Centralized Intelligent Kavach Monitoring System (CIKMS)

INTRODUCTION

1. Overview: CIKMS shall be provided over OFC Network for centralized monitoring of TCAS equipped Trains and Stations within the network. It is used for troubleshooting of error events, off line simulation, real time monitoring of TCAS loco etc. Stationary TCAS (STCAS) and Loco TCAS (LTCAS) transmit exceptional fault/critical messages to CIKMS through their respective GSM/Radio interfaces. A Central Server is present in the Division Control Room. All relay information and radio packets exchanged between Station and Loco are logged in Central Server and accessed through CIKMS.

DEFINITIONS

2.1 Login Screen: Login Screen will have User Name, Password with Login and Clean Button as shown in Fig. 1

Login Screen

2.2.1 Add User Account : The authority of control for the account shall enable/disable appropriate options on login. After receiving the inputs, system shall validate the username and create a user account. The information shall be stored in persistent database at server.

2.2.2 Edit User Account : After receiving the operator inputs, system shall edit the area of control and authority of control for the account. The information shall be stored in persistent database at server.

2.2.3 Delete User Account : After confirmation from the operator, the selected user account shall be deleted from the system. If the user account selected for deletion was logged in, it shall logout & login page shall be displayed on display.

2.2.4 User Login : The entered values - username and/or password shall be verified with database and on successful verification user shall login and main screen shall be displayed as per the role of the operator.

2.2.5 User Log Out : Application shall have provision to close the application. Application shall provide a close button, on clicking this button application shall prompt user with a password box along with the provision to enter the reason for closing the application. Application shall provide a textbox to enter the reason with a max character of 150. System shall validate the password before closing the application. if the user enters valid password and reason then application shall be closed otherwise it shall remain opened. System shall log the opening/closing of the application in the log file with date time along with the reason for closing entered by the user.

2.2.6 Change Password for the User Account : After receiving valid inputs from the operator, system shall change the password of the selected user account. If the user account selected for Change Password was logged in, it shall logout & login page shall be displayed on Display.

2.2.7 Flash Screen Loading Animation :

a) Application shall display loading animation until application loads completely.

b) Application flash screen shall be displayed on top of the screen.

c) Application flash screen shall have the information like Application title, Application Version details.

2.2.8 Display List of Connected Stations on the Main Screen :

a) On successful login into the system station list dialog shall be displayed to operator for selection of section.

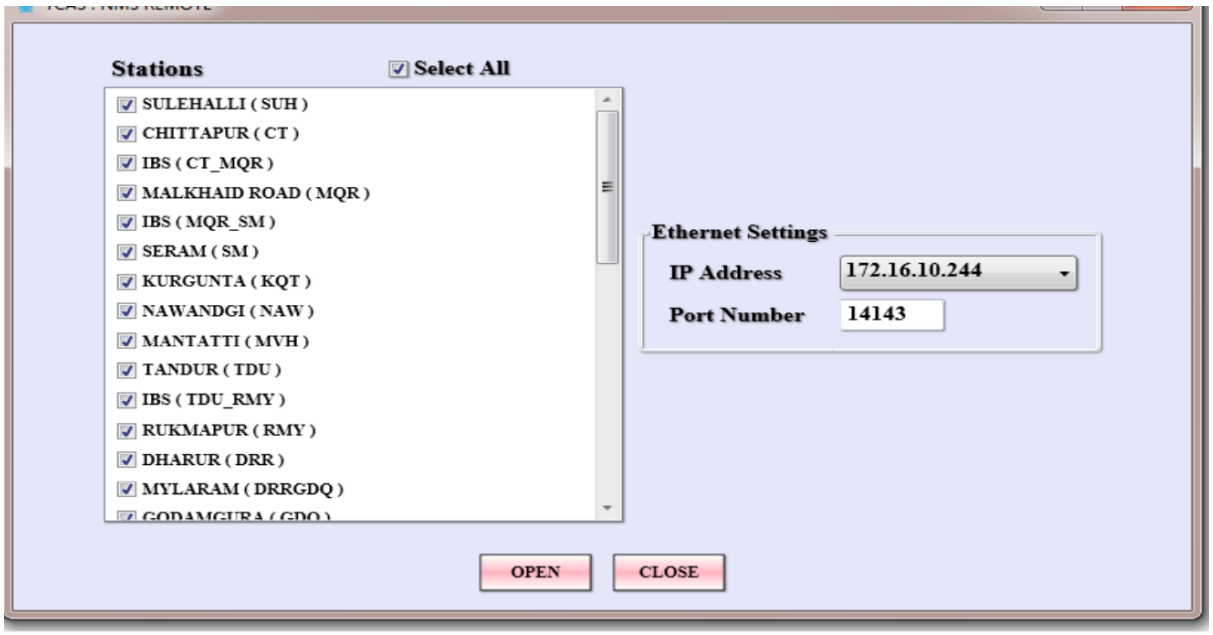
b) Station name and code shall be stored in the system. Along with station list operator shall also select the E1 and Internet IP address and port number for communication.

