15 –ാം കേരള നിയമസഭ

9 –ാം സമ്മേളനം

നക്ഷത്ര ചിഹ്നം ഇല്ലാത്ത ചോദ്യം നം. 668 **09-08-2023 - ൽ മറുപടിയ്ക്ക്**

എ .ഐ ക്യാമറകൾ സ്ഥാപിക്കാനായി കെൽട്രോൺ സമർപ്പിച്ച എസ്റ്റിമേറ്റിന്റെ പകർപ്പ്

ചോദ്യം		ഉത്തരം	
ശ്രീ. അൻവർ സാദത്ത്		**ശ്രീ. പി. രാജീവ്** **(നിയമം, വ്യവസായം, കയർ വകുപ്പ് മന്ത്രി)**	
(എ)	സേഫ് കേരള പദ്ധതിയുടെ ഭാഗമായി എ.ഐ. ക്യാമറകൾ സ്ഥാപിക്കാനായി കെൽട്രോൺ സമർപ്പിച്ച എസ്റ്റിമേറ്റിന്റെ പകർപ്പ് ലഭ്യമാക്കാമോ?	(എ)	**കെൽട്രോൺ സമർപ്പിച്ച എസ്റ്റിമേറ്റിന്റെ പകർപ്പ് അനുബന്ധമായി ചേർക്കുന്നു. .**

സെക്ഷൻ ഓഫീസർ

Ref. No. IND- D3/135/2023- IND

LA Question No. 668

KELTRON ESTIMATE

ANNEXURE - 1

KELTRON®

Kerala State Electronic Development Corporation Ltd.

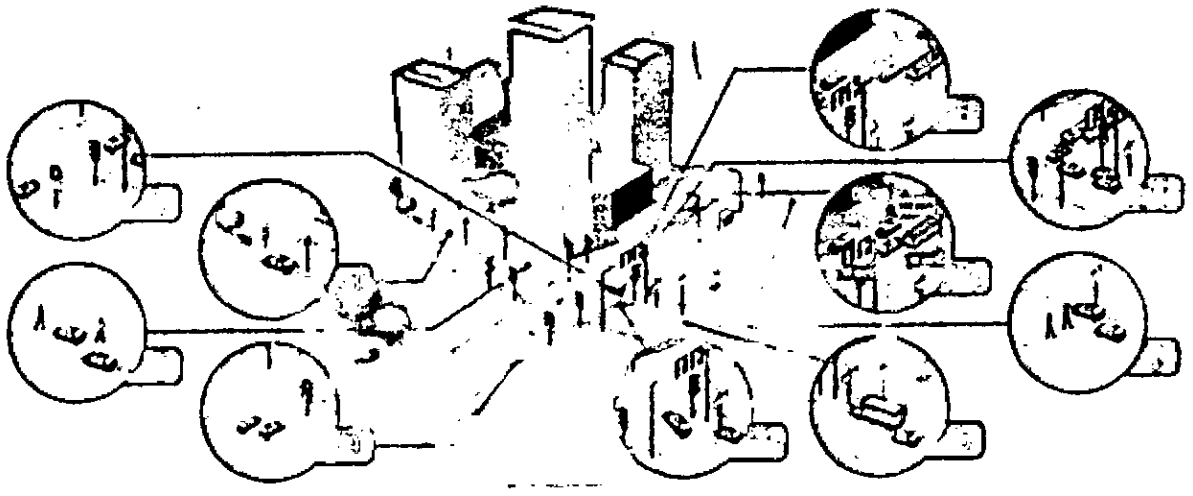
An ISO 9001-2015 / IEC 27001-2005/ CMMI3 Certified Govt. Company

Established: 1973

PROJECT PROPOSAL FOR

ADVANCED AUTOMATED TRAFFIC ENFORCEMENT SYSTEM BASED ON BOOT MODEL FOR 5 YEARS AND FACILITY MANAGEMENT SERVICES FOR 5 YEARS UNDER

SAFE KERALA PROJECT



Submitted to

Motor Vehicle Department

Submitted By

KELTRON COMMUNICATION GROUP

Keltron Communication Complex

Monvila, Kulathur (PO), Trivandrum- 695583

Kerala, India

Telephone: 0471 2598948 | FAX: 0471 2598984 | Mobile: 09447210533

www.keltron.org | keltronséu@gmail.com

KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LTD.
(A Government of Kerala Undertaking)

KELTRON®
ISO 9001: 2015 CERTIFIED

Communication Project Group
Keltron Communication Complex
Monvila, Kulathoor P.O.
Thiruvananthapuram-695 583
KERALA, INDIA

Telephone : 0471-2598948 (5 lines)
Fax : 0471-2598984
E-mail : keltronseu@gmail.com

KCC/SEU/G36/IT/2019-20 22.08. 2019

To,

The Transport Commissioner,
Trans Towers, Vazhuthacad,
Thiruvananthapuram, Kerala.

Respected Sir,

Sub: 'SAFE KERALA' Project proposal - Reg
Ref: (1) Technical presentation meeting we had with Hon'ble Minister for Transport
(2) Copy of the minutes of meeting

Based on the presentation meeting we had with Hon' ble Minister for transport on 07.08.2019 at south conference hall- Secretariat, TVPM. The Hon' ble Minister directed to submit a revised Techno-Commercial proposal by

- Excluding Ernakulam & Calicut Control room.
- The State Central Control Room and District Control room for Thiruvananthapuram may be combined together in the same premises.
- Exclude the hand held devices proposed for field officers.
- Submit the proposal with 5 year BOOT

Considering all the recommendations by Hon'ble Minister, Principal Secretary and Road Safety Commissioner we are re submitting the detailed techno-commercial project proposal on BOOT basis for 5 Years including Facility Management Services (FMS) for your consideration. After the BOOT period Government can decide whether the AMC & FMS service can continue with Keltron or not.

Thanking you,
Yours faithfully,
FOR KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LTD.

Gopakumar S P
Head – Keltron Communications Division,
Monvila, Kulathur PO, Thiruvananthapuram – 695583
Phone 04712598948Mob. No. 09447210533
Email: spgopan@yahoo.com, :keltronseu@gmail.com

Copy to
1. P S to Minister for Transport
2. Road Safety Commissioner
3. Principal Secretary – Transport

ISO 9001 : 2015

KELTRON

TABLE OF CONTENTS

PART A TECHNIAL PROPOSAL 4

1. INTRODUCTION 5
2. Accident Statistics of Kerala for Last 10 Yrs. 6
3. PROJECT OVERVIEW 7
3.1. Project Components 8
3.2. GENERAL VIOLATIONS 11
3.3. VIOLATION EXAMPLES 12
4. AI - ANPR CAMERA SYSTEMS 15
4.1. VISUAL PROCESSING UNIT (VPU) 15
4.2. ANPR CAMERA TECHNOLOGY 18
4.2.1. AI - ANPR CAMERA SYSTEM SPECIFICATIONS 21
5. RED LIGHT VIOLATION DETECTION SYSTEM 24
5.1. RLVD TECHNICAL SPECIFICATION 26
6. SPEED VIOLATION DETECTION SYSTEM 30
6.1. SVDS- TECHNICAL SPECIFICATION 31
7. MOBILE SPEED ENFORCEMENT SYSTEM 33
7.1. MOBILE SPEED ENFORCEMENT SYSTEM SPECIFICATION 34
8. PARKING VIOLATION DETECTION SYSTEM 36
8.1. TECHNICAL SPECIFICATION OF PVDS 36
9. GENERAL ENFORCEMENT MANAGEMENT SYSTEM 38
10. CONTROL ROOM MANAGEMENT SOFTWARE 39
10.1. CHALLAN PROCESSING SOFTWARE 41
10.2. PAYMENT MANAGEMENT APPLICATION 43
11. STATE CENTRAL CONTROL ROOM INFRASTRUCTURE 50
11.1. PROPOSED BOM- SCCR 50
11.2. SCR LAYOUT 53
11.3. TECHNICAL DETAILS OF MAIN HARDWARE COMPONENTS 54
11.4. CIVIL WORKS 74
12. DISTRICT ENFORCEMENT CONTROL ROOM (DECR) 76
12.1. DECR- SUB SYSTEM SPECIFICATIONS 77
12.2. DECR- LAYOUT 81
13. TOTAL ENGORCEMENT SYSTEM BOQ 93
13.1. PHASE 1 93
13.2. PHASE 2 93

