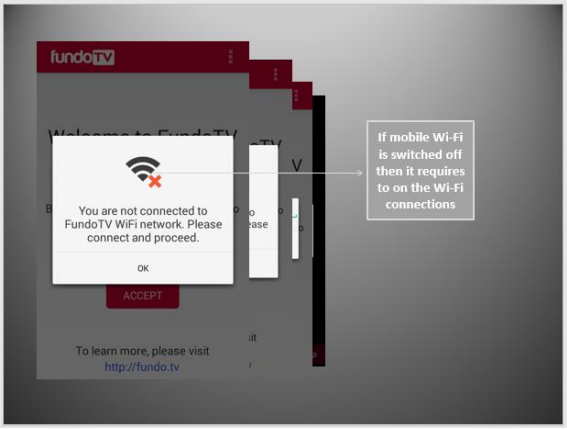
The end users need to register for the FundoTV service before enjoying the streaming content. The registration process is simple and can be modified based on operator's requirements. The user needs to fill a simple form and submit it. The information is sent to the cloud for collecting analytics and data about the user.

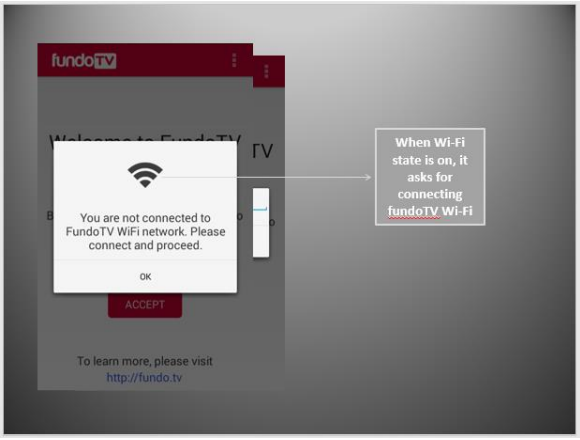
End User Experience

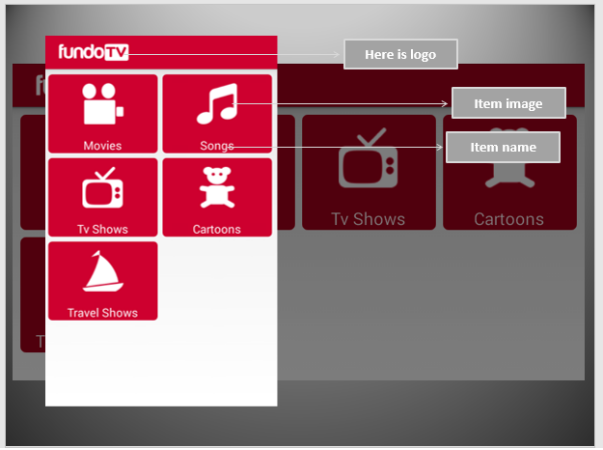
The end user interacts with the FundoTV router through the mobile app or web browser. In case of web browser, the user needs to type a URL in the browser to get directed to the welcome page.

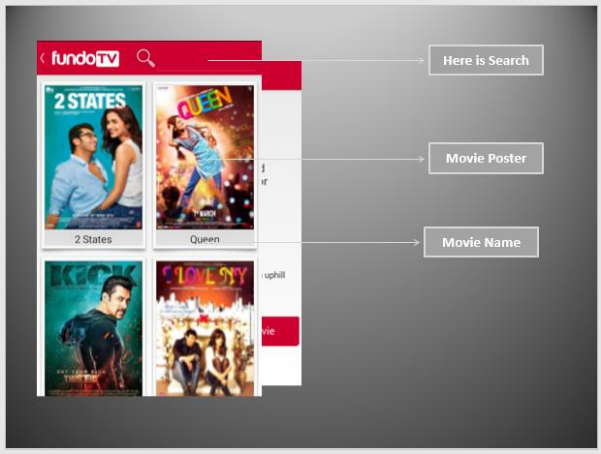
The screenshot below show the user's experience while using the FundoTV





