Wirelessly Controlled Bag-Counter System

Amazin Automation Solutions

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SIGNATORIES:

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1 Abbreviation/Acronyms

- JB – Junction Box
- TB – Terminal Block
- LED – Light Emitting Diode
- AP – Access Point
- CCQ – Client Connection Quality
- PtP – Point to Point Access
- PtMP – Point to Multi Point
- CPE – Customer Premises Equipment (device that is installed outdoors typically a **wireless** access point, **wireless** bridge, or **wireless** router)

2 Objective of the Document

The objective of this document is to give assistance to people about Bag-Counter Specification, operation & configuration.

3 Audience

1. End User
2. Testing Team
3. Plant Management

4 Introduction

This is a micro-controller-based system that receives input signal from load cell (Sher Beam), which is installed below conveyor belt. Whenever the cement bag passes over the load cell assembly, a pulse is generated according to the weight and time of the bag. (time in the sense, how long the bag was on the sensor)
When the target is given through the application. The controller starts counting the bags until the target is reached. The control unit has a relay to stop the conveyor belt after completion of the target. The discharge belt is connected to that relay. And it stops as soon as the target is met.

When the load-cell sense the cement bag, it sends a pulse to the control unit. The control unit processes the

pulse according to the defined algorithm and shows it on the LED display as a count. And along with this, there is communication from the application as well. And the count keeps updating on the application's dashboard.

5 Technical Specification and Features

- MCU: Cortex M3 based 32bit advanced micro controller.
- This controller can also count adjacent bags, overlapping bags, horizontal and vertical bags.
- It has 16X2 character LCD display to know the current status for better understanding to the operator.
- It has Single row high brightness LED display, to display the current count (4 Digits)/target count (4 Digits) with long view distance (20 meters) and the character size is 6inches.
- ON Board Ethernet Module (RJ45 port) with 10 to 100Mbps speed for MIS reports and operating from Amazin PPMS Application.
- IT Supports TCP Server, TCP Client, UDP Client, UDP Server and HTTPD Client working modes.
- On board one RS232 channel to send the data to LED Display.
- On board two RS485 channels.
- Supports 4X3 Keypad for entering target quantity (Not Included).
- LED indicators to know the controller working status.
- It can read belt running feedback signal to know belt running/stop status.
- It has 2 Nos. of On board potential free outputs to stop the conveyor belt when count reaches the Target value and it can be used as ALARAM.
- Isolated industrial SMPS for both load cell and controller power.
- No need of Separate power supply for load cell.

5.1 Electrical Specification

- Input power: AC 90V-240V/3amp.
- Device power consumption: 2watts.
- One load cell input to read the load cell status.
- Two potential free relay outputs with N0/NC contact to stop the belt.
- One Belt Running signal feedback input: AC 110V or 230V

5.2 Environmental Condition

- Temperature: 0 to +65 C.
- Humidity: 0 to 96% Rh non-condensing.

5.3 Mechanical Specification

Controller Junction Box

- Body: 1.2mm MS
- Dimension: 400mm * 400mm * 200mm
- Surface Finish: Powder coated.
- Net weight: 15 Kgs
- Standard Wall Mounting.

LED DISPLAY:

- Body: 1.2mm MS
- Dimension: 3 ½ Feet* ½ feet
- Surface Finish: Black Powder coated.
- Net weight: 12 Kgs
- Standard Wall Mounting.

6 Associated Hardware Components

6.1 Control Unit

The controller is the main part of Bag-Counter (web base application). It is an embedded device in which the bag counter application operates the entire functions with the help of programmed controller.

The bag counter Controller has a metallic cabinet, inside which all its necessary components are packed. Those are relay Card, PoE switch, MCB & SMPS etc.

For controller connection detailed diagram (Internal), please refer to:
Reference Document\ Reference Docs\Bag-Counter_Internal_Wiring_Diagram.pdf

Default IP : 192.168.0.7
Default ID : admin
Password : admin

Follow these steps to configure the Bag-Counter controller:

- If the IP address is known, then open it on the web browser and set the parameters as described below- (**Figure 4, 5, 6, 7**).
- User Name & Password is **admin.**
- Or download the USR-TCP232-M4K3 Setup Software for find the IP
  Download Link - https://www.usriot.com/support/downloads/usr-tcp232-m4k3-setup-software.html
- USR-TCP232-M4K3 Setup Software V2.3.3.97.exe (or available latest version).
- First Search the device (**Figure 1)** and set the parameters as described.

