

INTEGRATED COMMAND AND CONTROL CENTRE (ICCC)

Information Handbook



SMART CITY THIRUVANANTHAPURAM LTD (SCTL)

Executive Summary

Smart City Thiruvananthapuram Limited is a Special Purpose Vehicle (SPV) set up for the implementation of Smart City Mission of Government of India with a project overlay of Rs. 1538 Cr. The proposal submitted to Government of India had 43 projects aimed at improving basic infrastructure of the city and harnessing the use of IT based solutions to make the City Smart. The projects were grouped into two categories; Pan City Solution (IT based solution) for entire corporation area and Area based development (ABD) Projects which are specifically targeted for 9 wards in the City Centre as a retrofit model.

The objective is to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. Some of the core infrastructure elements in a Smart City includes adequate water supply, assured electricity supply, sanitation, including solid waste management, efficient urban mobility and public transport, affordable housing, especially for the poor, robust IT connectivity and digitalization, good governance, especially e-Governance and citizen participation, sustainable environment, safety and security of citizens, particularly women, children and the elderly and health and education.

The strategic components of the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Area-based development (ABD) transforms existing areas (retrofit and redevelop), including slums, into better planned human settlements, thereby, improving liveability of the whole cities. Application of Smart Solutions enables the cities to use technology to improve infrastructure and services.



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Integrated Command and Control Centre

The city needs to establish governance processes which use technology to manage, monitor and secure all the city assets. A real time monitoring of various critical infrastructure such as parking, transport and street lights that enable citizens to travel freely and make informed decisions help in long way the city to not only mange the existing infrastructure but also help in planning for the future. All this could be achieved by setting up an Integrated Control and Command Centre (ICCC). In order to setup ICCC, the city plans an agile integration considering the following areas:

- Integrated Platform for real time city operations, collaborative decision supports and advanced simulation and optimization
 - real-time operations hub and enterprise knowledge hub
- Unified Big Data Platform for structured, semi-structured and unstructured data with high volume and velocity
- Real time Situational Awareness and pre-built extendable Standard Operating Procedures (SOPs)
- 2D / 3D locational intelligence and analytics with time series analysis for Smart City Operations planning and management
- Prebuilt KPI Manager with role-based configurable / customizable Smart City Operations dashboards

Benefits from ICCC

Following are the benefits envisaged from ICCC:

- Enable real time monitoring of the various facets of management of Thiruvananthapuram i.e. Security, Traffic and City Utilities
- Provide capability to respond in a unified manner to situations on ground (both day to day and emergency situations) by creating a common operational picture for the relevant stakeholder
- Provide and manage touch points from all concerned stakeholders during the lifecycle of various incidents



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- Define and manage the Key Performance Indicators (KPIs) for various operational aspects of the City Management to bring about efficiency the overall working.
- Provide capability to conduct analysis for continuous improvement of city operations
- Generate and aggregate data that can be utilised to plan for the future as well as monetise

Integrated City Control Centre (ICCC) in the Thiruvananthapuram Municipal Corporation is the nerve centre for managing city operations as well as monitoring various critical components of the city administration. It is also planned to integrate all e-Governance applications in a single platform and provide a single mobile application – “Smart city Thiruvananthapuram” mobile App for accessing various e-Governance applications.

The ICCC project is also having a central monitoring and controlling center in Thiruvananthapuram Corporation premises for the City Administrators to enhance the decision support system through various reports and analytics based on the data being collected through various sensors as well as through the integration of existing software applications. The analytics provide actionable items upon which city officials can take action.



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The main components of ICCC are given below:

- 1) Data Centre with Servers, Storage, Security and Network Components
- 2) Bigger Video Wall (5 x 3 cube of 70" DLP Projection screen) and related Controllers
- 3) Citizen Engagement Platform with Chatbot
- 4) One City One Mobile Application for Thiruvananthapuram
- 5) Smart Parking System & Mobile app for Dept and Citizens
- 6) Smart Water Management System & Mobile app for Dept and Citizens
- 7) Intelligent Transit Management System (ITMS) and mobile applications
- 8) Smart Environmental System
- 9) Integrations with third-party applications
- 10) Enterprise GIS Software platform
- 11) ICCC Software Platform with Enterprise Service Bus (IoT and Middleware) for Situational Awareness -Map based /Video based, Incident Management layer, SOP Execution Layer, Notification System, Social media Integration and sentiment analysis
- 12) ICCC AI /Bigdata Platform: With machine Learning for predictive servicing
- 13) ICT services on Smart Bus Shelter (Surveillance system, PIS displays, Emergency Call Box)-35 nos
- 14) ICT services on Sreechithra Park & Charithra Veedhi (Surveillance system, Outdoor video wall, Emergency Call Box)
- 15) ICT services on Children Park (Surveillance system, Emergency Call Box)
- 16) ICT services on MLCP – Thampanoor (Surveillance system, Boom barrier, POS machines, etc.)
- 17) ICT services on Ponnara Sreedhar Park, Thambanoor
- 18) ICT services on Putharikandam Maidanam (Surveillance system, Outdoor video wall, Emergency Call Box)
- 19) Providing Connectivity between the locations to the ICCC Data Centre
- 20) ICCC has the scope of Operation & Maintenance for 5 years from the date of Go-Live

The work was awarded to M/s NEC Corporation, Delhi through QCBS tendering via e-tendering mode covering the Operation & Maintenance for an period of 5 years from the date of Go-Live. The project is considered Go-Live from the date - "31st August 2024".