COPAKUMARAN
Head CPG
Communication Projects Group, KCC
Monvila, Thiruvananthapuram-695 583

KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED
COMMUNICATION DIVISION
KULATHOOR, TRIVANDRUM
PIN: 695 583

PART B: COMMERCIAL PROPOSAL 94

1. CAPEX FOR 5 YEAR BOOT WITH QUATERLY ASSURED PAYMENT 95
2. FACILITY MANAGEMENT SERVICES (FMS) 97
3. PROJECTED CASHFLOW FOR THE PROJECT 104
4. COMMERCIAL PROPOSAL- ABSTRACT 105
5. TERMS & CONDITIONS 106

ELECTRONICS DEVELOPMENT CORPORATION LTD. COMMUNICATION DIVISION KULATHOOR, TRIVANDRUM PIN: 695 583 KERALA STATE

CPG
Communication Projects Group, KCC
Mavila, Thiruvananthapuram-695 583

KELTRON

PART A TECHNIAL PROPOSAL

COMMUNICATION DEVELOPMENT CORPORATION LIMITED
KULATHOOR, THIRUVANANTHAPURAM
PIN-695 583
KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED

Head CPG
Communication Projects Group, KCC
Monvila, Thiruvananthapuram-695 583

1. INTRODUCTION

Cities are becoming populous day by day. There is an ever increasing number of vehicles on the roads, increase in number of offices and public places etc. which in turn contributes to increase in traffic hazards, crowd gatherings, night travel etc. Citizen safety becomes an utmost priority which demands proliferation in efficiency of surveillance systems which could predict occurrences of undesirable incidents, track/ monitor vehicles and people in real time etc., thus improving the quality of life and security of citizens in cities. Considering the requirements, technology integration and a considerable level of automation becomes inevitable for the sustainability and efficiency improvement of the city surveillance system. This could be achieved by inducing artificial intelligence and analytics capability into smart Cameras across the cities, which would provide centralized information in the form of predictive analytics and real time insights to the authorities.

Undisciplined Driving on roads across the state have resulted in major unwanted accidents causing serious injuries and loss of life which is a very major concern for all state authorities. These accidents that has been the major cause for injury and deaths amongst citizens, has prompted the authorities to look for a disciplined motoring awareness among the citizens, for which Traffic Monitoring and Enforcement is a must.

Speed violations, driving two wheelers without Helmet, non-use of Seat Belts while driving four wheelers etc. are another major cause for fatalities and loss of Human Life. Unauthorized parking in no parking zones is another major issue that affects the traffic discipline in any city. Automated speed enforcement systems which are totally free from human interference is an important element in speed control and an effective counter measure to reduce crashes and accidents.

Safe Kerala Project aims to improve traffic safety and traffic rules/law enforcement by harnessing information gathered from Video and other road-safety sensors posted at various intersections throughout the cities. This involves installing, if not present already, and maintaining the heterogeneous camera and sensor network. In many cities, such networks are already installed and have different levels of autonomous decision making, but in most cases, the decision making process is largely human-driven. The data is/will be too voluminous to be handled by humans, so the processes need to be automated as much as possible, to feasibly monitor road traffic patterns, and develop cost-effective and efficient solutions towards road-safety.

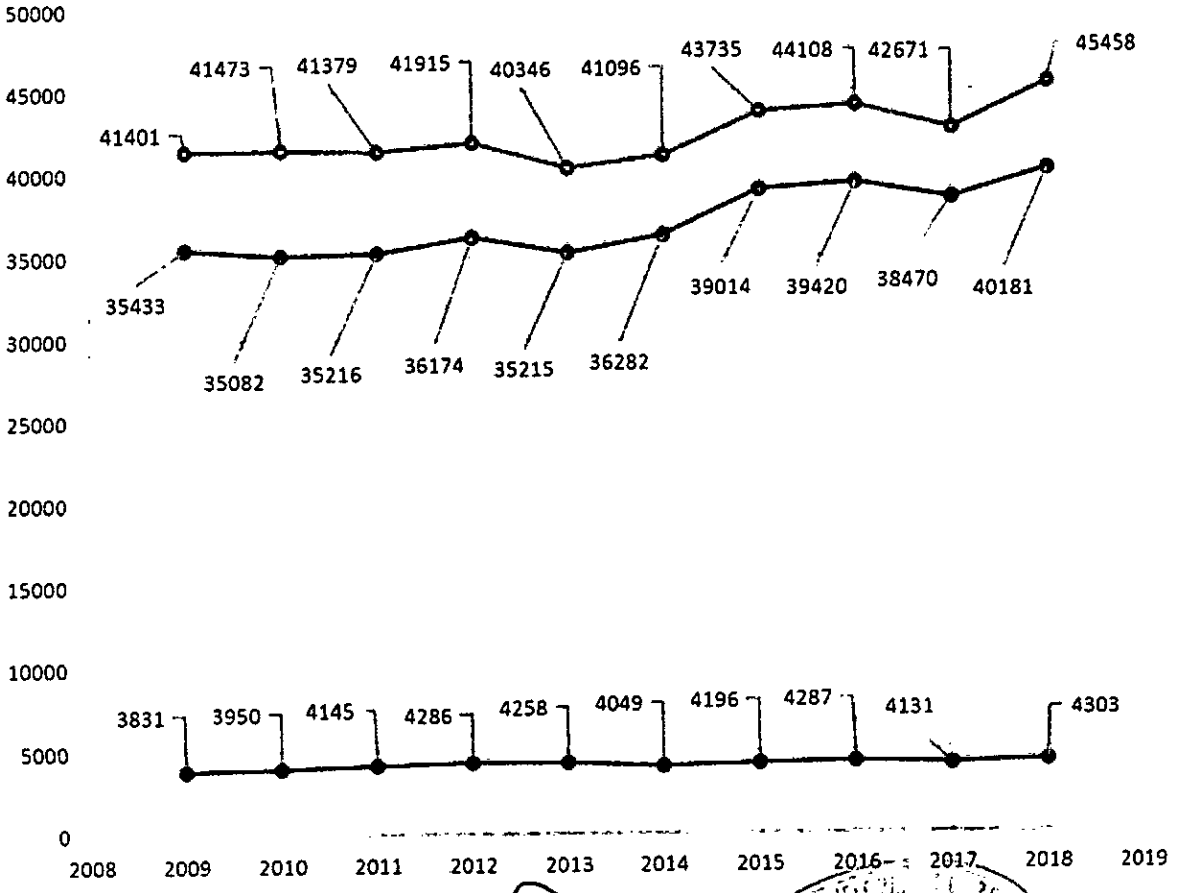
Such automation involves the core machine learning, deep learning, computer vision and data analysis problems of converting unstructured video and sensor data to a structured traffic data to further analyse it for various decision making scenarios either by the domain-experts or algorithms.