Opened in USR-TCP232-M4K3 Setup Software

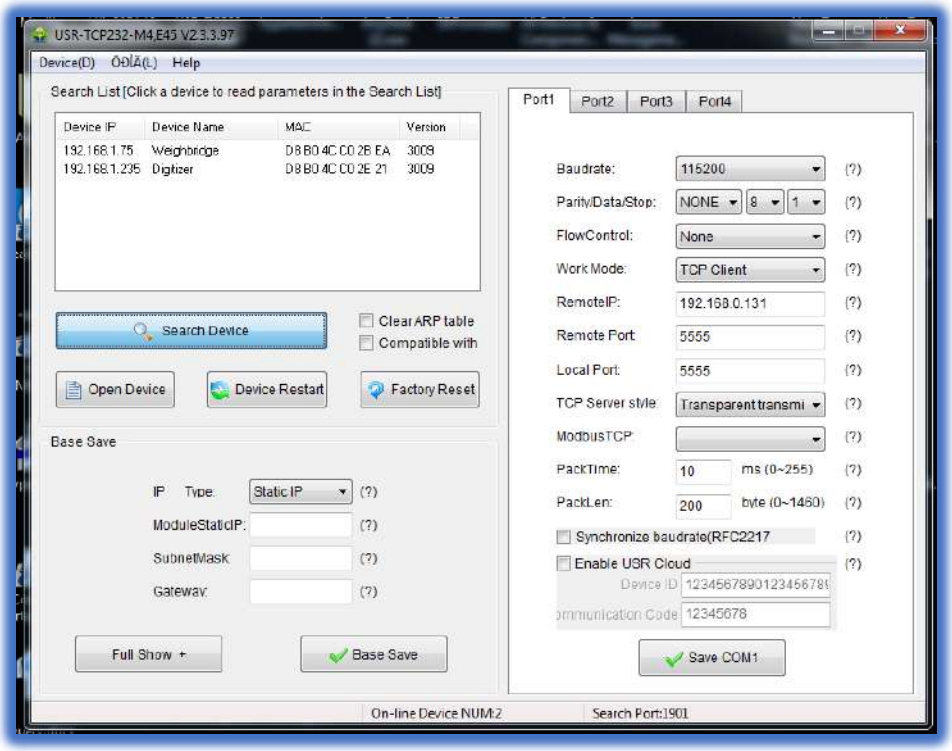

Figure 1. Search Devices (Default Parameters)