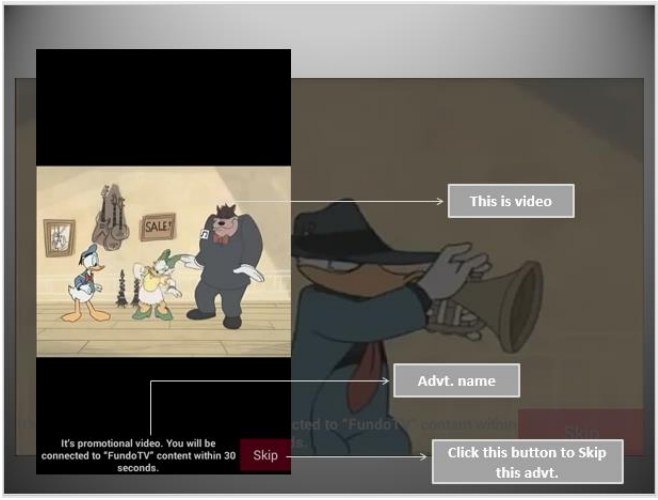






Advertisement Insertions

The system is designed to show advertisements to the end users before the video start playing. The mobile app can show a video advertisement before the user get access to the content. This will help operator generate revenues from the advertisements.



Wifisoft is also working on a new feature that will allow operators to insert advertisements in the video and movie contents. This interstitial advertisement content will appear while the movie/video is playing. The advertisement model is similar to Youtube.

Content Manager

The content manager is a web application installed in the FundoTV router that allows operators to manage the content stored on the storage. It allows easy uploading of content and modifying the meta data of the content. The metadata stores information about the content e.g. the name of video, time period, etc.

The content for each video/audio is organized on the router. The end user can view the metadata while browsing through the stored content.

Installation

The installation of FundoTV router is quick and simple. The router comes with external power cable. The length of the cable can be adjusted as per the specifications of the operator. A standard 2 meter cable is provided by default.

The power cable can be directed connected to the power source like battery in the vehicle. The router contains a power circuit which is responsible for regulating the power fluctuations and spikes.

The enclosure is designed to withstand the vibrations and shocks during the normal vehicle operation. It needs to be mounted using screws. Generally the unit is placed in the center of the vehicle to provide maximum coverage and better connectivity. However, if the central mounting is not possible then the unit can be installed behind the driver in the bus or wherever the power source is easily available.

Management

Wifisoft can provide a complete managed service for management of the remote FundoTV routers. The management for the routers can be handled from the central server. Each router can be equipped with a 4G dongle which will provide Internet connectivity to the central store.

The router will be designed to periodically send the data and statistics of the end users to the server for analysis and reporting. This will allow operator to collect and analyze the data from all remote installations.

The central system can be installed in the operator's data center or hosted in private instance in Wifisoft Cloud. Alternatively, the operator can also take full control of the backend management of the routers through the management platform.

Captive Portal

WiFiLAN OSS/BSS has a very comprehensive captive portal system which allows administrators to define wide range of captive portals. Our solution offers flexibility of configuring a captive portal for each hotspot and multiple options on the captive portal for branding and advertisements.

Each captive portal offers option to set logo, branding, images, terms & conditions so the administrator have a full control on branding of the service.

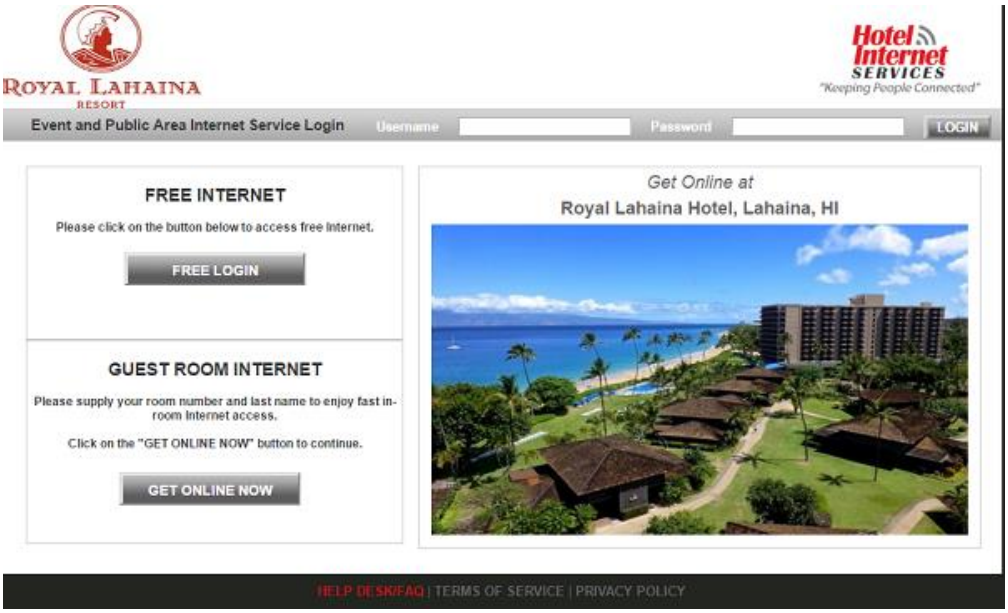
We also help can build custom captive portals based on requirements of the project and host them on a secure web server.