c) Based upon the IP address and port communication shall be done on these IP address and port.

2.2.9 Display of Selected Stations on the Single Main Screen Window :

Application shall display all selected stations in a single window with small foot print to recognize all the connected stations with their link status. Total screen size shall be divided into equal parts depending on the number of stations selected in the CIKMS. Each station shall be displayed in a tabular form.

Each yard/station area shall be designed according to the RFID layout of that station in CIKMS display tools or using separate tool. Every required function aspect shall be mapped against to the corresponding relay. Function such as signal aspect, TIN and Berthing Track shall be mapped to be displayed on the CIKMS software. Stationary TCAS link status shall be mapped to station/IB/LC/RIU name. System shall monitor the link status of each selected station, on link failure, station name shall be displayed in Red color after the continuous delay of communication for 10 cycles (20 seconds) otherwise Green color.



2.2.10 Display Stationary TCAS Parameters :

Display application shall display the following parameters of each stationary TCAS (STCAS)

a) **Yard Background:** Application shall display all selected stations in a single window.

b) **Track:** Application shall display tracks with rectangular bars. Application shall display all tracks in gray color by default. Berthing Tracks shall be mapped with corresponding Berthing track relay, whenever the relay drops then the track control shall be displayed with Red color.

c) **Point**: Application shall display Point with rectangular bars with required inclination. Application shall display all Points in Gray color.

d) **LC Gate**: Application shall display LC Gate with dashed lines in Gray color.

e) Signal Post: Application shall display signal post with a line in Gray color.

Signal Aspect: Application shall display signals with circular controls with gray border. Each aspect shall be filled by its corresponding aspect type and its mapping relay. For example: Red aspect shall be mapped with XRECR, whenever XRECR picks up then the signal aspect shall be filled with Red color otherwise it shall be filled with black color. The same shall be followed for Yellow, Double Yellow, Green and Calling-on aspects.

b) **Shunt Signal**: Application shall display Shunt signals with Quadrant circle with a gray color border and filled with black color.

c) **Route Indicator**: Application shall display Route Indicators with small rectangular bars in Gray color by default. Whenever the route indicator relay picks up then the application shall display corresponding route indicator in Yellow color.

d) **TIN**: Application shall display TIN as rectangular bars on tracks. These TINs shall be displayed whenever corresponding TIN relay picks up. By default, they shall be filled with Olive color.

e) **Text**: Application shall display required labels foreground with White/Gray color with "Times New Roman" font. For station name the font size shall be 20 and for others 14.

f) **Train**: Application shall display Train with consecutive rectangular strips with Deep Sky Blue color. The front stripes shall be displayed with Yellow color to indicate Engine. Train info shall be displayed in Orange color.

g) System shall update and display the status of all parameters based on the periodic data received from the station and loco TCAS.

2.2.11 Display Full View of Stationary TCAS :

Application shall display selected station/yard in full view of main screen. On double clicking the yard, the yard shall be displayed in full screen. If the operator again double clicks it, then it shall be displayed in the normal state.

On full screen view, application shall display the next station and previous station links. On clicking the station link, application shall navigate to corresponding station and shall display the station data in full view.

2.2.12 Display Top Slider Menu (Configuration, Magnifier, SMS Contacts) :

Display application shall have slider menu at the top of the screen, it shall display an icon to show/hide the menu bar. On clicking this icon, application shall toggle from show to hide and vice-versa.