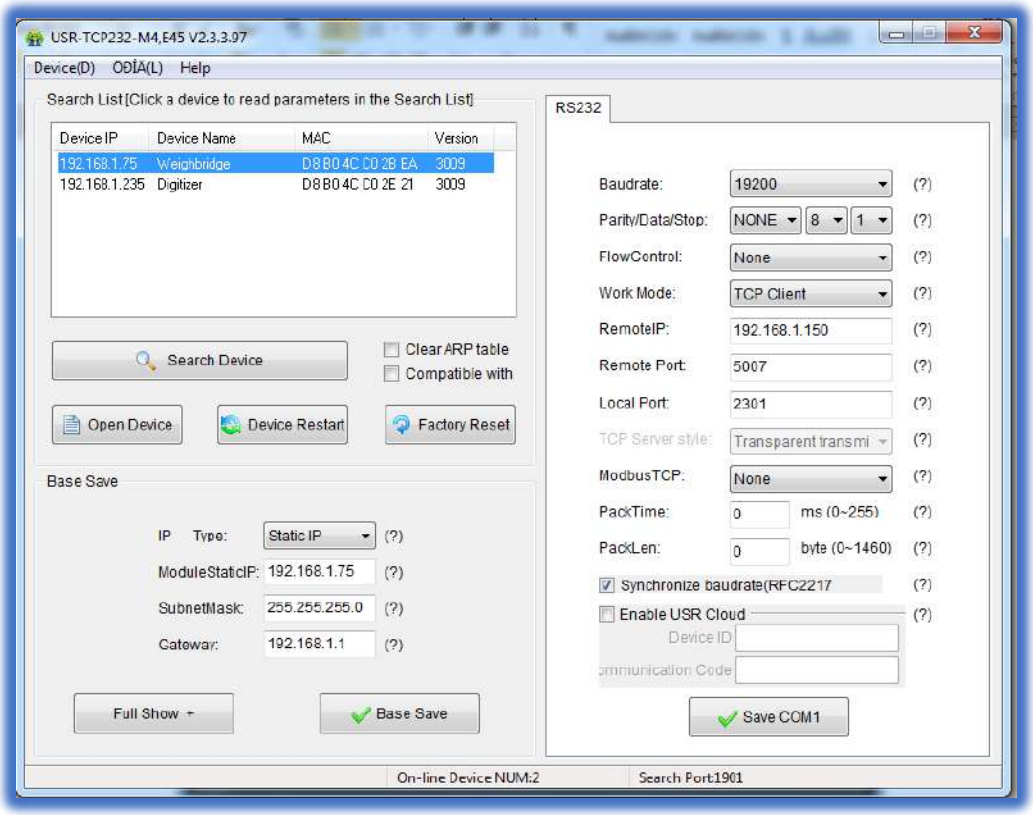

Figure 2. Selected Parameters

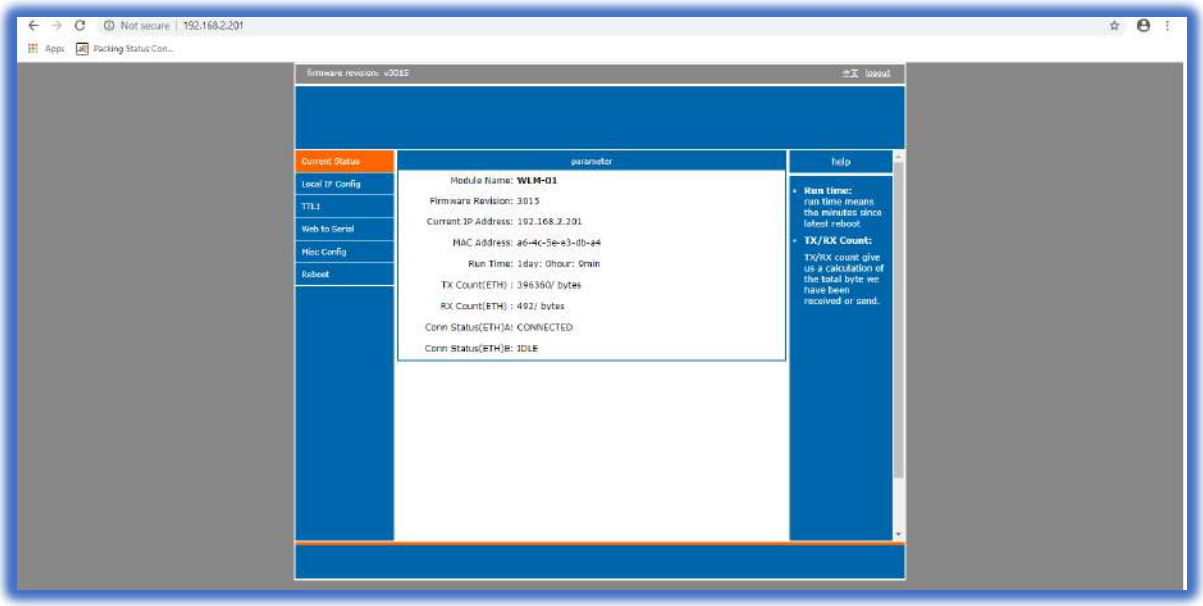

Figure 3. Current Status

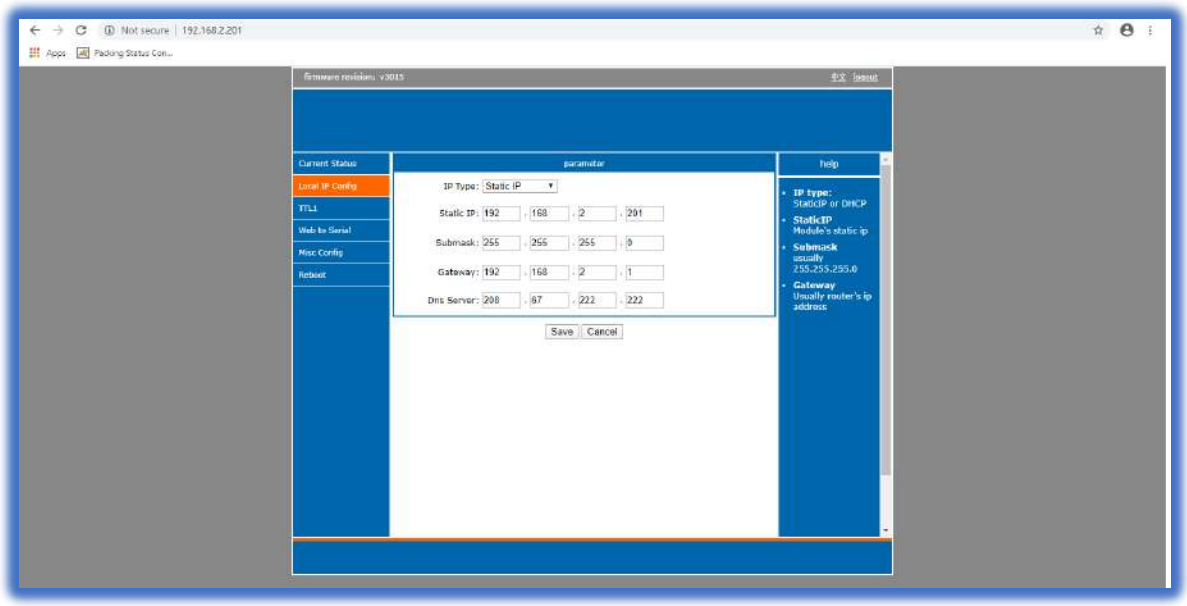

Figure 4. Local IP Configuration

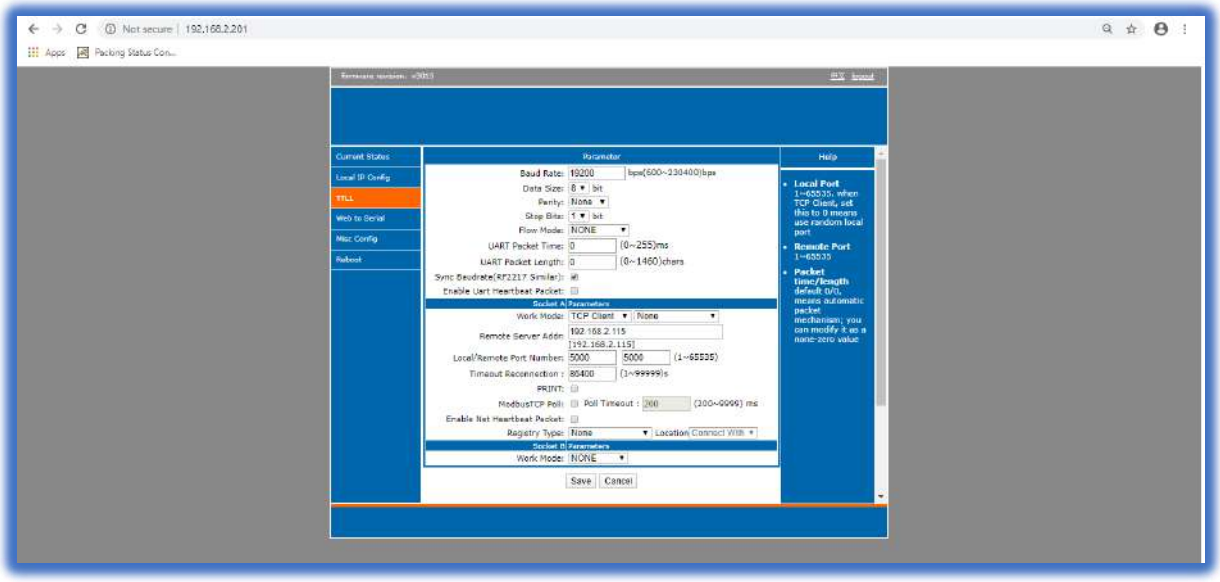

Figure 5. All Parameters

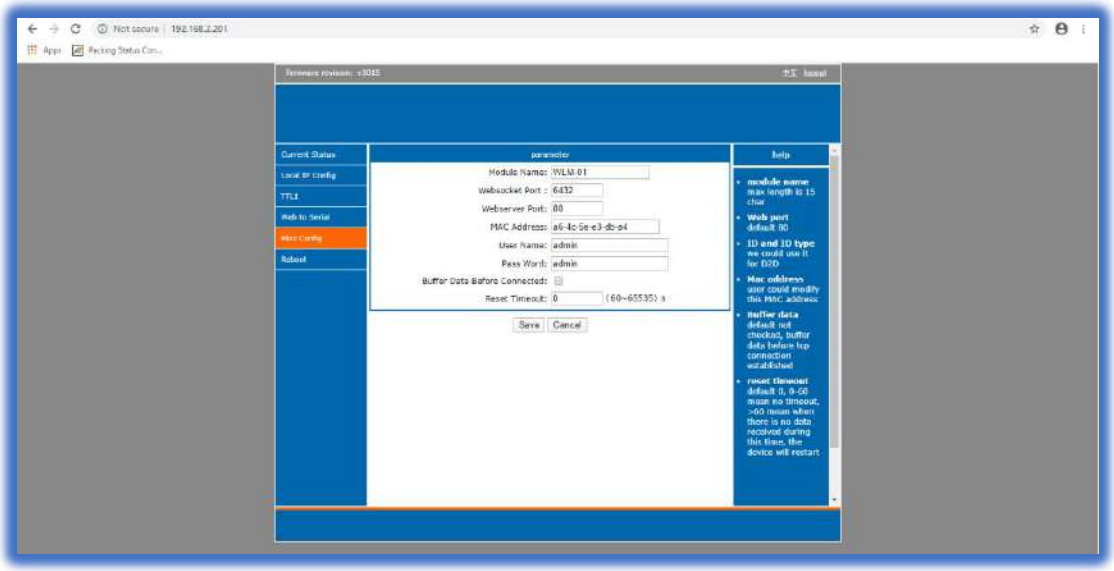

Figure 6. Misc Config

6.1.1 Control Unit Programming Procedure

- **Required Platform - Windows (win 7 and higher version)**