Our captive portal system offers following options

1. **PAID (credit/debit/Bank Transfer/Wallet)**
2. **FREE ACCESS (click-through / T&C access)**

3. **SMS / OTP (Requirements for TRAI/DOT compliance)**
4. **PREPAID VOUCHERS**
5. **SOCIAL MEDIA (Facebook, Twitter, LinkedIn, Google, Instagram)**
6. **DATA CAPTURE**
7. **USERNAME/PASSWORD**
8. **ADVERTISEMENT BASED ACCESS**

Here are some examples of the captive portal



Subscriber Management

WiFiLAN OSS/BSS provides the user management module. This module allows administrators to manage users, track usage, enforce restrictions and generate reports for each individual hotspot.

WiFiLAN OSS/BSS provides a comprehensive API for provisioning the users from the captive portal and interfaces with the billing module to charge the users for bandwidth usage. Administrators can view detailed session history and bandwidth usage for each user.

Bandwidth Management

WiFiLAN OSS/BSS provides comprehensive bandwidth management capabilities for controlling the bandwidth and duration for each users Internet session. Bandwidth management is one of the important elements for any public network since it ensure fairly allocation of bandwidth and provides a good browsing experience to the end users. WiFiLAN allows administrator to define bandwidth rules and policies using simple web interface. These restrictions can be enforced on user groups or individual users thus allowing administrators to finely tune the bandwidth policies

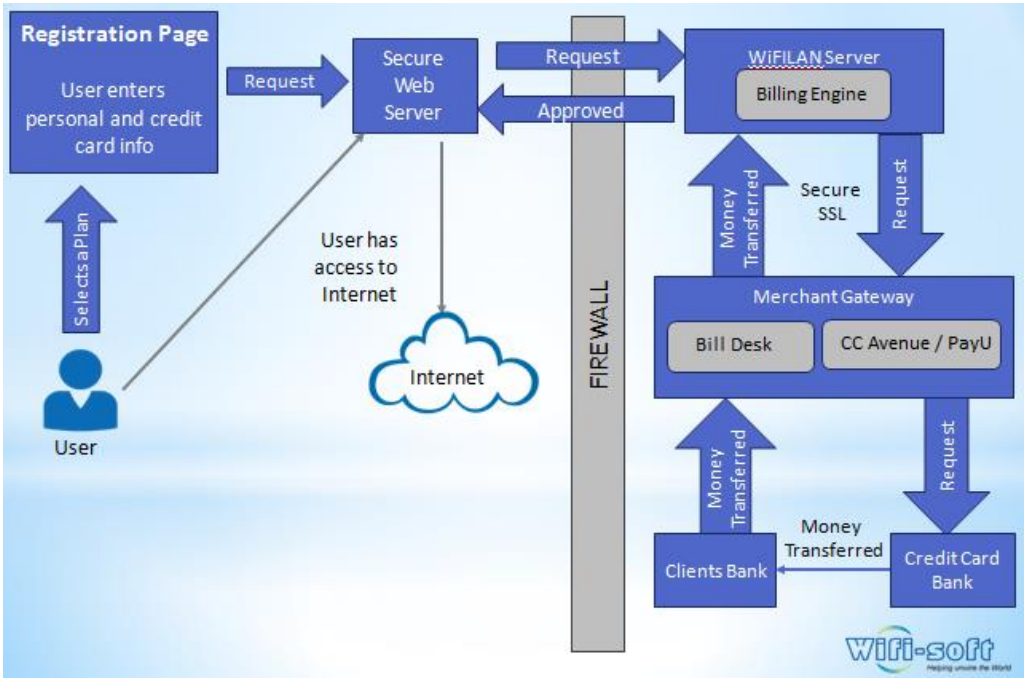
Following are some examples of bandwidth management

1. Provide 512 Kbps Free Internet session for limited time (e.g. 1 hour)
2. Capping users to 1 GB per day
3. Allowing users to purchase data based plans e.g. 1 GB, 5 GB with validity period
4. Allowing users to purchase unlimited plans with restricted speed e.g. 512 kbps
5. Restricting users to only 2 devices
6. Allowing users to login from certain devices concurrently

7. Restricting users to specific hotspot

Payment Gateway Integration

WiFiLAN offers a comprehensive payment/billing solution for public hotspots. This includes online payment using credit / debit / bank transfer / wallet / PayPal and other payment methods.