KELTRON

In most cases, the data generated by the citywide networks is unlabeled, so the core problem to address is "identification" (of offences, offending vehicles etc.), so the goal, eventually, boils down to detecting and classifying different vehicles and pedestrians in videos and generating structured data about counts, direction, offences etc.

2. Accident Statistics of Kerala for Last 10 Yrs.

Year	No. of accidents	Death	Total Injuries
2009	35433	3831	41401
2010	35082	3950	41473
2011	35216	4145	41379
2012	36174	4286	41915
2013	35215	4258	40346
2014	36282	4049	41096
2015	39014	4196	43735
2016	39420	4287	44108
2017	38470	4131	42671
2018	40181	4303	45458



3. PROJECT OVERVIEW

Safe Kerala to be implemented in various cities across the state, is a well-planned initiative from the law enforcement authorities and Government that unites, the working class, businesses, city officials, and law enforcement through a project that is intended to maximize safety of the population in all respects and minimize, road accidents, book offenders, and penalize other traffic offences in the total community. By working together to address these issues, the cities under this project will become a safer place to live in all aspects. In order to provide a good quality of living environment for the citizens, a safe city planning must be implemented which includes identification of hot spot accident areas, improvement of physical environment, transport system, enforcement of traffic rules and appropriate surveillance. The proposed project is a 6 year project with 1 Implementation and 5 year Operations and Maintenance.

The project envisages identification of accident hotspots and placing them under coverage with total AI camera based surveillance, deployment of automated number plate reading (ANPR) cameras, and setting up an Integrated Smart Control Room for the purpose of facilitating the project implementation. By choosing a fully digital integrated surveillance system, the law enforcers can view the happenings in the city from the integrated Control Room and take appropriate measures to curb offences and ensure safety of the citizens.

Safe Kerala project for the various cities, leverages partnerships and technical solutions to help reduce accidents, reduce traffic offences, book and tag offenders, and create an environment where people feel safe and secure to live and work.

AI SMART cameras (incident detection cameras) which are deployed in the city roads use Artificial Intelligence (AI) and can help the law enforcing authorities to detect and identify any offence as detailed in the report. These AI based cameras use state of the art deep learning technology to learn and automatically detect various incidents and report the same to the control room. They are also equipped with IR illuminators, for night detection.

These smart cameras also act as high end high speed ANPR cameras for number plate capture as explained later.

3.1. Project Components

1. **AI based ANPR Camera System:**

The system will analyze the Camera output and detect violations & incidents like seat belt violation, helmet violation, usage of mobile while driving, triple riding, wrong number plate, lane change etc. The identified violations will send to Central Control Room and use this information prepare challan against offenders. The system uses AI based ANPR cameras for violation detection on the field, and only violating vehicle images are captures and send to control room for challan processing and fine collection.

2. **Red Light Violation Detection System (RLVDS):**

The system will identify red light signal violation at Traffic signals and send the court proof images to central control room to prepare court evidence and take further penal action against the offender

3. **Fixed Speed Violation Detection System (SVDS)**

The system is designed detect and record evidence of over speeding vehicles. Unmanned detection is possible for day and night. It consists of a number of ANPR grade cameras installed at the road, on a cantilever / gantry (Capture Point Units) connected to the Central control room.

Vehicle speed is detected by Sensor like 3D Doppler vehicle tracking radar. The sensors can detect any violating vehicles and give capture command to the camera for capturing images of the number plate of the violating vehicle. Single radar is capable of capturing up to 4 lanes.

4. **Mobile Speed violation detection systems**

Vehicle mounted Mobile speed enforcement systems, can be randomly positioned at various roads, to capture all over speeding vehicles. Vehicle speed is detected by Sensor like 3D Doppler vehicle tracking radar. The sensors can detect any violating vehicles and give capture command to the camera for capturing images of the number plate of the violating vehicle

5. **Parking Violation Detection System (PVDS)**

Combination of AI-Smart cameras coupled with associated PTZ cameras can be used for parking violation as described below. Preset Zones can be marked in these PTZ camera images to identify, non-parking areas in a junction. On site vision AI hardware will detect parking violations and these preset View images will be send same to control room. This will result in minimum bandwidth per site.

Communication Projects Group, KCC
Mon..., Thiruvananthapuram-695 533

6. General Enforcement System using ANPR cameras.

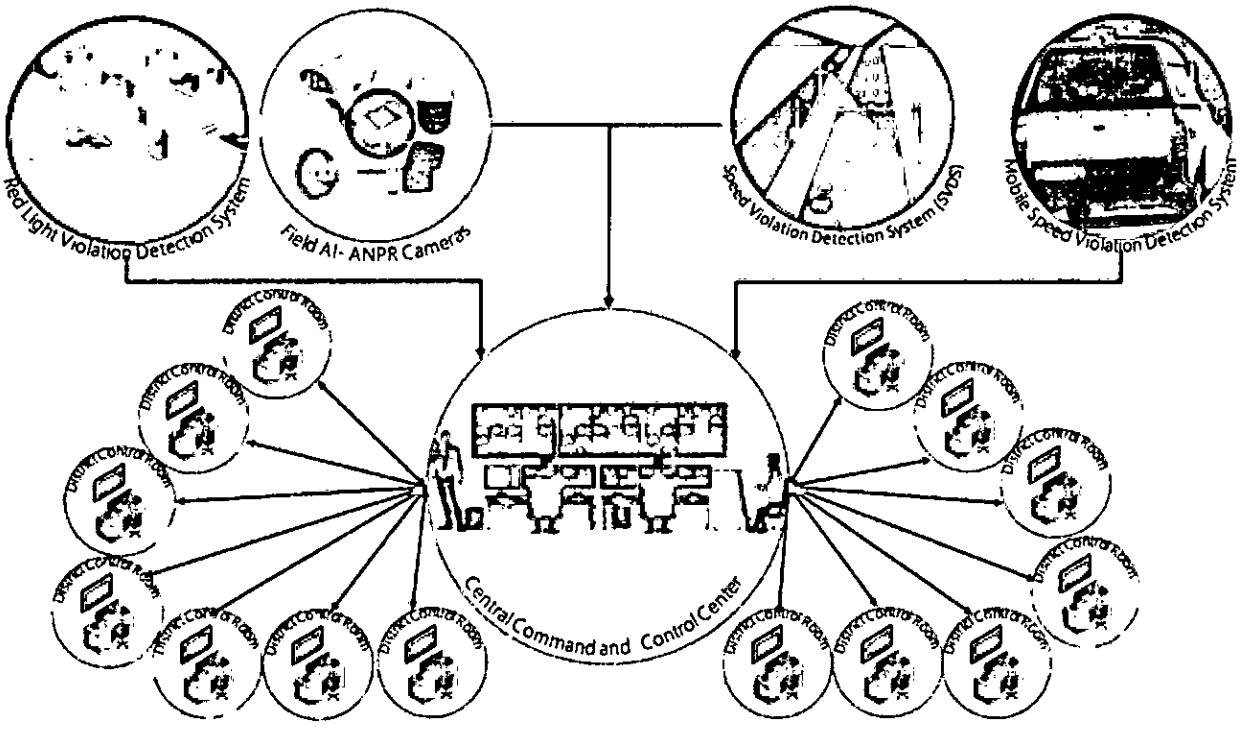
The system will cross check with the non-compliance of various mandates and statutory payments related to vehicles like road tax, pollution certificate, insurance etc. The penalty challan can be generated against such violations by cross checking respective databases.