- **Download FLASH-MAGIC (open source*) programming software**
- **Connect RS232 Programming kit to controller through jumper wire as follows**
  - **RX to RX**
  - **TX to TX**
  - **GND to GND**
- **Power the controller 5VDC @2A**

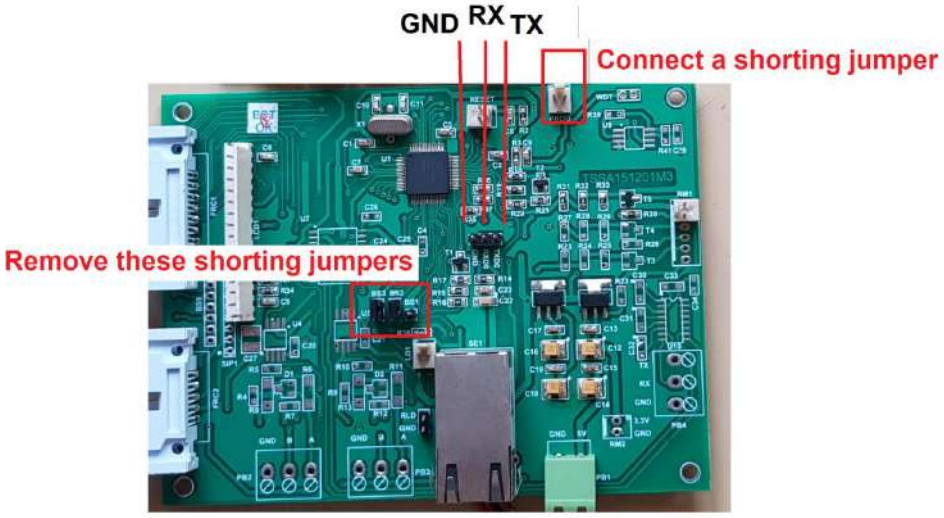

Figure 27. Bag Counter Controller

Figure 8. Programming Kit

- **Open Flash magic software and select parameters according to the following screenshot**