This menu shall have the following sub-menus.

a. Configuration

b. SMS Contacts

c. Magnifier

d. Help

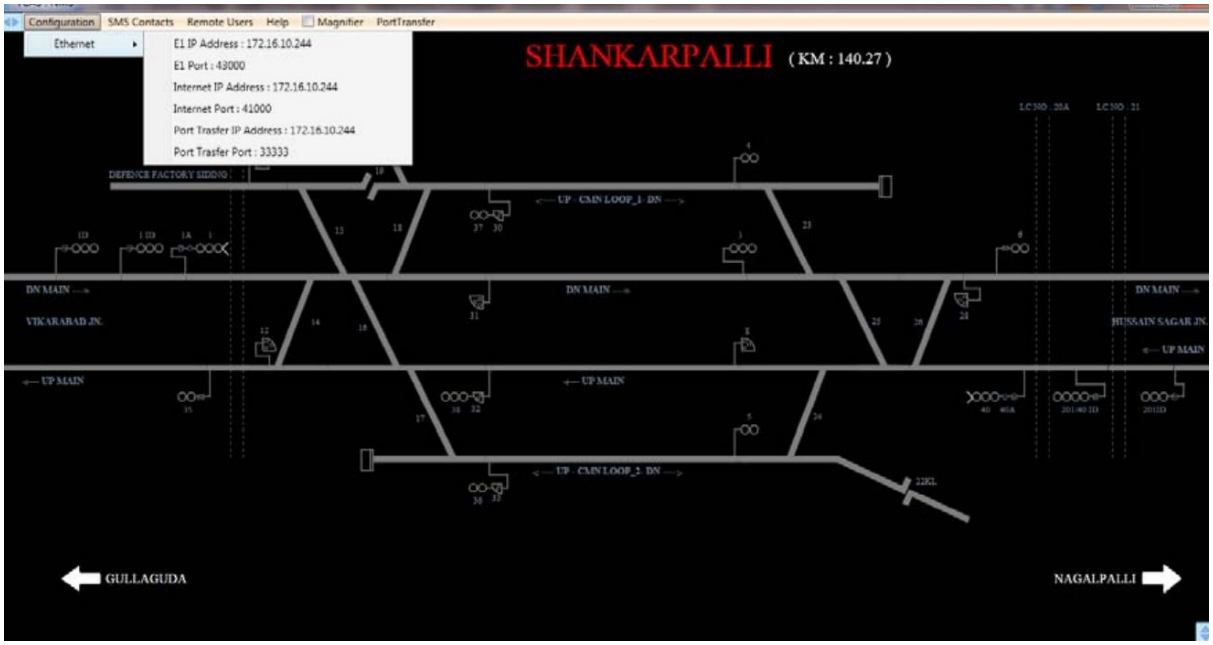
2.2.13 Display Inter and Intra Network Configuration Details :

Application shall display Ethernet as sub menu of configuration. In this sub menu, application shall display following information about

a) E1 IP address and Port Number (used for communicating with CIKMS Server)

b) Public IP Address and Port number (used for communicating with Internet server for sending messages)

c) Port Transfer IP Address and Port Number (used for communicating with CTC system)



2.2.14 Display and Manage SMS Contacts :

System shall have a provision to manage SMS contacts. Display application shall have a sub-menu with name ‘SMS Contacts’. In SMS contacts management window, application shall have a provision to add, edit and delete users.