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Data Centre with Servers, Storage, Security, and Network Components

The main components of the Data Center of ICCC are given below:

- a) Application & Database servers for hosting the applications
- b) Primary & Secondary Storages for storing all data (from applications, sensors, camera, etc.)
- c) Backup servers and related software for ensuring proper backups and Tape library for physical Backup
- d) Active Directory services for ensuring proper authentication
- e) Virtualization solution for creating multiple servers in the physical servers
- f) Network Devices
 - o Firewalls in High Availability mode for protecting our ICCC data from outside and controlling the data traffic to and from the Data Centre
 - o Anti-APT solutions for the "advanced persistent threat (APT)" to prevent cyberattacks
 - o EDR (Endpoint Detection & Response) solutions for continuous monitoring of endpoints to detect malicious activities.
 - o Router and Switches for controlling the data traffics as well as segregating the data into separate channels based on the characteristics
- g) Security information and event management (SIEM) to detect, analyse, and respond to security threats before it harm business operations
- h) DDoS Appliance to prevent the "Distributed Denial-of-Service (DDoS) Attack" through which the attacker will interrupt the connected online services and sites



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- i) Load balancers for servers and links
- j) High-end Workstation & Desktop Systems
- k) Network Monitoring Software & Enterprise Monitoring System for monitoring of IP devices

Data Security

Various security tools and systems are integrated to ICCC to ensure comprehensive protection against cyber threats, enhance performance, and maintain data integrity. Some of the features are highlighted below:

- Secured Socket Layer Intercept (SSLi) provides industry-leading 3rd-Party Security Devices with Visibility into Encrypted Traffic for Improved Security and Performance. It enables secure, high-performance SSL/TLS encryption and decryption across multiple devices, optimizing security and traffic flow.
- Firewalls in HA with a management license offer advanced threat filtering and centralized policy management, ensuring robust perimeter security with redundancy for reliability.
- A Server Load Balancer with WAF (Web Application Firewall) distributes traffic efficiently across multiple servers while protecting web applications from attacks like cross-site scripting (XSS) and SQL injection.
- The Anti-APT (Advanced Persistent Threat) appliance solution detects and mitigates sophisticated, targeted attacks, safeguarding the network from long-term, stealthy threats.
- EDR (Endpoint Detection and Response) solutions continuously monitor endpoints for suspicious activity, providing rapid detection and response to potential security breaches.

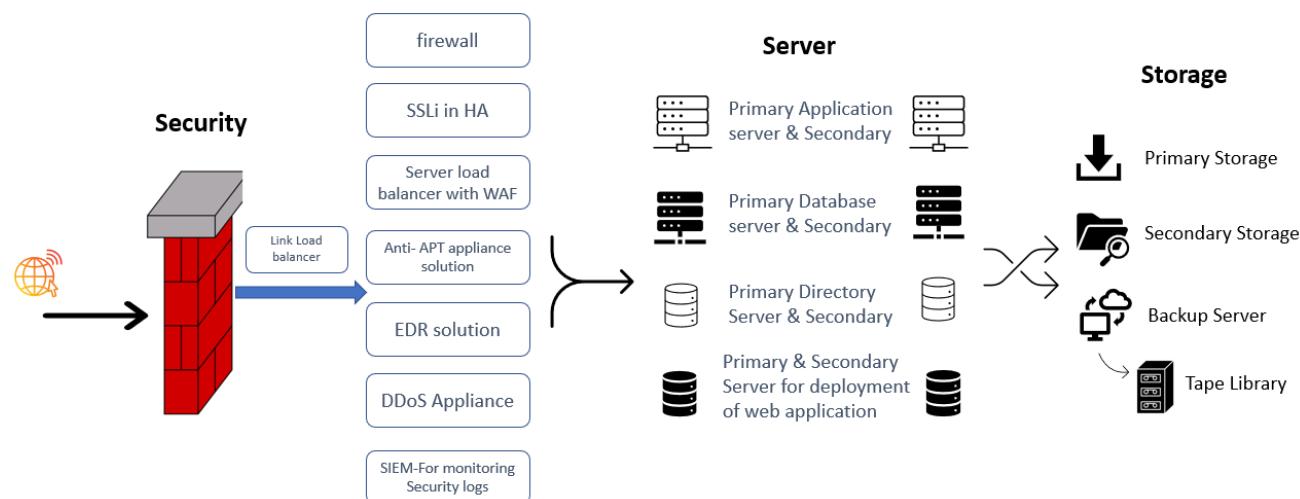


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- DDoS appliances protect against large-scale distributed denial-of-service attacks, maintaining network availability under heavy traffic conditions.
- Finally, SIEM (Security Information and Event Management) systems aggregate and analyze security logs from all network devices and security appliances, enabling real-time threat detection, incident response, and compliance reporting.

Together, these tools form a layered, proactive defence strategy to secure network infrastructure both inside and outside the network against a wide array of cyber threats. Personal data security in a Integrated Command and Control Centre (ICCC) is significantly enhanced by the implementation of various network security tools as described above, which work together to protect sensitive information from unauthorized access, theft, or breach.