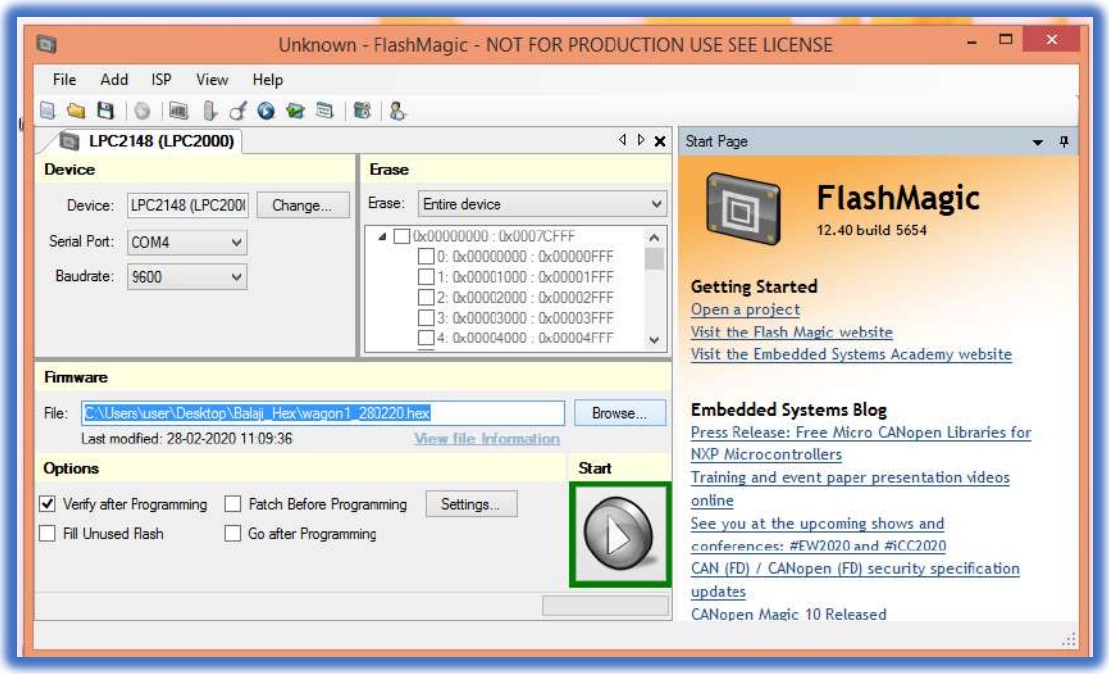

Figure 9. Flash Magic Software Screenshot

- **Browse Hex file as per WLM number (WLM-1.Hex)**
- **Click on Start**

- **After the controller is programmed, the name of the hex dumped in it will be displayed on its LCD. (e.g. Wagon Loader - 1)**

6.2 Load-Cell (Shear Beam)

Sher Beam load cell are used wherever compressive forces act.

The core of the shear bar load cell is the spring body. This consists of a piece of metal, which deforms under the action of force and return to its original state when the force is withdrawn. This defined deformation is registered by a strain gauge attached to metal and converted into an electrical signal. It has to be calibrated time to time.

Figure 10. Load Cell

6.2.1 Load-Cell /Bag Timing Calibration

Figure 11. Load-Cell /Bag Timing Calibration

6.3 LED Display

It is a serial communication based 12 characters LED display, which is communicates directly with the bag counter controller and displays counts and target.

Figure 12. LED Display

6.4 Handheld Device (Kiosk/Tablet)

Security Application Password: 0000

Figure 13. Tablet/KIOSK

7 Wireless Connectivity Architecture

For wireless connection detailed diagram, please refer to:

Reference Document\Reference Docs\Wireless_Connectivity_Diagram.pdf

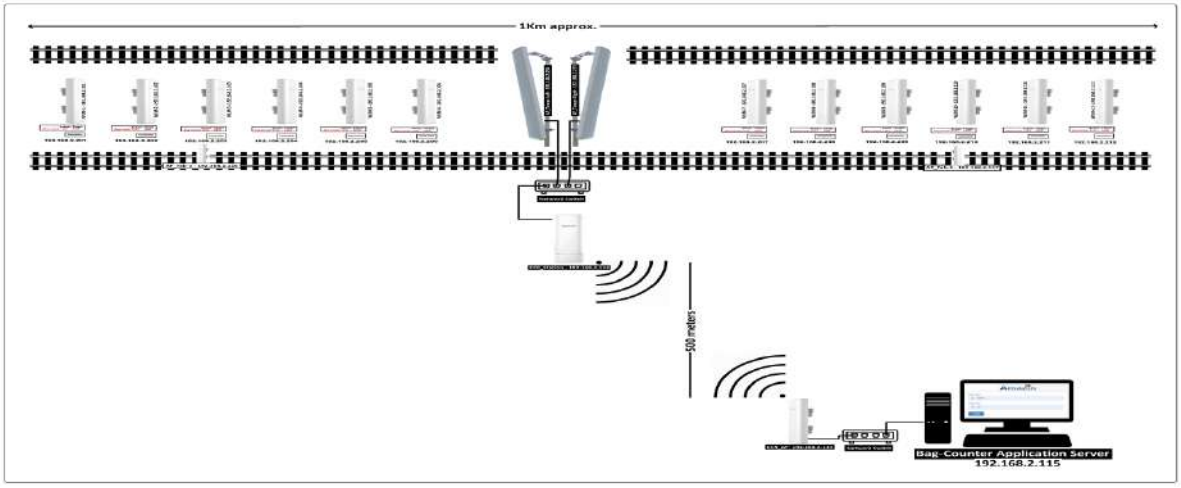

Figure14. Connectivity Architecture

Figure 3

7.1 Base-Station (AP)

Tenda B6 5GHz 11n 300Mbps Basestation is designed for PtP and PtMP solutions for wireless connectivity B6 adopt of IP65 weatherproof and 6000V Lightning protection design, it can withstand the harsh environmental conditions such as sunshine, rainfall or extremely low/high temperature environment.