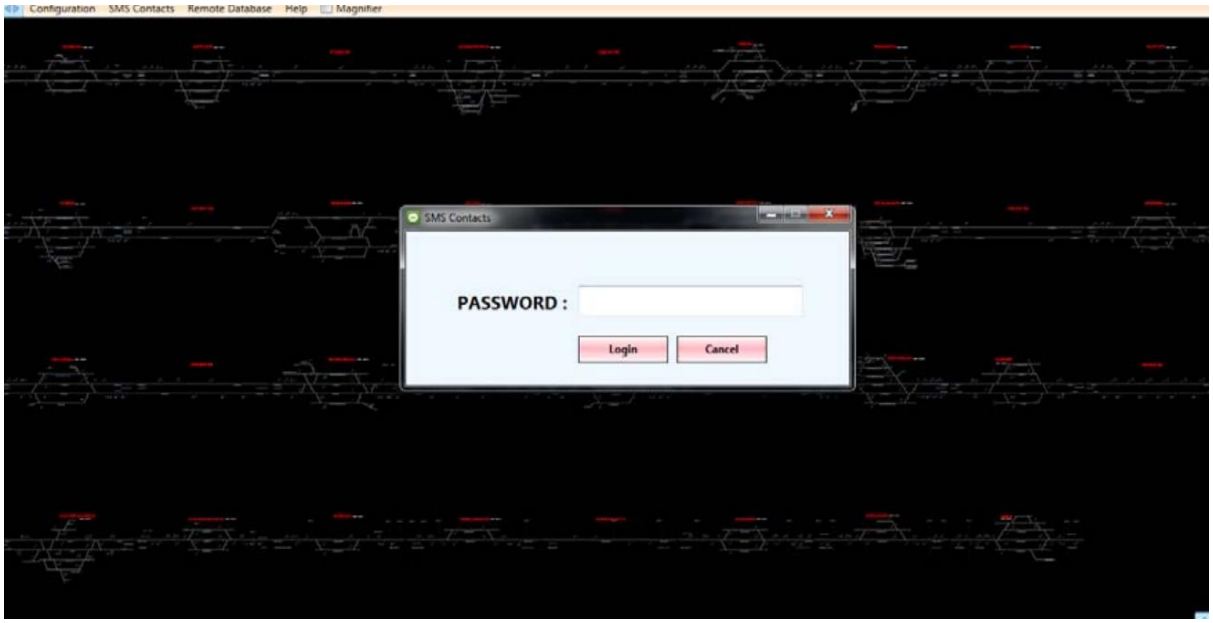
System shall provide a button named ‘Add’ to add new users. On clicking this button, system shall validate mobile number in case of any errors, system shall display appropriate message to the user otherwise it shall add the user into the database.

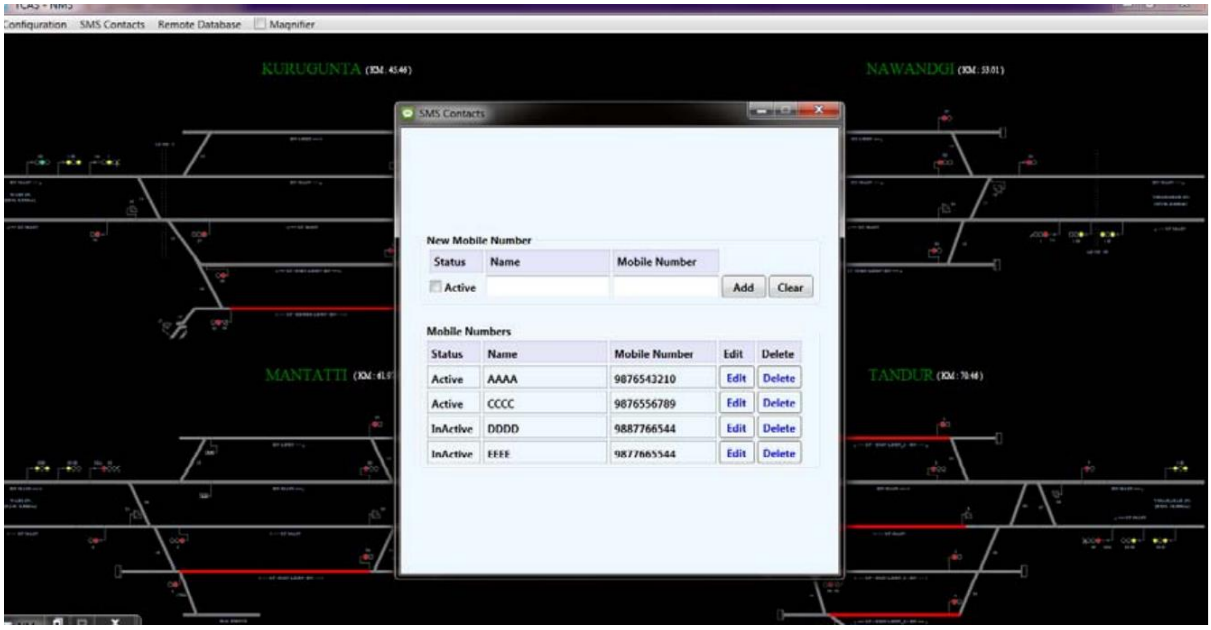
Added user name along with active/inactive and mobile number shall be displayed in tabular

form.

For active users, ‘Active’ otherwise ‘Inactive’ in the status column shall be displayed. The active user shall receive the message however the inactive users shall not receive the message but remain in the database.