Personal data privacy and usage assurance

Personal data will not be used for any monitoring or analysis purposes. We are committed to ensure that the citizen's information remains private and secure, and it will only be used for the specific purposes for which it was collected. Personal data will not be shared or utilized for tracking, profiling, or any form of surveillance.

Application & Database Servers

In ICCC Data Centre, the servers play a crucial role in managing, processing, and delivering real-time data for monitoring and decision-making. These servers are typically deployed in High Availability (HA) mode to ensure maximum uptime and reliability. The Application Server handles and processes business logic, managing various applications critical for operations and decision support. The Database Server stores and manages vast amounts of operational and historical data, ensuring fast retrieval and updates to support decision-making processes. The Directory Server provides centralized authentication and access management, securely storing user credentials and network resource information, typically using LDAP for efficient querying and control. The Server for Deployment of Web Applications hosts and serves web-based applications, making them accessible to users for real-time monitoring, analysis, and reporting. By deploying these servers in HA mode, the center ensures redundancy, minimizing the risk of downtime and ensuring continuous operation even in the event of hardware failure.

Storages

The storage systems are essential for ensuring the availability, reliability, and security of critical data. Primary Storage refers to high-speed, volatile storage (such as SSDs or RAM) used for real-time processing and fast access to active data required by applications and



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systems. This storage supports operations by holding data that is actively being used or processed. Secondary Storage is made up of hard drives and larger-capacity SSDs, provides non-volatile, long-term storage for large volumes of data, including system logs, historical records, and operational data that may not be actively in use but are crucial for reference and analysis.

For data protection and disaster recovery, a Backup Server with Tape Library is used to create periodic backups of critical data. The tape library used for storing large amounts of backup data offsite or in archival form, ensuring that data can be recovered in case of failure, corruption, or other data loss incidents.

Together, these storage systems ensure that the ICCC centre can efficiently manage, protect, and recover data as needed.



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Video Wall (5 x 3 cube of 70" DLP Projection screen) and Controllers



Helpdesk agents and supporting officers will be sitting in this office to monitor and to manage the ICCC activities.



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Citizen Engagement Platform (CEP) with Chatbot and Web Portal

The citizen engagement solution is provided for the city administrators to have a consolidated view of the grievances/ incidents/feedback from the citizens, and to interact with the citizens. The One-City Mobile application is integrated with CEP and the tickets raised by the citizens is available in the CEP dashboard.

The Contact Centre Solution is integrated with CEP and various channels are available, so that citizens can use their preferred channel for interactions, either for raising tickets or for sharing the feedbacks. Ticket resolution mechanisms is configured in the CEP so that all the tickets can be addressed within the stipulated time. In case the tickets are not being addressed properly by the first-level helpdesk staff, an escalation matrix is also available so that the grievances of the citizens will be definitely addressed.

As part of the contract, there will be 5 dedicated Helpdesk staffs from the O&M Contractor and several staffs from the respective departments and ward representative for running the ICCC.

The main features of the Citizen Engagement Platform are as follows:

1. The web-based application for the citizen engagement solution where citizens can raise grievances and interact with administrators on various subjects.
2. Provide grievance redressal mechanism with specified SLAs towards incidents /issues/problems related to citizen services
3. Citizen facility is provided through Toll-free lines, landlines, helpdesk tools, E-mail, direct walk-in, etc.
4. Implement a call logging system in line with the severity levels as per the SLAs. The citizen shall log user calls related to the services and assign an incident/ call ID number. Severity shall be assigned to each call as per the SLAs.
5. Track each incident / call to resolution.



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6. First-level call or service is self-service like chat / IVR and in case the citizen demands, the same is to be transferred to an agent.
7. Escalate the calls, to the appropriate levels, if necessary, as per the escalation matrix agreed upon with authorities.
8. Analyse the incident/call statistics and provide monthly reports including but not limited to:
 - a. Type of incidents/calls logged
 - b. Incidents/calls resolved
 - c. Incidents/calls open
 - d. Best Performance wards
 - e. Ratings of all wards
9. The solution shall further have the capability to upload frequently asked questions and solutions
10. Will be integrated with ICCC for analytical reports so that which are the areas to be improved and which are the wards that need more attention, etc. to be assessed.

A toll-free number is configured, and calls are attended by the operators in ICCC.

Toll-Free No: 1800 425 0471

Contact Centre is configured for the use of the operators so that each ticket can be tracked and monitored by the respective operator.

The Key Performance Indicator (KPI) of each ward will be assessed based on the resolution time for both complaints and incidents and a review of the performance will be ascertained by City Administrators regularly.



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One City Mobile Application (OCM)

The One City Mobile App creates a real-time user-friendly single window service delivery system in the city comprising various governance, informative, navigational & transactional services. The One City Mobile App is based on the Mobile Service Delivery Platform, which hosts various existing and forthcoming services in the city pertaining to domains like Waste, Mobility, Utilities, Emergency, Environment, Traffic, etc. One City Mobile Application acts as a “One Stop Solution” offering various e-Governance services and also offers a community discussion platform for city dwellers to interact with the city administration and presents the real-time status, alerts, intimations, etc. on various useful city services/parameters with respect to aforesaid domains.