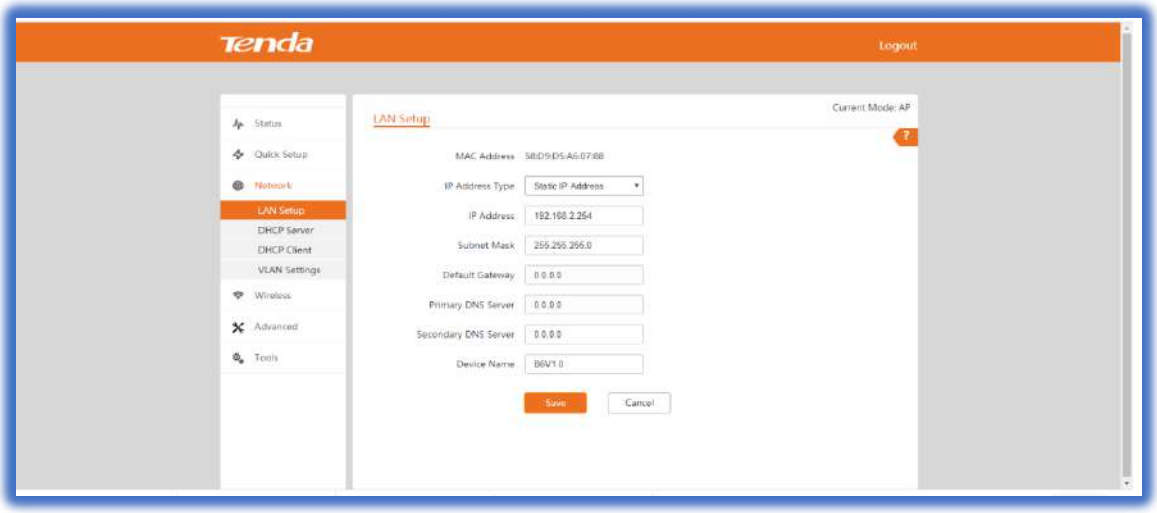

Figure 15. Tenda O6 & B6 Web UI

Default Credentials:

IP : 192.168.2.1
Default ID : admin
Password : admin
WiFi Password : amazin@123

For detailed configuration, please refer to:

Reference Document\B6_User_Guide.pdf

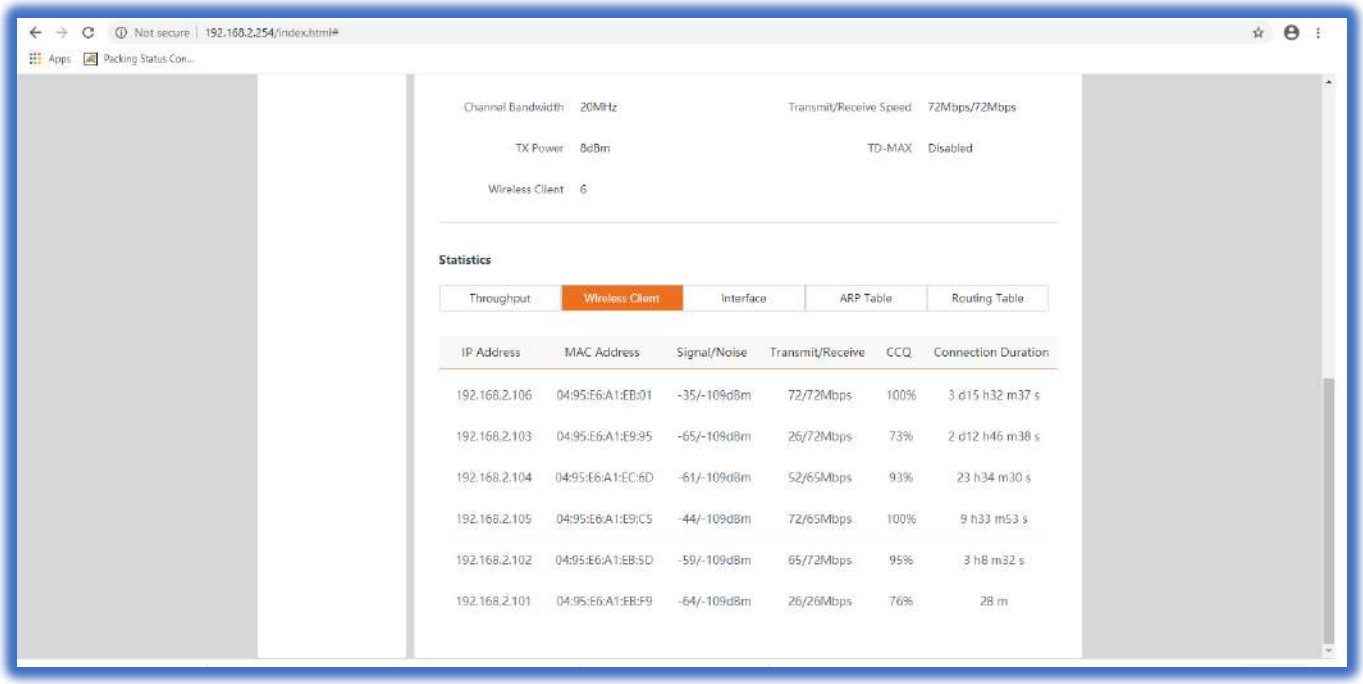

Figure 16. Client Connection Quality Check

7.2 Wireless CPE (AP/Station)

It features with an external power amplifier and a built-in 16dbi directional antenna to provide an efficient way to pick up and maintains a stable signal for a wireless network connection range up to 10 kilometers.

Default Credentials:
IP : 192.168.2.1
Default ID : admin
Password : admin
WiFi Password : amazin@123

For detailed configuration, please refer to:
Reference Document\O6_User_Guide.pdf

8 Application Overview

The interface of the Bag-counter application is as follows:

8.1 User Login

Bag-Counter application is a web based application. To open the application user has to open the browser and enter the below mentioned URL,