7. Control Room Management and Challan Processing Software

Control Room Management Software is comprehensive application integrated with all filed systems and offices and officers as part of the Safe Kerala Enforcement System. The system will have full configuration and user role rights management capability. The application will handle all evidence data from various field systems like AI based ANPR cameras, RLVDS, SVDS, Mobile SVDS, PVDS etc.

The application will have ANPR processing and Challan processing capability. The application can integrate other systems by using API.

8. State Central control Room (SCCR)



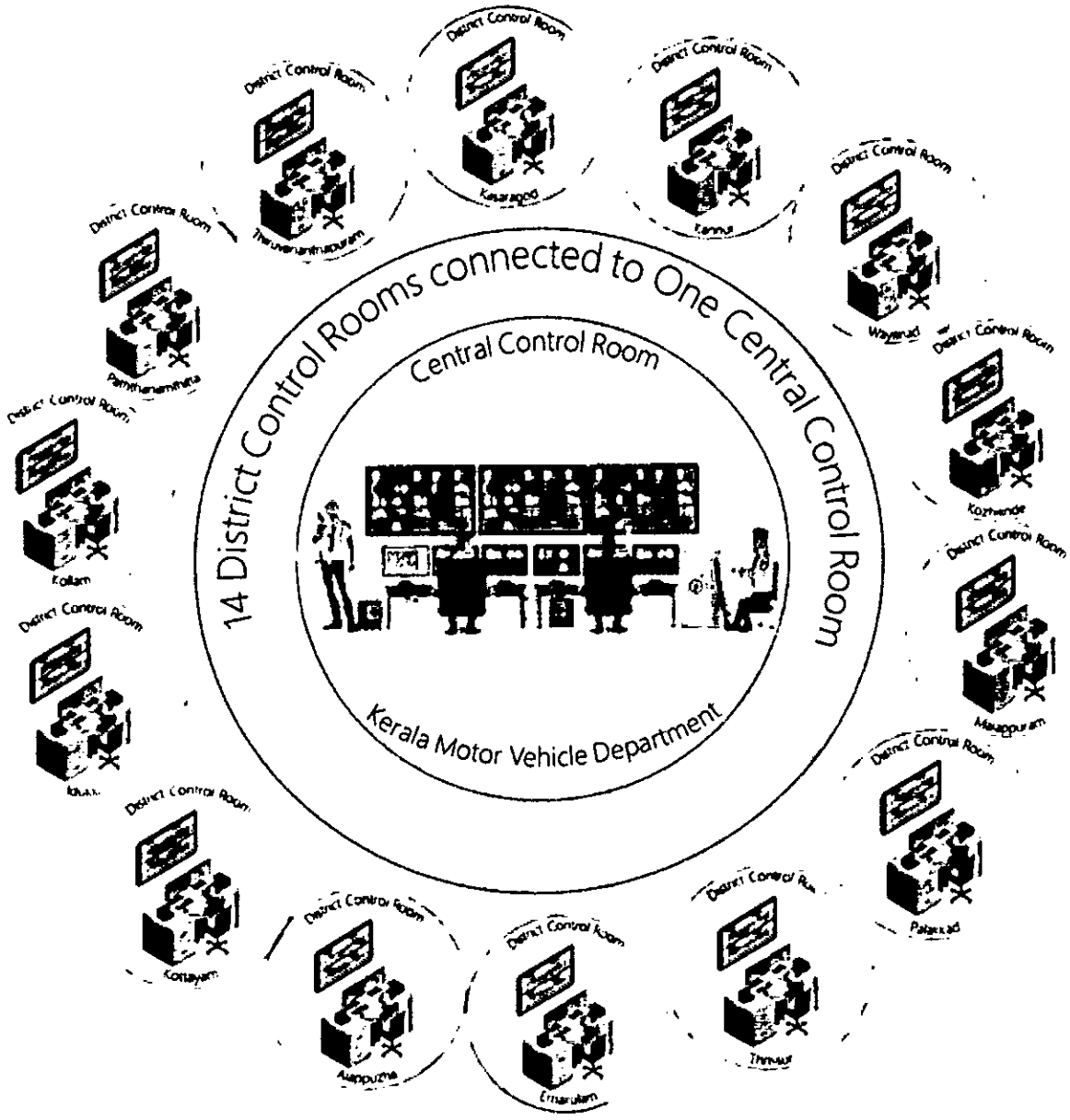
All field systems described above are connected to one State Central Control Room (SCCR). SCCR has required connectivity, servers, storage & firewalls etc. SCCR will receive all violation data from all field units, Do ANPR operation and further processing. & same will be stored in local storages. SCCR will be connected to 14 District Enforcement Control Rooms as in diagram.

KELTRON

9. District Enforcement Control Rooms (DECR)

DECR will receive Violation data from SCCR. DECR will have operators to verify the offences and initiate challan processing, printing, dispatching etc. The facility will be equipped with associated hardware & software applications.

Subsequently dispatched challan data will be pushed to payment management service software application for fine collection by cash payment collection / on line payment collection etc.