The application is already available in the Google Play Store and available, the same is provided in the below QR code:



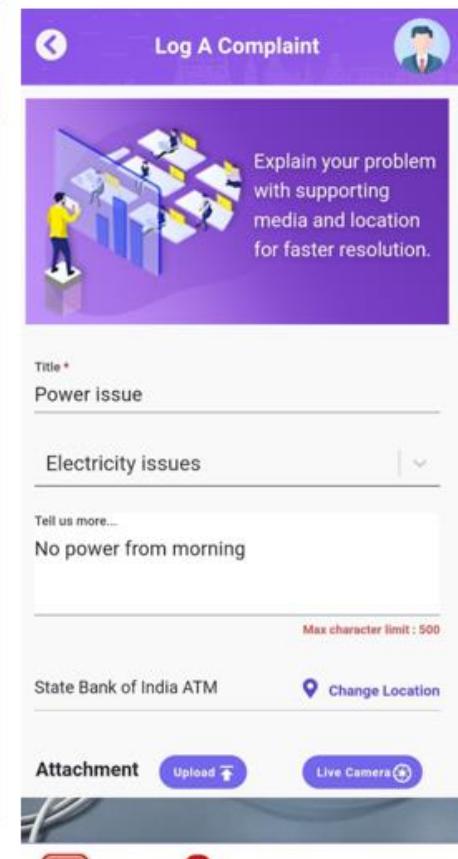
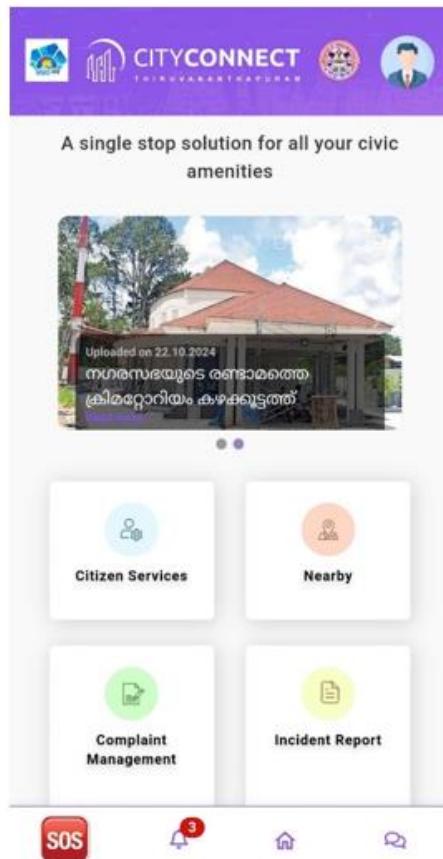
Video-based user manual is available in the below QR code:



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Screenshots of the applications are also provided below for quick reference.



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The Thiruvananthapuram One City Mobile Application integrates the Citizen Service request and also provides visibility to the citizens of the various city notifications. The App is fully integrated with the Citizen Engagement platform and enables end-to-end service fulfilment.

Features of Mobile App:

- Citizen Services – Links to various e-gov services, etc
- Nearby Services - Information regarding Parking, Bus stops, etc,
- Complaints Management: Citizen can raise complaints and track them till resolution
- Incident Report: Citizens can report any incident through this option
- Collaboration: citizens can interact with the city administrators and share their ideas
- What's Trending: Latest & breaking news and
- Emergency – Citizens can contact Ambulance, Fire, Police, Women Helpline, child Helpline, Senior Citizen helpline, animal helpline and ICCC Toll free number
- Notifications – various notifications will be intimated through the mobile app
- Chat-bot – AI based and agent based chat messages will be possible through this option.

Mobile app provides the capability to citizens to report incidents across various grievances covering emergencies, garbage collection, accidents, water leakage, electricity outage, etc. Such requests are integrated with the ICCC platform, and the service delivery is automated through the ICCC functions through the SOP (Standard Operating Procedure) defined in ICCC.



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ICCC Software Platform for Integrated Dashboard and Analytical Reports

Objective: Integrated Control & Command Centre with a robust IoT Platform involves leveraging on the information provided by different devices/platforms & various departments and providing a comprehensive response mechanism for the day-to-day challenges across the city. The Platform is a fully integrated portal-based solution that provides seamless incident-response management, collaboration, and geospatial display.

The Platform provides real-time communication, collaboration, and constructive decision making amongst different agencies by envisaging potential threats, and challenges and facilitating effective response mechanisms. Thus, the platform provides a Common Operating Picture (COP) of various events in real time on a unified platform with the means to make collaborative and consultative decisions, anticipate problems to resolve them proactively, and coordinate resources to operate effectively.

The platform has high processing power and adequate data storage with a high-performance information highway to provide process information in real time and serving the Decision Support System.

The platform also provides portability to meet changing city scenarios. The data storage and processing power of the platform adequately to meet the system design and functionality to be achieved.

The solution is capable of seamless integration with various government and emergency services such as law enforcement, disaster and emergency services, utility services, etc. The platform has built-in analytical tools to provide real-time analysis of individual events and also a measure of the incidents for each of the silos integrated into the platform. This will help the decision makers with the in situ challenges and facilitate immediate responsive actions to mitigate/control multiple complex challenges.



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SMART PARKING MANAGEMENT SOLUTION

Objective: Traffic congestion caused by vehicles is the problem to be addressed in all Cities. Searching for a parking space is a routine (and often frustrating) activity for many people in cities. Until 2019, Thiruvananthapuram. The number of parking spaces as suggested by the NATPAC has been mapped in the central application and through the mobile application, citizens can search for the parking application near to the destination and also they will get the information of the occupancy (vacancy available or not).