After editing required fields user can save the data into database by clicking save button. System shall also have a provision to cancel the edit mode through Cancel button, on clicking this button, and edit mode shall be canceled. System shall have a provision to delete existing users through delete button and Confirmation message shall be displayed to the operator on deleting the user from database.





2.2.15 Management of Remote Users :

a) CIKMS display shall have a sub-menu with name ‘Remote Users’.

b) On clicking this menu, system shall authenticate for authorized user so that a password box shall be opened, user shall have to enter valid password. Setting of the password shall be defined in the user manual.

c) A login button shall be provided to validate user, on clicking this button system shall validate the user. On successful login, application shall open Remote Users management window. Application shall have a button named ‘Cancel’ to close the Remote Users authentication window. On clicking this button, application shall close the Remote Users authentication window.

c) In Remote Users management window, window shall have a provision to add, edit and delete users. To add a user, operator shall enter user name with a max length of 25 chars. Operator shall enter remote user id with minimum length of 4 characters and maximum length of 10 chars. Application shall accept only alphanumeric for remote user name. Application shall have a provision to enter remote user password with minimum length of 4 characters and maximum length of 10 chars.

d) Application shall also provide an option to set the active status of the remote user with a simple check/uncheck option. Application shall have a button named ‘Add’ to add new users. On clicking this button, system shall validate user name and password in

case of any errors, application shall display appropriate message to the user otherwise it shall add the user into the database. Conformation message shall be displayed after adding into the database.

e) Application shall also check if remote user name exists in the database if it exists then application shall display error message and it shall not allow same remote user name.

f) Application shall have an option to clear user, user name and password fields. Application shall provide a button with a name 'Clear'. On clicking this button, application shall clear name, user name and password fields. Application shall display added users in a tabular form with status, user name, user id and password.

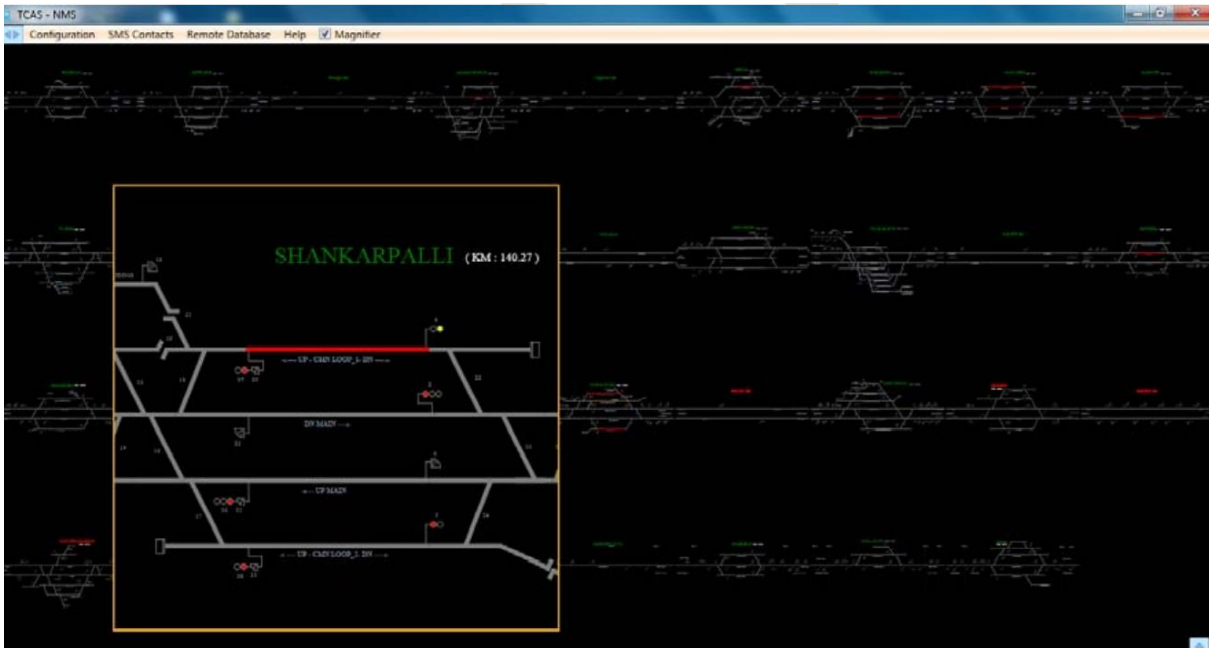
g) For active users, application shall display 'Active' otherwise 'Inactive' in the status column. Application shall also have a provision to edit and delete existing users. Application shall provide 'Edit' button for each remote user. On clicking this button, application shall make status, name, user id and password fields to editable.

h) After editing required fields user can save the data into database. Application shall provide a Save option to save the modified data into the database. On clicking this save button, application shall validate user id and password. Application shall also have a provision to cancel the edit mode, application shall provide a button with name 'Cancel'Play Back CIKMS, on clicking this button, and application shall cancel the edit mode.