192.168.2.115:8080/BagCo2

Default User ID : admin
Password : 1234

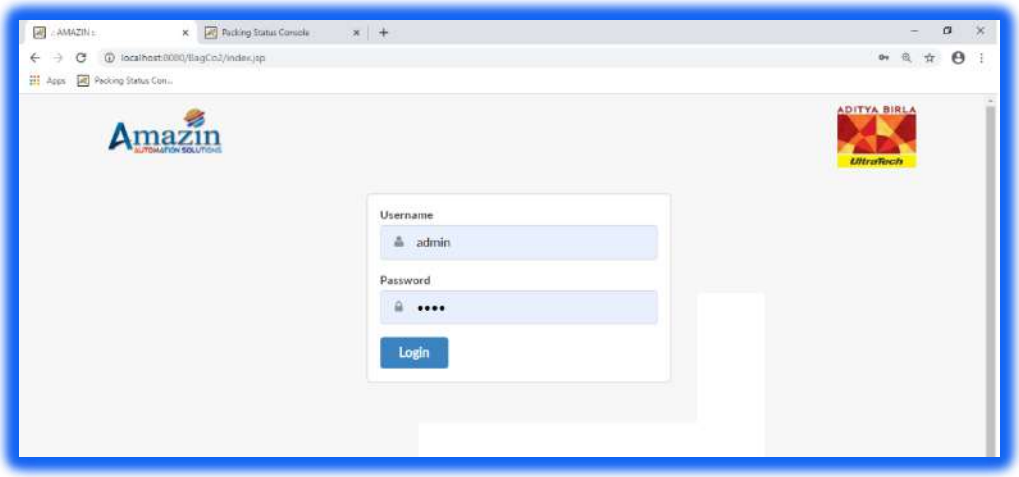

Figure 17. Login

8.2 Home

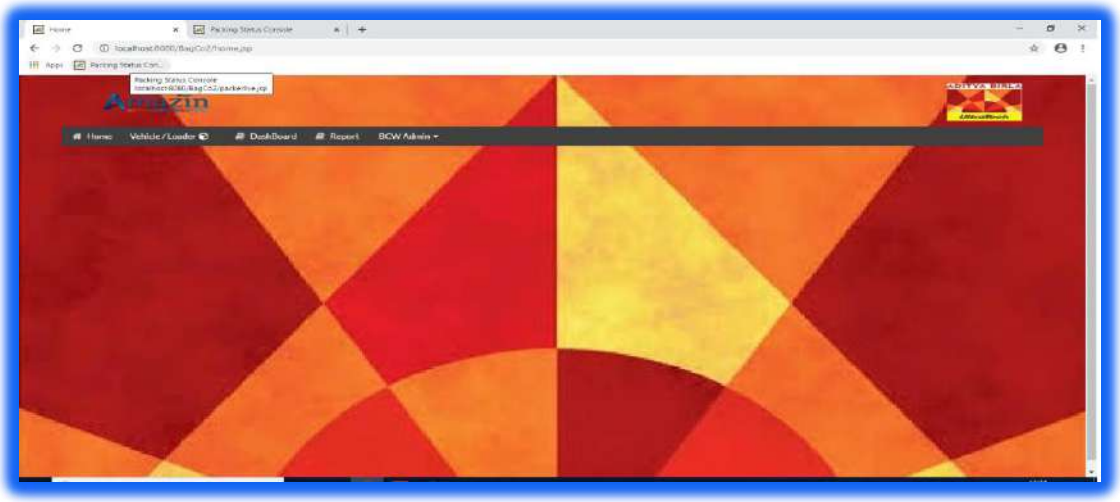

Figure 18. Home

8.3 Vehicle/Loader

User need to open the **Vehicle/Loader** tab

Following fields will be filled by the user as per loading requirement:

- Destination (Rack)
- Vehicle/Wagon Number*
- Number of bags*
- Type of Bags* (HDPE, LPP, LPP5-S, Others)
- Product Code* (43, 53, PPC, Ultra Super, Others)
- Packer Number* (Packer-1/2/3/4/5)
- Wagon Loader Number* (WLM-1/2/3/4/5/6/7/8/9/10/11/12)
- Remarks
- Tare Weight

The entire star (*) marked fields are required to be filled by the user.

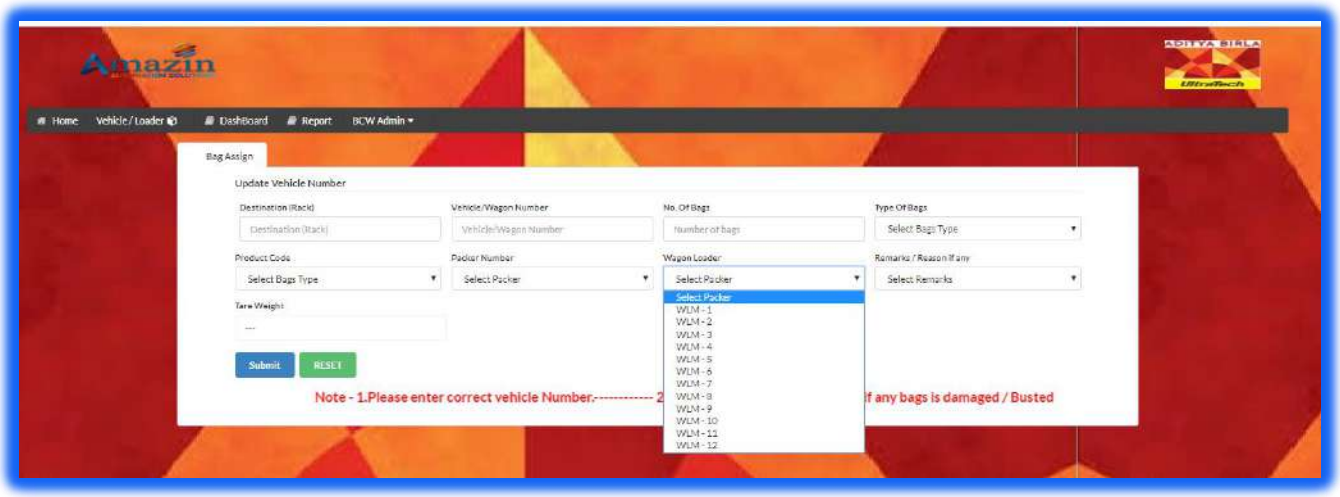

Figure 19. Target Assign Page

8.4 Target Entry Procedure

By using web application:

- Login the AMAZIN Application as **ADMIN** or **OPERATOR** with provided password and open **BAG assign** option.
- User has to fill required detail in compulsory fields (*) and click the **SUBMIT** button.
- The target entered will appear on the dashboard.