The Multi-Level Car Parking facilities and Private parking facilities will be integrated with the solution for the availability of more parking

The application is already available in the Play Store and available, the same is provided in the below QR code:

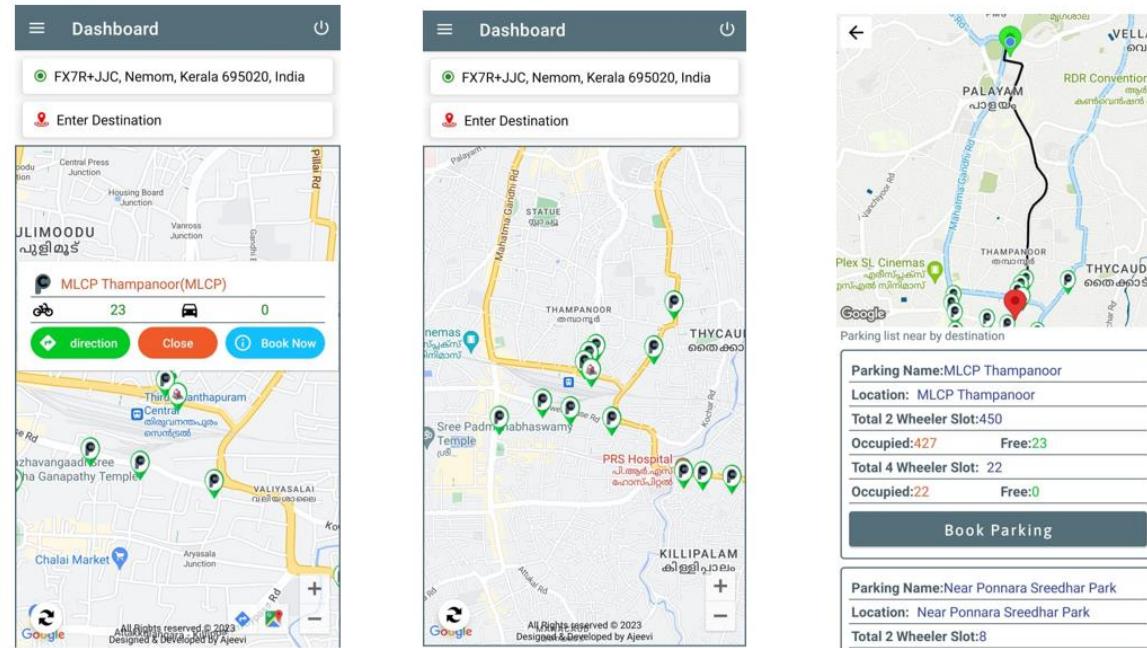


Video-based user manual is available in the below QR code:



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Thus, the goal of smart parking is to provide a seamless, efficient, customer-friendly, cost-effective parking operation for the city and have the capability to expand and integrate the latest technology.

The Smart Parking Applications contains the following components.

1. Web applications
2. Customer Mobile Applications
3. POS Android Application



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Smart Water Metering

Objective:

The smart water management envisages monitoring the flow of the water to know the quantity and quality of the water that is being supplied to the citizens of the city. The overall project shall consist of procurement, supply, installation, and maintenance of AMR meters for domestic and non-domestic usage, flow meters, quality sensors, and mobile applications for consumers as well as for the employees of the KWA for 5 years. The details of the consumer mobile application is detailed below:

The application is already available in the Play Store and available, the same is provided in the below QR code:



Video-based user manual is available in the below QR code:



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Screenshots of the mobile application is given below for reference:



The scope of works under this module are detailed below:



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- Replace the old meters in the ABD area of the city with the latest technology based ultrasonic water meters of ranges 15mm-40mm size and configure for remote reading to carry out effective and efficient water metering.
- Install bigger size smart flow meters of sizes 50mm, and 250mm in the identified locations and configure for remote reading to assess the quantity of NRW (Non-Revenue Water). An area has been identified by KWA with 430+ consumers and marked a District Metering Area (DMA) for the NRW assessment.
- To develop a smart advanced metering infrastructure (AMI) for the water meters by implementing Long Range Wide Area Network (LoRa WAN) based Communication infrastructure.
- To Integrate with the billing application and Complaint redressal system of KWA
- To provide better service and experience to the customers of KWA through mobile applications – one for the consumer and another for the employees.
- To monitor the real time water distribution, water consumption by consumers, and monitor quality information on the water supplied so as to take necessary action and also define future activities, especially for water management projects.
- To plot the positions of all the supplied components in the GIS platform to have a geographical representation in the common platform.

KWA Smart Water Metering Solution contains four components as listed below:

1. Meter Data Management (MDM) system (installed in State Data Centre, Kerala)
2. Mobile Application for Dept. users (for collecting meter readings of non-smart meters and a lot of other features)



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3. Mobile Application for Consumers (for checking their daily/weekly/monthly consumption, getting notifications/alerts, raising grievances, etc.
4. LoRA Network Infrastructure for data communication

The NRW has been calculated based on the volume of the input supply to the selected area (from the 80KL Tank at PTP Nagar) and the revenue collected from those consumers is also taken from the ABACUS system and the NRW is being calculated automatically (on monthly basis). The NRW is 27% in the selected location after the replacement of 65% of mechanical meters with Smart water meters.