I) Application shall have a provision to delete the user. Application shall have a button with name 'Delete'. On clicking this button, application shall ask for confirmation if yes then application shall delete user from database otherwise no action shall be taken. Conformation message shall be displayed on deleting the user from database.

2.2.16 Display of Yards View Through Magnifier :

System shall have an option to view yards through magnifier. This option shall be on/off type. By default, it shall be off. On selecting the magnifier, a rectangular magnifier window shall be displayed from which the content shall be zoomed in or out. By default, the view shall be displayed in a magnified view, on rolling the mouse wheel, magnification shall be changed accordingly.



2.2.17 Reposting the STCAS Data to TMS/CTC via Port Transfer :

System shall have an option to repost all the message frames as received from the stationary TCAS units, on to another LAN port on which TMS or CTC would be connected or dedicated IP Address and Port. This option shall be ON/OFF type. By default, it shall be OFF. When user clicks on 'on' option, system shall transfer all received packets to TMS or CTC on dedicated IP address and port. When user clicks on 'off' option, application shall stop transfer the received packets.

2.2.18 Display of Prompts Window (Prompts, Station Information, Loco Info) :

Application shall have a prompt window at the bottom right corner of the display. Application shall have a provision to show/Hide this window. Application shall have icon, on clicking this icon, application shall toggle from show to hide and vice-versa. In the prompt window, application shall have 3 tabs.

a. Prompts Alert
b. Station Info
c. Loco Info

2.2.19 Display Details of Prompts :

In the prompts Alert tab, application shall display 03 types of alerts. These are classified on the basis of critical nature of the alert.

a) A simple prompt message shall be displayed with category name as prompt for low level alerts. System shall display type of TCAS system such as Loco number or Station/IB/LC name or ID and message along with date time stamp.

b) On receiving data from stationary TCAS if any alert condition occurs in the system then alerts with buzzer shall be displayed, application shall display buzzer as category name, followed by type of TCAS system such as Loco number or station/IB/LC name or id and message along with date time stamp.

c) If any critical failure occurs in the system, then an SMS shall be sent along with prompt message, these are displayed with SMS as category name. Application shall also display type

of TCAS system such as Loco number or station/IB/LC name or id and message along with date time stamp.

d) The following conditions/scenarios shall be considered for alert/promt generation:

Generation of Exception Reports - LTCAS Unit-wise, STCAS Unit-wise, RFID Tag Set wise.