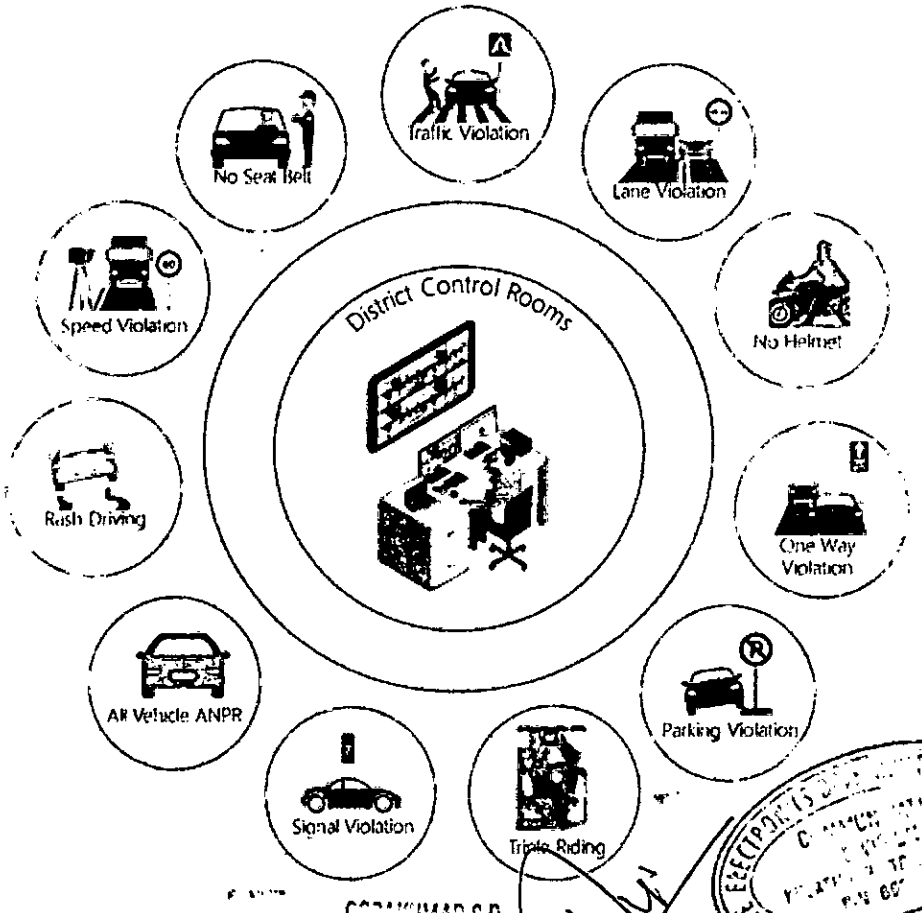
3.2. GENERAL VIOLATIONS

List of violations & Incidents

1. Over speeding beyond set limits
2. Red Light Jumping at Signals
3. Helmetless driving
4. Driving without seat belt
5. Use of Mobile Phones while driving
6. Wrong Entry
7. Illegal Parking
8. Triple riding on two wheelers
9. Vehicles plying without necessary clearances of Pollution etc.
10. Unauthorized vehicles moving on road, in wrong time of the day.
11. Illegal and non-standard number plates

Additional useful information from smart cameras are

- Vehicle crowding, traffic blocks on the roads
- Stopped vehicles on highways (may be due to accidents, breakdown etc.)
- Vehicle classification and counting
- People crowing on roads



COMMANDANT S P
Head CPS
Communication Projects Group, KELTRON
Monvila, Thiruvananthapuram 695 583

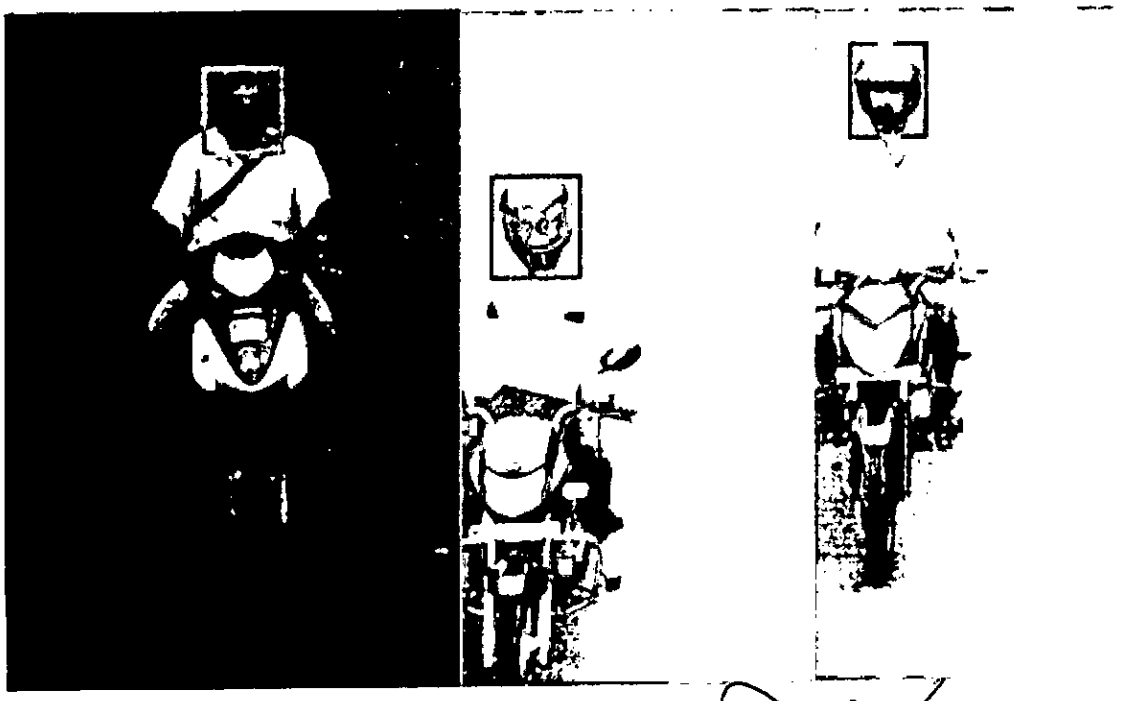
3.3. VIOLATION EXAMPLES

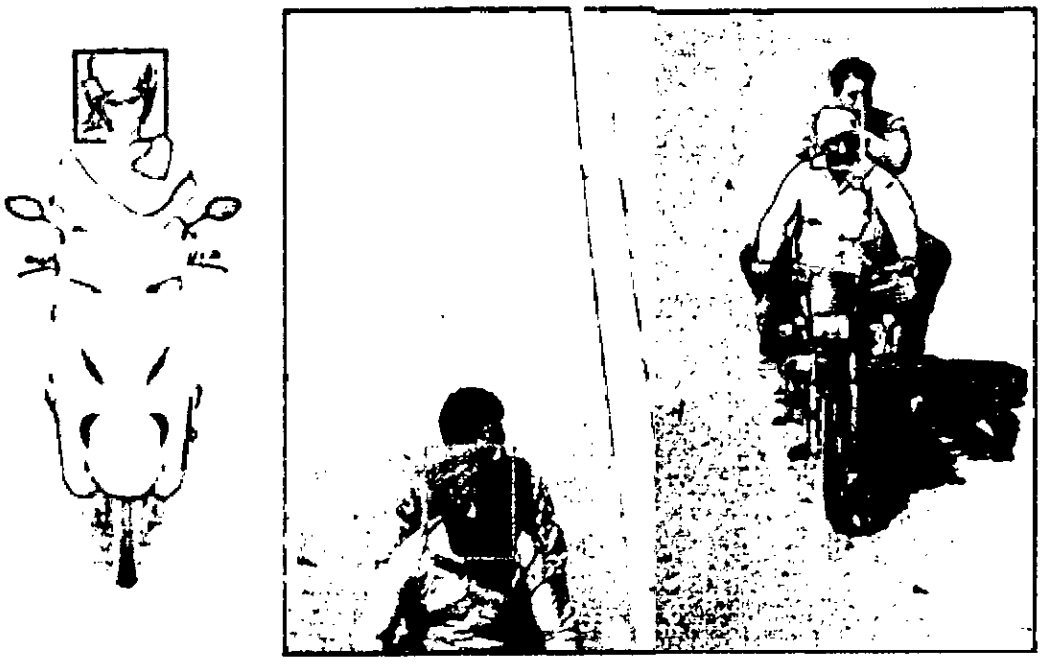
1. Helmet violation

AI based cameras at site captures images and analyses same for helmet absence detection. Same image also will have vehicle number plate information. Violation data & images are send to CR for further processing.