Integrated Transit Management & Passenger Information System

Objective:

The Integrated Transit Management System is the GPS based vehicle tracking system that monitors and tracks the movement of the vehicle in real time using satellites. The data is sent to backend servers where the information is displayed on map to view the movement of the buses. Various data including routes and bus stops are plotted on the maps so that the data concerning the performance of the buses is available to the management. This helps increase operational efficiency of the operator. The Vehicle Tracking System pull the GPS data of current location of the Vehicle and continuously feed the same to the PIS system for monitoring - over speed / route violation / stop violation and other related business logics

The passenger information system is an integrated service that utilizes tracking data from vehicles which is centrally processed for the purpose of arrival and departure time estimation. Central PIS system delivers ETA (Estimated Time of Arrival) information to the fixed display devices installed on bus stops/depots at a set frequency or on a bus movement basis.



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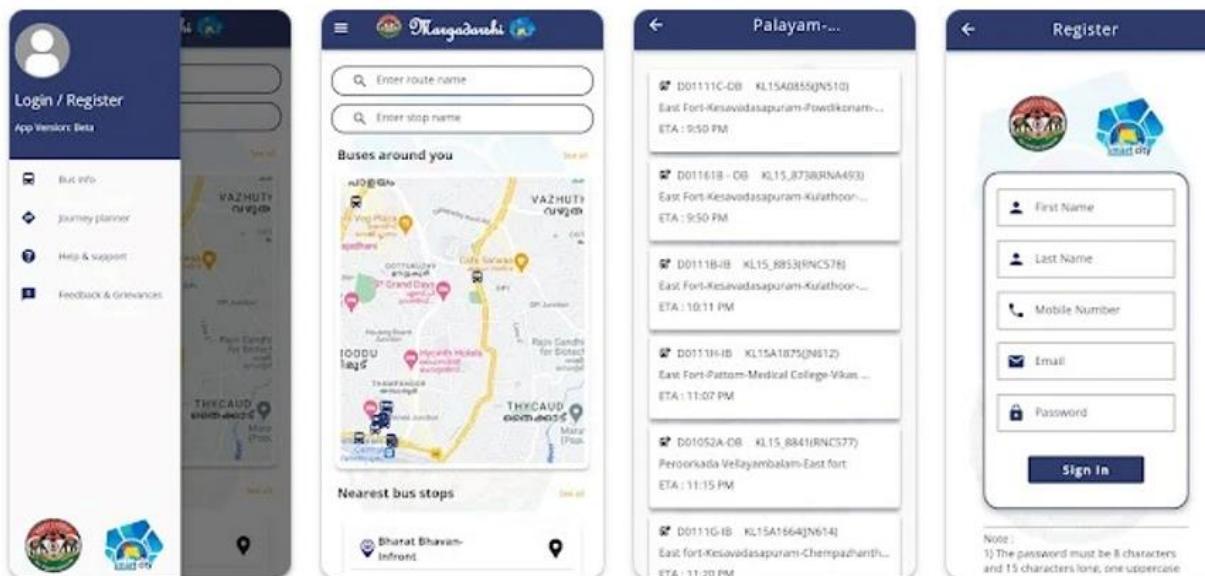
The application is already available in the Play Store and available, the same is provided in the below QR code:



Video-based user manual is available in the below QR code:



The Screenshots of the mobile application is provided below for reference.



The web based Integrated transit management system has the below features:

- The website as a journey planner.
- The user shall be able to enter the route, direction, and station/stop ID, or select these from a sequence of drill down lists or from a map.
- The system by default displays the predicted number of minutes until the arrival of the next bus on the next route or the same route.
- The number of bus predictions displayed on the customer screen is configurable by the SCTL/KSRTC.
- The website GUI allows for graphical presentation of vehicle locations on GIS-based maps.
- The website is designed to show the information in English and Malayalam language.
- Website allows the commuter to plan their complete trips including multiple modes of travel (walk, bus trips using direct routes, and transfers of the citywide bus system including suburban buses).
- Information requested by commuters on map line diagrams or tables is updated automatically without manual page refresh.
- Basic information like ETA, ETD, Line diagram, etc. is provided on the website.
- The new website page is with the SCTL/KSRTC input (branding, graphics, and colors).
- Screen layouts, menu, and screen information is provided to KSRTC for review, comment, and approval during the implementation process.

Scheduling Software is part of the solution and the scheduling software has the below-mentioned features:

1. Data by zone, depot, operation, route, schedule, bus type, employee type, employee, bus, etc. is available.



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2. The system supports operations for a minimum of 500 buses and is capable of expanding to around 7000 buses in the future if KSRTC is required for other locations.
3. Ability to optimize the complete service delivery by developing the route and publishing final timetables & rosters.
4. Ability to Generate informative statistical summaries and MIS from the system.
5. System has the following integrated functionalities/tools:
 - Route Plan & Timetables
 - Trips & Vehicle Planning
 - Crew Schedules
 - Roster and Dispatch (Operations)
 - Crew Kiosks (optional)
 - Performance monitoring
 - Bus travel time data from the AVL system
6. The application provides the feature for creating vehicles in one depot and the process for transferring vehicles to other depots.
7. The application has the feature to capture trip/schedule wise revenue kilometre Capability to capture dead kilometres in the System.
8. PIS Software has the following features:
 - Spot Your Bus
 - Live Station
 - Bus schedule list