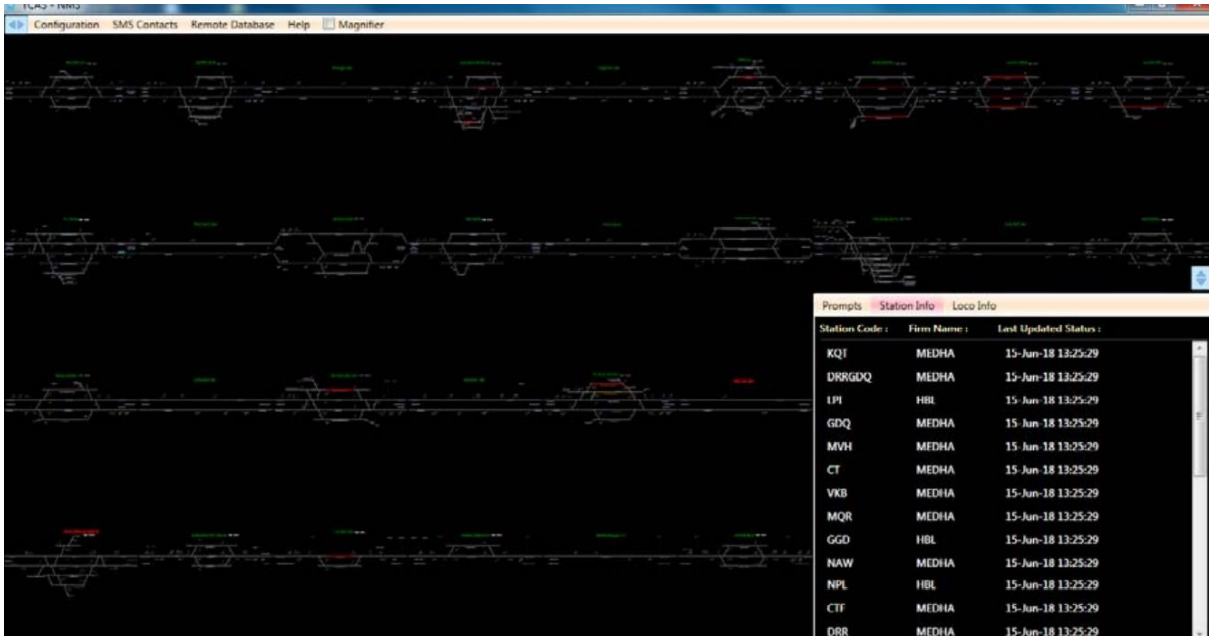
i. Prompt through CIKMS for Missing:
   a) One of the two RFID tags of same set.
   b) Both RFID tags of same set.
   c) Communication packets overall below a set level (say 20%) for moving train in Communication mandatory zone.

ii. SMS Alert for
   a) Repeated same RFID tag missing events in Full Supervision Mode.
   b) Any brake application command by TCAS Loco forcing train to bring to dead stop in Full Supervision Mode.

SPAD Prevention by TCAS.

2.2.20 Display Station Information :

In the station info tab, application shall display station code, firm name and last updated status. Whenever a station packet reaches to the CIKMS system, corresponding station last updated status shall be updated with the latest date time. Based on the frequency of the communication Station name shall be displayed with white, orange and red colors text.



2.2.21 Display of Loco Information :

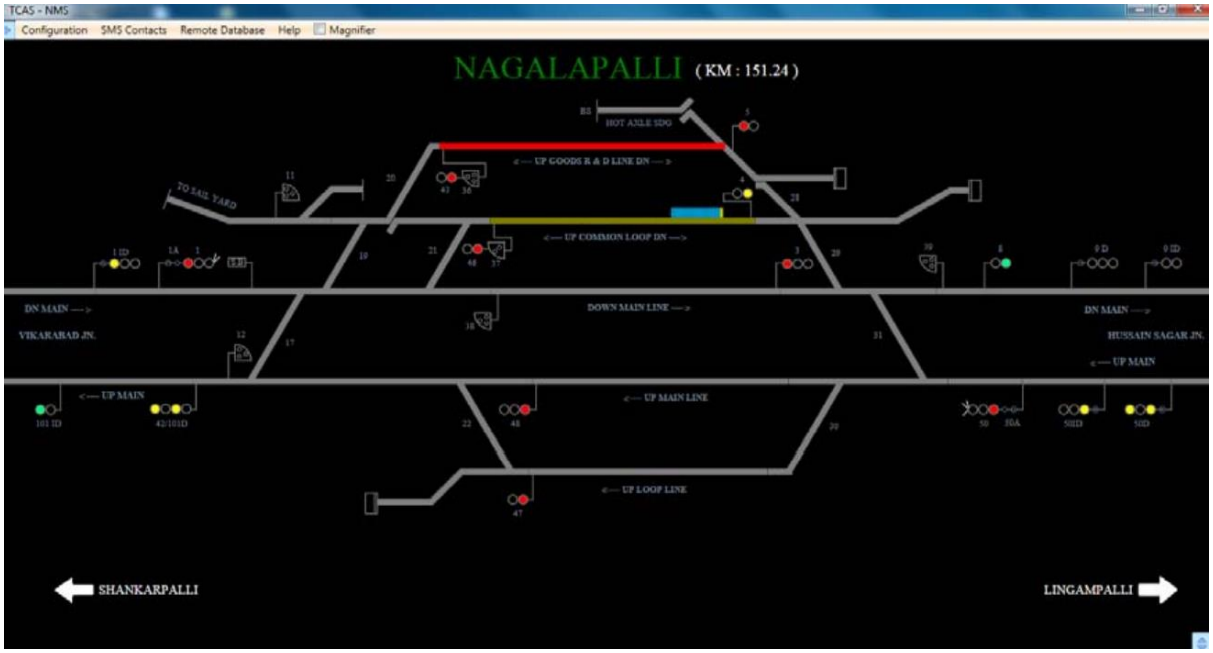
In the Loco info tab, application shall display Loco ID, firm name and last updated status. Whenever a Loco packet reaches the CIKMS system, corresponding Loco ID updated status shall be updated with the latest date time.Based on the frequency of the communication they shall be displayed with white, orange and red colors text.