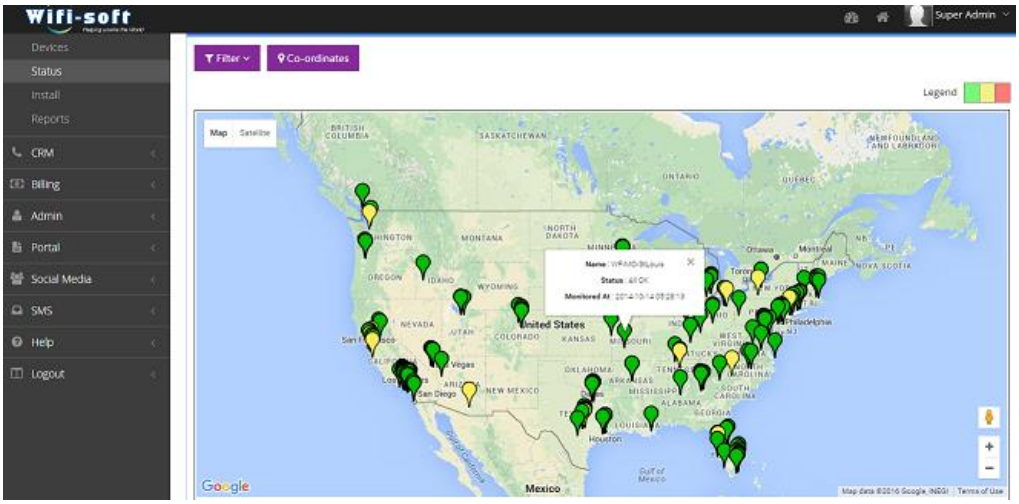


We also offer feature-rich voucher management system for prepaid billing. These vouchers can be fully customized and branded. Each voucher can be tracked using the batch and serial number to generate an audit trail.

Network Management Solution (NMS)

WiFiLAN and AP controller have a built-in NMS solution that allows administrator to monitor the status of the complete network from a single console. The NMS system is designed to seamlessly work with the remote access points and learn the current health of the network. It constantly keeps track of the critical RF parameters, online users, the data throughput, uptime and other important indicators of the WiFi hotspot.

The NMS system comes with an integrated alerting and performance tracking system. The alert system will immediately send email/text notifications to the administrators when any remote network or APs goes down. Each AP also periodically communicates with the NMS system and reports all the performance metrics to the central dashboard. This allows the admin to monitor the overall health of the network and fine tune the network parameters as and when required.



Wireless Clients

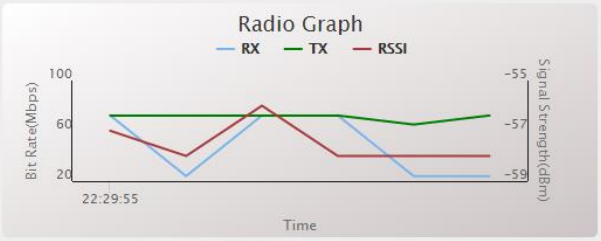
10 records per page

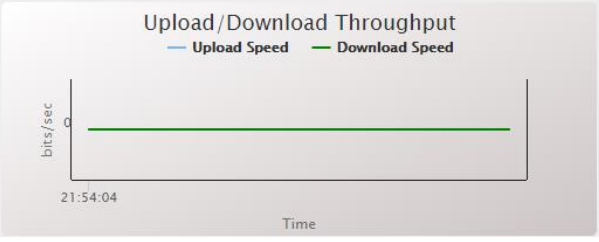
Search:

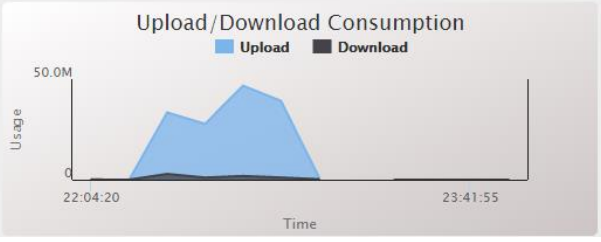
	MAC Address	IP Address	Username	Rx Bit Rate	Tx Bit Rate	Checkin Time	RSSI	AP Name	Status
⊞	30:C7:AE:08:14:A4			72.20 Mbps	72.20 Mbps	2016-10-29 23:47:11	-61 dBm	Tumkey A10	Connected
⊞	84:10:0D:BC:2E:FC	10.68.181.0	84:10:0d:bc:2e:fc	6 Mbps	26 Mbps	2016-10-29 23:47:11	-72 dBm	Tumkey A10	Online
⊞	A8:66:7F:42:AE:E2	10.68.181.6	a8:66:7f:42:ae:e2			2016-10-29 23:47:11		Tumkey A10	Online
⊞	90:B6:86:F1:6C:0D	10.68.181.2	DC_20161029_572583@tumkey	24 Mbps	130 Mbps	2016-10-29 23:47:11	-55 dBm	Tumkey A10	Online
⊞	C8:1E:E7:D5:FF:93	10.68.181.4	c8:1e:e7:d5:ff:93	58.50 Mbps	43.30 Mbps	2016-10-29 23:47:11	-72 dBm	Tumkey A10	Online