HELMET VIOLATION CHALLAN

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL-01-BR-2047	KL01BR 2047	Location -R1	2018-08-28-16-20-13	No Helmet





2. Seat Belt Violations

AI based cameras at site captures images and analyses same for seat belt violation detection. Same image also will have vehicle number plate information. Violation data & images are send to CR for further processing

SEAT BELT VIOLATION CHALLAN

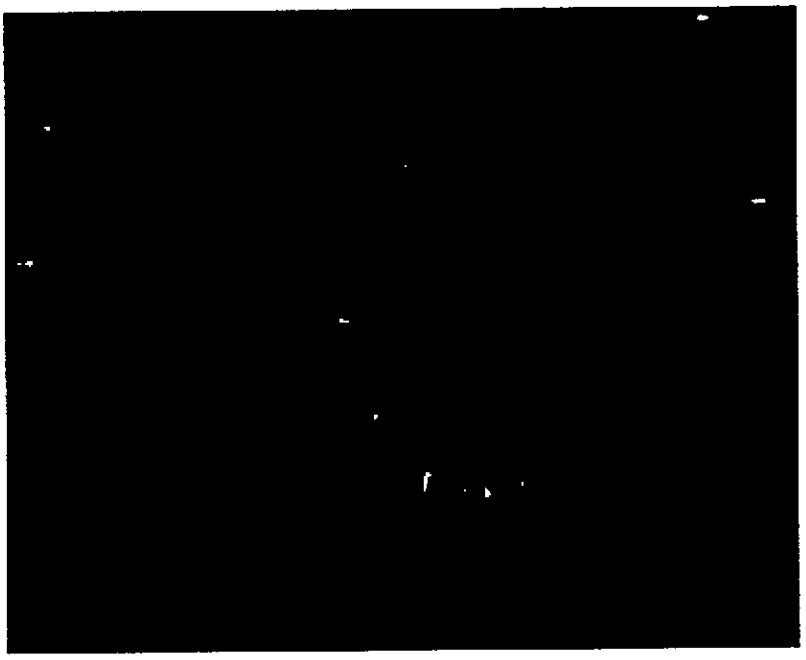
Registered Number	ANPR	Location	Date & Time of Detection	Details
KL-20-L-5256	KL 20 L 5256	Location -R1	2018-08-27-17-18-52	No Seat Belt

17

KELTRON

SEAT BELT VIOLATION CHALLAN

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL-01-AS-4185	[illegible]	Location-R1	2018_10_17-20:32:42	No Seat Belt



3. **Other violations :**

AI based cameras can also detect and classify vehicles moving on road in real time, along with direction. This feature can be used for many type of traffic violation detections. Hence it can detect heavy vehicles moving on road at wrong time of day or wrong lanes. Also wrong way movement of vehicles, non-standard plates etc. can be detected by the AI engine. After a violation detection all Violation data & images are send to CR for further processing

Wrong way violation

Nonstandard plate

GOPAKUMAR S P
Head ...
Communication ...
Mon...

4. AI - ANPR CAMERA SYSTEMS

AI based ANPR cameras is a combination of Global shutter based state of the art ANPR capable camera, Deep learning based AI processing at edge (using AI Vision processor) and other electronic subsystems, UPS, IR illuminator etc.

We are using advanced technologies like Machine learning, Machine Vision, Artificial Intelligence and Deep Learning to build algorithms and detection models to identify specific violations. Our Visual Processing Units are edge devises equipped with highly optimized detection models and algorithms which can process the frames real-time.

These AI based cameras use state of the art deep learning technology to learn and automatically detect various violations & incidents and report the same to the control room.

4.1. VISUAL PROCESSING UNIT (VPU)

Visual processing Units (VPU) are Low power ARM SoC based industrial compute boards with Graphical Processing Unit (GPU). Visual processing units are interfaced directly to the AI-ANPR cameras.

The VPU will be equipped with Artificial Intelligence/ Machine Learning/ Deep Learning algorithms to analyze the video stream continuously to trace specific type of events. The algorithm in the VPU have trained to identify specific type of suspect events with all supporting data to take further decision. The accuracy of event identification can be improved by using the data which we are capturing from various locations

A 4G module attached along with the VPU board shall provide the band width required for transferring the suspect event to a Central Server.

Figure 1 depicts the high-level data-processing architecture based on the proven big-data paradigm called lambda architecture. Within this architecture, there are several processing pipelines that carry out the various task demanded by a given application for road-transport safety, management and surveillance. Moreover, all such centers are connected to MVD databases for various other tasks, e.g., gathering registration data from such databases for identification tasks following detection tasks.

From the data processing point-of-view, the vision/AI tasks are composed as a data-processing pipeline, wherein each stage of the pipeline executes a low-level task that processes the streams of data. Such a streaming view of data processing is critical to maintain the low-latency, near-real-time nature of the entire solution.

Communication Pro...
Manvila, Thiruvananth...