If NSM system is continuously in communication with the Loco TCAS, these Locos shall be displayed with white color text. If the Loco TCAS packets are not reaching the CIKMS system for more than 5 cycles (10 seconds) then the loco shall be displayed with orange color text. If the Loco TCAS packets are lost for more than 10 cycles (20 seconds), then the Loco shall be considered as offline, the Loco shall be displayed with red color text. Any change in the status of communication of Loco TCAS message shall be displayed in loco info area.

2.2.22 Display of Real Time Loco Movement:

System shall have provision to display real time position of the Loco in the TCAS territory. System shall consider stationary TCAS ID, current signal ID direction, RFID and absolute location to determine exact position of the particular Loco in the TCAS,territory.

Locos with good communication shall be displayed in Deep Sky Blue color strips. System shall monitor Loco TCAS communication status, If the Loco TCAS loses communication for more the cutoff time then the corresponding Loco shall be displayed in red color strips. If the Loco TCAS loses communication for more than the cutoff time, then the Loco is termed as offline and it shall be removed from the system.



System shall have a provision to display the following parameters for a Loco TCAS in the CIKMS territory. Application shall have a provision to click on the Loco, On clicking the Loco Corresponding Loco Id, Length, Speed, RFID, Mode and Absolute Location shall be displayed over the Loco.

2.2.23 Display the Details of Remote CIKMS:

System shall have a provision to watch CIKMS at remote location. Application shall display list of stations with station name and code from the Database file. Each station shall have a provision to select / de-select option, only selected stations shall be displayed.

Application shall have a provision to select / de-select all stations by a simple checkbox on the GUI and have a provision to display list of IPs available in the PC from which user can select one IP at a time for connecting CIKMS. Application shall have a provision to enter available Port number for CIKMS Communication.

In Remote CIKMS main window, Application shall have a login option to login remote user. Login popup window shall also display connect option to connect to CIKMS.

When user clicks on connect button, system shall validate user credentials.Application shall have a disconnect option to disconnect the remote user. When user clicks on disconnect button, system shall be disconnected from CIKMS application.

2.2.24 Play Back CIKMS:

Application shall display list of stations with station name and code from the Database file. Each station shall have a provision to select / de-select option; only selected stations shall be displayed by a simple checkbox on the GUI.sss

Application shall have a button with the name 'Start Playback' to open Playback CIKMS Main window.

Application shall have a provision to browse log directory path where CIKMS binary Log files are located. Application shall display name of the directory on UI.

Application shall have a play option to play the CIKMS. When user clicks on play option, application shall validate user inputs if valid application shall play CIKMS for the selected date otherwise displays appropriate error message to user. Application shall have a provision to pause the playing CIKMS. Application shall also have a provision to stop the playing CIKMS. After selection of particular yard, play back options shall be provided. On the bottom side of the screen the play back options shall include:

a) From Date and Time

b) To Date and Time

c) Previous, Play, Pause and Next

d) Application shall display different speed options for the playback. The speeds shall be 1x, 2x, 4x, 8x, 16x and 32x. Application shall allow only one speed option to be selected at a time.

When user selects the speed, application shall play CIKMS in the selected speed.

e) Loco available during that period shall be displayed to the user. User shall select one loco for monitoring. This loco needs to be tracked during that period and Station yards displayed on top shall change accordingly.

f) Save as option shall be given,

i) avi file,

ii) log file.

2.2.25 Display Help and About CIKMS:

Application shall provide a help button to view About Information. If User clicks on the help button, it shall display About Information window. The Help Document shall contain the information about application help tips. The Help Document shall be placed in the application

path of setup file with the name as CIKMS_Help.pdf.

If User clicks on Help Document link, Application shall open the help document. If Help document does not exist then a prompt message “Help document doesn’t exist” shall be displayed to the user.