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- Bus between Stations
- Special services
- Cancelled Buses.
- User Account Registration

PIS Boards Installed in Bus Stops : Sample pictures attached

PIS board at Statue BSNL Bus shelter



PIS board at Pattom- Vydyuthi bhavan Bus shelter



PIS board at Sasthamangalam Bus shelter



PIS board at Pattom Jn Bus shelter



PIS Board at East Fort North Bus shelter



PIS Board at PMG Bus shelter



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PIS Boards Installed Locations

| Sl No | Bus Stop Name | PIS Type | Latitude & Longitude |
|-------|--|----------|----------------------|
| 1 | Pattom-Vaidhudhi bhavan road | 4-Line | 8.518228, 76.941528 |
| 2 | Pottakuzhi (towards Pattom) | 4-Line | 8.516635, 76.938646 |
| 3 | Nanthancode Junction- towards the Corporation | 4-Line | 8.515307, 76.953792 |
| 4 | Sasthamangalam Junction towards Vellayambalam | 4-Line | 8.512789, 76.970926 |
| 5 | Sasthamangalam-Vellayambalam Road(1) | 4-Line | 8.508277, 76.962258 |
| 6 | Murinjapalam | 4-Line | 8.515939, 76.934445 |
| 7 | Kannamoola avittam road(towards Kannamoola) | 4-Line | 8.508700, 76.929762 |
| 8 | PMG Junction- Students Centre(2) | 4-Line | 8.508388, 76.949833 |
| 9 | PMG Junction- Students Centre(1) | 4-Line | 8.508388, 76.949833 |
| 10 | Pattom 1(Towards Kesavadasapuram) | 4-Line | 8.520043, 76.941709 |
| 11 | Pattom 2(Towards Kesavadasapuram) | 4-Line | 8.520065, 76.941727 |
| 12 | Bakery Jn 2 (to Vazhuthacaud) | 4-Line | 8.500660, 76.954441 |
| 13 | Statue - BSNL | 4-Line | 8.496874, 76.948330 |
| 14 | Palayam - Saphalyam Complex | 4-Line | 8.502514, 76.950330 |
| 15 | East Fort - North Bus Stand (towards Statue) - 1 | 4-Line | 8.483042, 76.947501 |
| 16 | East Fort - North Bus Stand (towards Statue) - 2 | 4-Line | 8.483073, 76.947512 |
| 17 | East Fort - North Bus Stand (towards Statue) - 3 | 4-Line | 8.483100, 76.947510 |
| 18 | East Fort - North Bus Stand (towards Statue) - 4 | 4-Line | 8.483131, 76.947469 |
| 19 | East Fort - North Bus Stand (towards Statue) - 5 | 4-Line | 8.483208, 76.947459 |
| 20 | Bakery Jn 1 - Starting point of Overbridge | 4-Line | 8.503199, 76.952644 |
| 21 | Vellayambalam keltron (towards Museum) | 4-Line | 8.510836, 76.961593 |
| 22 | Pattom Girls School(1) | 4-Line | 8.523062, 76.940475 |
| 23 | Pattom Girls School(2) | 4-Line | 8.523062, 76.940475 |



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| Sl No | Bus Stop Name | PIS Type | Latitude & Longitude |
|-------|---|----------|----------------------|
| 24 | Pattom St mary's(towards Kesavadasapuram) | 4-Line | 8.526117, 76.938968 |
| 25 | Pattom St mary's(towards Pattom) | 4-Line | 8.526350, 76.939137 |
| 26 | Statue - SBI ATM-1 | 4-Line | 8.498925, 76.948620 |
| 27 | Statue - SBI ATM2 | 4-Line | 8.499034, 76.948607 |
| 28 | Poojapura to Thirumala | 4-Line | 8.492009, 76.973950 |
| 29 | Ambalamukku towards kowdiar | 4-Line | 8.530923, 76.961392 |
| 30 | Kesavadasapuram (towards Pattom) | 4-Line | 8.529522, 76.938637 |
| 31 | Kumarapuram medical college road (towards Kannamoola) 1 | 4-Line | 8.516950, 76.927811 |
| 32 | Kumarapuram medical college road (towards Kannamoola) 2 | 4-Line | 8.516966, 76.927822 |
| 33 | East Fort - North Bus Stand (towards Statue) - 6 | 7-Line | 8.483208, 76.947459 |
| 34 | East Fort - North Bus Stand (towards Statue) - 7 | 7-Line | 8.483208, 76.947459 |

Note: The PIS boards will be installed on other locations also in due course.

ENVIRONMENTAL SENSOR MONITORING SYSTEM

Objective: One of the fundamental features of smart cities is providing a sustainable environment. For a Smart city, it is a necessity to monitor the environmental conditions to identify the sources of pollution and mitigate them. A network of sensor nodes can be deployed to monitor air quality and meteorological parameters across the city. Through pollution source detection, the city can take corrective measures and improve its environmental health. By installing disaster detection systems like flood and rainfall monitoring solutions, the citizens can be alerted beforehand in case of a catastrophic event. A holistic view can be derived, which enables the authorities to make data-driven decisions for infrastructure and policy planning.