2 hrs | 6 hrs | 12 hrs | 24 hrs

Assocaited Fequency:0MHZ **Associated SSID:-**







System Logs

WiFiLAN also is responsible for storing the system and user logs in a central repository. The WiFiLAN system is integrated with the storage server which will be responsible for storing and archiving user logs, system logs, AP monitoring status, user browsing logs and session statistics.

All logs are properly archived and stored for record keeping on the servers. Administrator can easily access the logs when required and provide the information to law enforcement agencies.

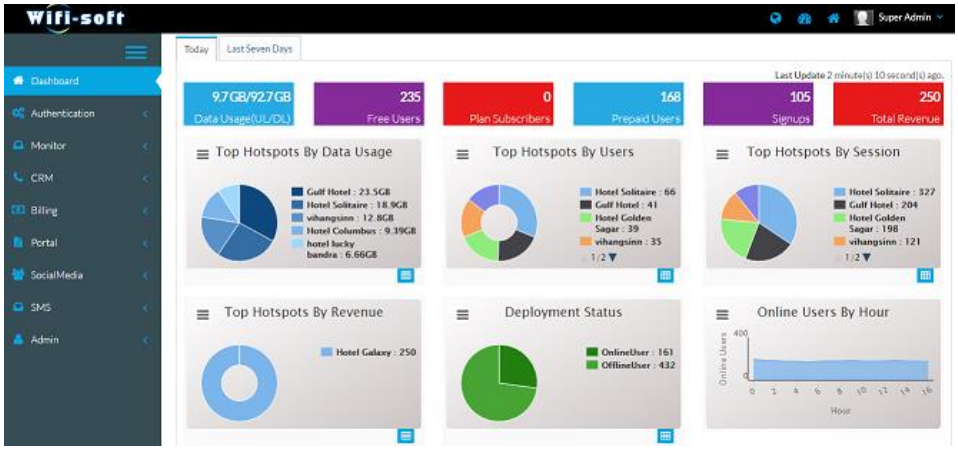
Reporting and Analytics

WiFiLAN provides extensive reporting and analytics of the data collected from the WiFi hotspots and user. Over 75 different reports are integrated in the WiFiLAN system that provides administrators a comprehensive view of the network.

Many reports can be viewed in summary or detailed view. The summary view provides a graphically summary of the data thus allowing administrators to view the overall statistics of the hotspots. The detailed view provides low-level details of the data and provides an option to the admin to export the data for further analysis.

#	Report Name	Summary View	Detailed View	Description
1	Online Users Report	Click here	Click here	This report displays location wise and detailed information about login users.
2	Accounting Report	Click here	Click here	This report displays location wise and detailed information about accounting details.
3	Signup Report	Click here	Click here	This report displays location wise and detailed signup details.
4	Unique Users Report	Click here	Click here	This report displays location wise and detailed Unique users details.
5	Session Report	Click here	NA	This report displays location wise and Session details.
6	Day Wise Average Traffic Report	Click here	NA	This report displays location wise Session Traffic over Days.
7	Average Traffic Distribution over Duration Report	Click here	NA	This report displays location wise Session Traffic over Hours.
8	Session Traffic Length Insight Report	Click here	NA	This report displays location wise Session Traffic Length Insight.
9	Device Brand Distribution Report	Click here	Click here	This report displays location wise and detailed device vendor count.
10	Device Type Distribution Report	Click here	NA	This report displays location wise device type and their count.
11	AAA Report	Click here	NA	This report displays location wise Summary.

Here are some examples of reports available



WiFiLAN also provides automated reports via email to be delivered to the administrator so they will remain abreast of the status of the network, usage, performance metrics, bandwidth usage, user registrations and other relevant data via email.