KELTRON

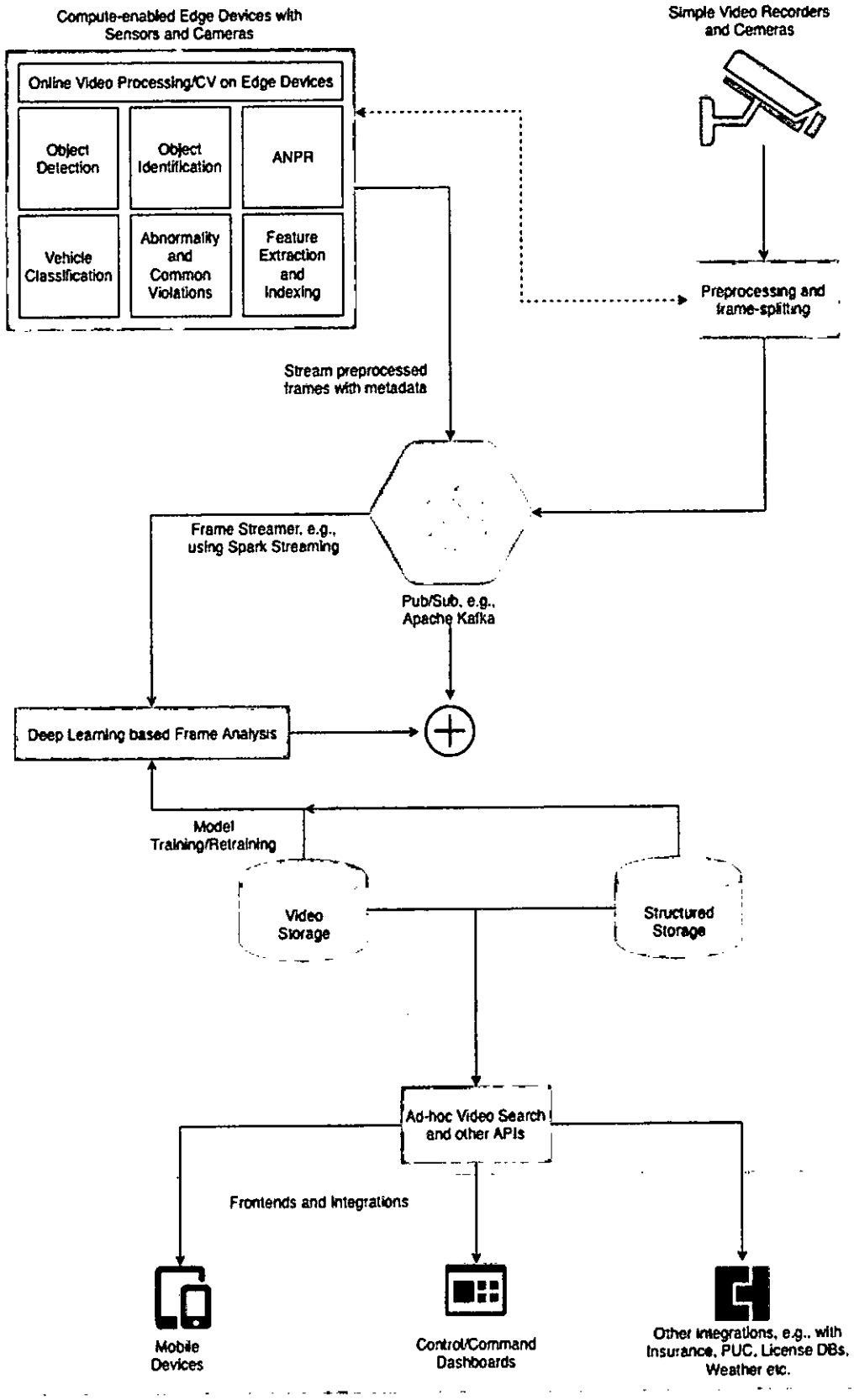
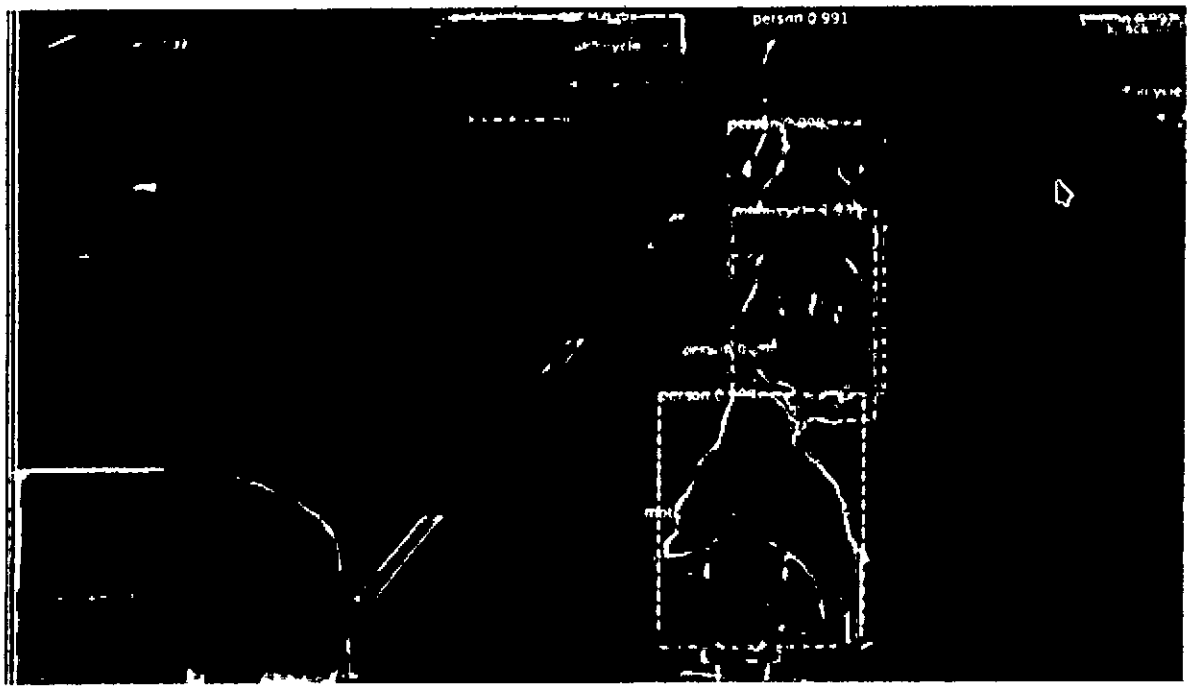
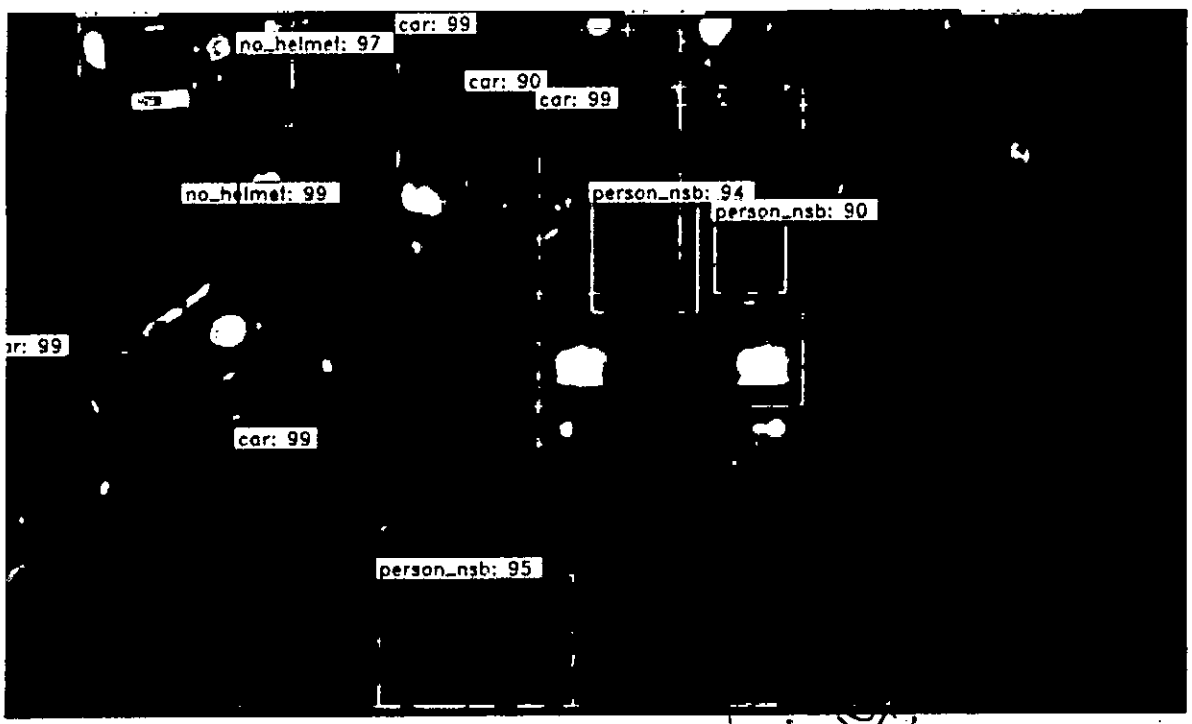


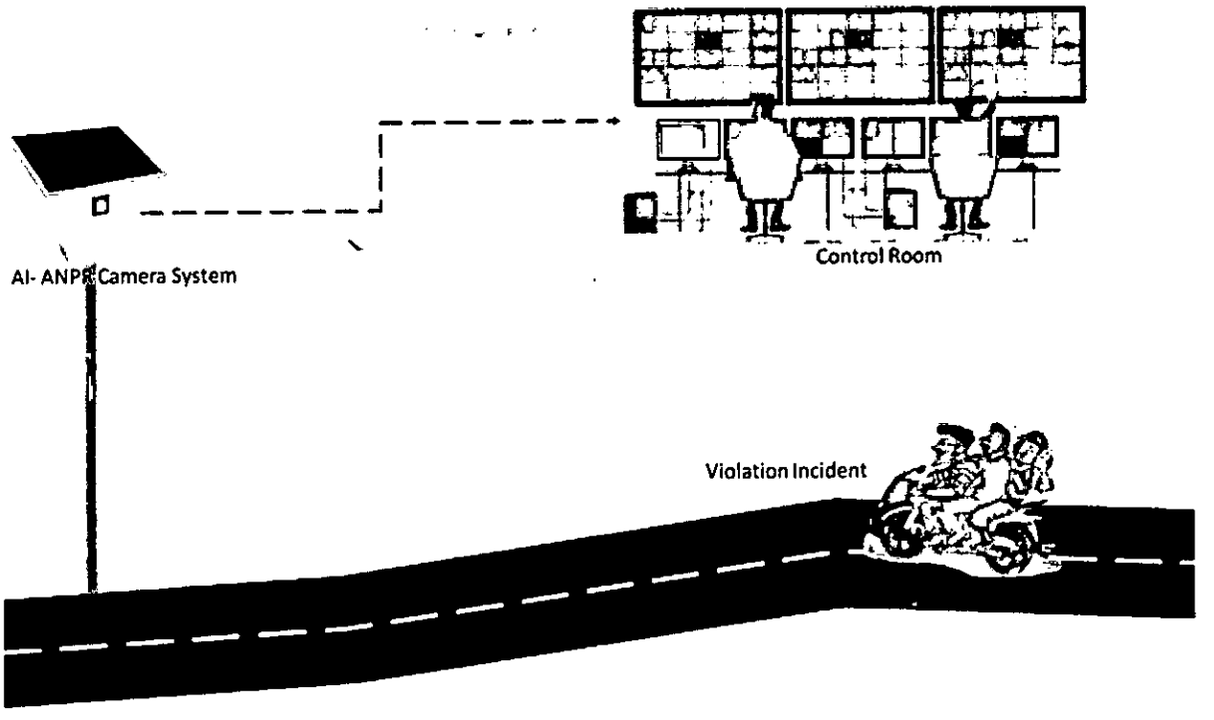
Figure 1. High-level data-ingestion and data-processing architecture