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Smart environment sensors gathers data about pollution, ambient conditions (light, noise, temperature, humidity and barometric pressure), weather conditions (rain), levels of gases (pollution) in the city and any other events on an hourly or predefined interval. It is for information of citizens and administration to further take appropriate actions during the daily course/cause of any event.

a) The environment sensors has the following capabilities:

- They are ruggedized enough to be deployed in open-air areas, on streets, roads, coastal areas, parks, etc.
- They are able to read and report at least the following parameters: Air-Quality, Sun Light, Noise, Weather conditions, etc.

b) Smart environment sensors notify and allow citizens and administrators to keep a check on their activities which impact the environment and enable the city to take remedial action if required.

c) These environmental sensors can be connected via 3G wireless network based on connection availability.

d) The data is collected on a data analytics software platform which is not a third-party software application to avoid integration issues. The data analytics software platform is integrated to ICCC Software platform using secured APIs.

e) Various environment sensors sense the environmental conditions and send the data to the integrated control system where real-time data resides and the same is made available to various other departments and applications for decision making. The platform includes intelligent analytical engines that make information meaningful, to all stakeholders and helps ease decision making.

f) The sensor management platform allows the configuration of the sensor to the network and also location details etc.

g) The sensors are able to be managed remotely. This includes sensors being updated with calibration parameters and software upgrades.

h) Apart from information provision, the sensors ensure that the data is transmitted securely and have security measures from sensors to the software platform. It also ensures tamper alerts are provided in cases of vandalism, security breaches, etc.



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ICT SOLUTIONS FOR THE ABD AREA PROJECTS

As part of the ICCC project various smart elements like the CCTV surveillance, Emergency Call buttons, Wi-Fi Access points, LED display boards and parking management solutions, etc. on the below locations, as described.

| Sl No | Projects | Scope of works | Status as of 31st Oct 2024 |
|--------------|--|--|--|
| 1 | Ponnara Sreedhar Park | Supply and Installation of the following: • CCTV Surveillance System | Completed. |
| 2 | Smart Bus Shelter (35 Bus Shelters) | Supply and Installation of Surveillance system, Emergency Call Boxes and Wi-Fi solutions | Completed (6 Bus shelters.) <u>List of Smart Bus shelters</u> 1. Killipalam jn 2. Ayurveda college 3. Panavila 4. Thampanoor 5. Vazhuthacaud 6. General hospital |
| 3 | Charithra Veedhi | Supply and Installation of the following: • CCTV Surveillance System • Emergency Call Button Telephone • LED Display Boards for Information dissemination | Completed. |
| 4 | Open Air Theatre at Putharikandam | Supply and Installation of the following: • CCTV Surveillance System • Emergency Call Box • LED Display Boards for Information dissemination | Completed. |



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| Sl No | Projects | Scope of works | Status as of 31 st Oct 2024 |
|-------|--------------------|--|--|
| 5 | MLCP Thampanoor | Supply and Installation of the following: <ul style="list-style-type: none">● CCTV Surveillance System● Parking Management System with POS machines● Boom Barriers & Display systems | Completed. |
| 6 | Childrens Park ICT | Supply and Installation of the following: <ul style="list-style-type: none">● CCTV Surveillance System● Emergency Call Box | Completed. |
| 7 | Manaveeyam Veedhi | Supply and Installation of the following: <ul style="list-style-type: none">● CCTV Surveillance System | Completed. |

Public Information System (LED Display Screen)

Video wall at Sreechithra Park



Videowall at Putharikandom OAT



Videowall at KSRTC Bus Terminal



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Abbreviations

- **ICCC** - Integrated Command and Control Centre
- **e-Gov** - Electronic Governance
- **IoT** - Internet of Things
- **GIS** - Geographic Information System
- **AI** - Artificial Intelligence
- **MDM** - Meter Data Management
- **GPS** - Global Positioning System
- **PIS** - Passenger Information System
- **SIEM** - Security Information and Event Management
- **DDoS** - Distributed Denial of Service
- **NMS** - Network Management System
- **EMS** - Enterprise Management System
- **EDR** - Endpoint Detection and Response
- **APT** - Advanced Persistent Threat
- **SLA** - Service Level Agreement
- **IVR** - Interactive Voice Response
- **KPI** - Key Performance Indicator
- **OCM** - One City Mobile
- **CEP** - Citizen Engagement Platform
- **SOP** - Standard Operating Procedure
- **ABI** - Automatic Billing Interface
- **ETD** - Estimated Time of Departure
- **AVL** - Automatic Vehicle Location
- **MIS** - Management Information System
- **SCTL** - Smart City Thiruvananthapuram Limited
- **KSRTC** - Kerala State Road Transport Corporation
- **SSL in HA** - SSL in High Availability
- **HA** - High Availability
- **WAF** - Web Application Firewall
- **Anti-APT** - Anti Advanced Persistent Threat
- **LDAP** - Lightweight Directory Access Protocol
- **COP** - Common Operating Picture
- **LoRa WAN** - Long Range Wide Area Network
- **AMI** - Advanced Metering Infrastructure
- **NRW** - Non-Revenue Water
- **KWA** - Kerala Water Authority
- **CCTV** - Closed-Circuit Television
- **Wi-Fi** - Wireless Fidelity
- **LED** - Light Emitting Diode
- **QR** - Quick Response
- **ETA** - Estimated Time of Arrival



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