By hand held device (Kiosk/Tablet):

- The same web UI will also be accessible through the kiosk/Tablet, Just as the user fills the details through the PC, and the same has to done through the tablet.

8.5 Dashboard

Dashboard are provided to view the data on real time basis

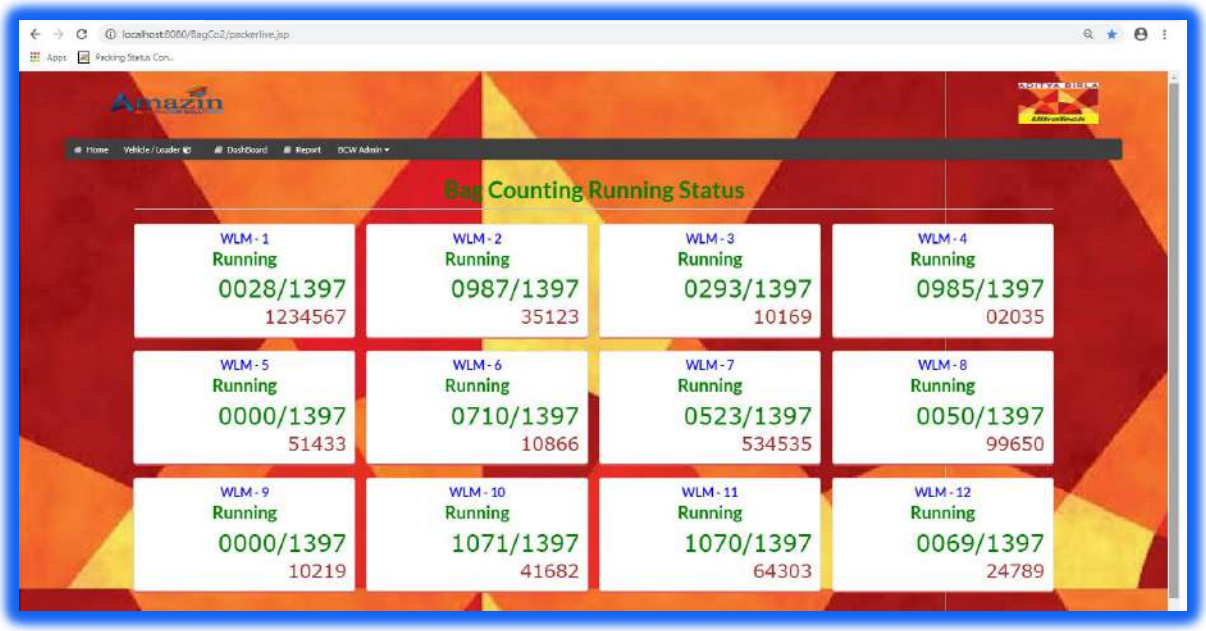

Figure 20. Dashboard

Following data is displayed on the Dashboard

- Loader Number
- Running Status
- Bag Target and Current Count
- Vehicle or Wagon Number

8.6 Report

For accessing **Reports**, user need to open UI > Reports > Daily Dispatch Report/ Shift Report

- **Fields**
  - **Serial No.** : Serial Number
  - **Destination** : Where it will be sent
  - **Wagon No.** : Number of the Wagon
  - **No. of Bags** : Loading Target
  - **Types of Bags** : Material type of the cement bag cover
  - **Product Code** : Type/Quality of the Cement
  - **Packer** : Packed by which packer machine
  - **Loader** : Loaded by which Loader
  - **Actual Bags** : Actual loaded bags

- **Remarks** : Remark if any
- **Tare Weight** : Tare (Empty) weight of that wagon
- **Start Date/Time** : When the bag counter machine was targeted
- **End Date/Time** : When the bag counter machine was stopped

Figure 21. Report Generation

8.6.1 Daily Dispatch Report / Shift Wise Report

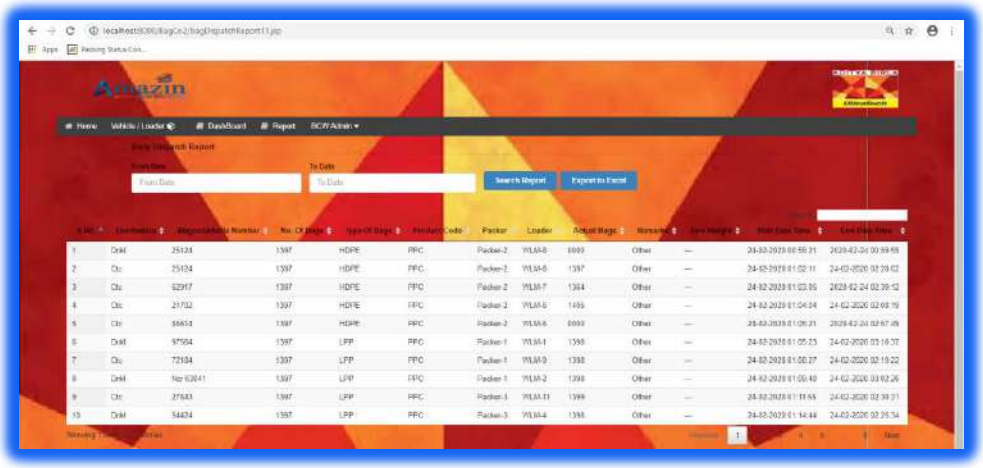

Figure 23. Generated Report

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