The system consists of several such pipelines for various end-to-end tasks. Some of these pipelines may reside on the edge devices.

IDENTIFICATION AND CLASSIFICATION:







4.2. ANPR CAMERA TECHNOLOGY

The ANPR cameras use the widely acclaimed Global shutter technology compared to the normal rolling shutter technology used for normal cameras which is mandatory for recognizing and capturing the image of speeding vehicles, which normal cameras are unable to capture clearly. These cameras are designed for both day and night conditions without dependence on any ambient light. The high power Synchronized IR flash for night capture is critical to the fast shutter operation of camera.

ANPR cameras are also able to capture "Two wheeler" number plates, apart from the number plates of normal four wheelers, and are capable of capturing both Normal and Retro-reflective number plates deployed in the country. The advanced technology used in our Cameras helps in avoiding vehicle head light blooming while capturing the image from the front side of the vehicle

These systems are designed to provide more than 90% automatic number plate recognition accuracy, with high quality images. These high quality images are helpful to the law enforcing agencies to identify any vehicle for post crime analysis purposes. Pulsed IR flash enables high quality image capture of fast moving vehicles even beyond 200 KMPH at night time and is in synchronization with the high-speed Global shutter camera

Night time Image capture

Pulsed IR flash enables high quality image capture of fast moving vehicles even beyond 150 KMPH at night time. It works synchronously with the high-speed Global shutter camera.

Advantages

- Crystal clear quality images at night, helmet violation detection, crime analysis, hit-run vehicle identification, seat belt violation
- Ultra-low average (actual) power < 10 W.

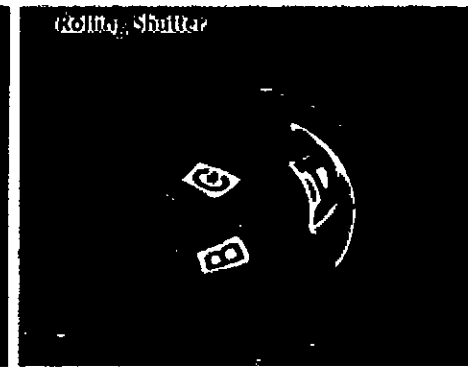
General System requirement for ANPR camera

1. **Resolution**

   Greater than 1920 pixels per lane is recommended for capturing Two Wheeler number plates. Also it is possible to provide partial adjacent lane coverage. Hence 2 Mega Pixel camera with motorized zoom recommended

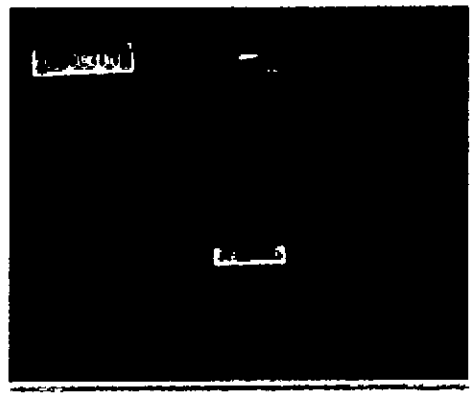
2. **Global shutter technology**

   ANPR cameras use Global shutter technology compared to rolling shutter technology used for normal CCTV cameras (fast moving Fan shown below)



3. **Fast Electronic Shutter**

   Fast electronic shutter (low exposure time < 1mS) is required to capture even vehicles, moving at > 200 KMPH without any image blur



ANPR Camera capture

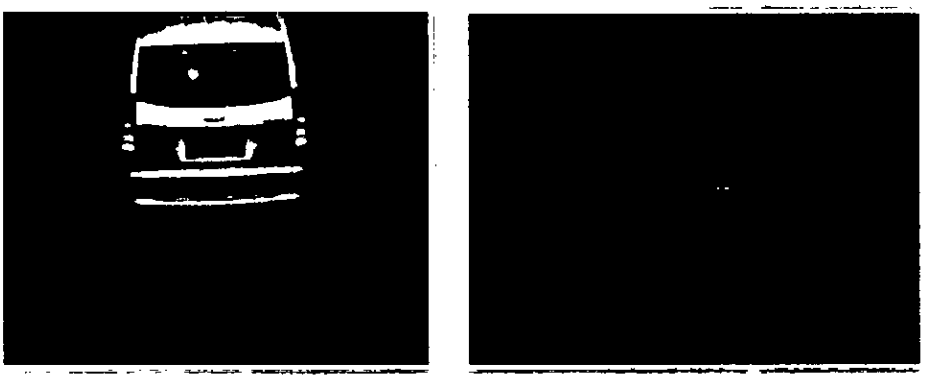
Normal Camera capture

Communication Pr... KCC
Menvila, Thiruv...

KELTRON

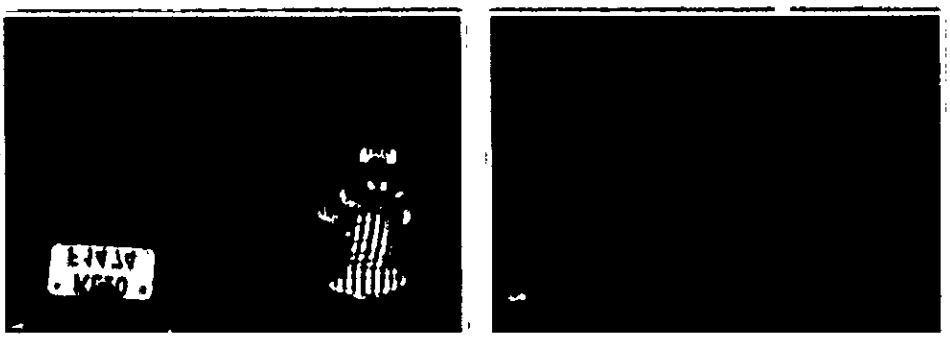
4. **Day and Night Condition**

ANPR cameras should work for Day & Night conditions without depending on any ambient light. Synchronized high power IR flash (> 500 Watt peak power) for night capture mandatory due to fast shutter operation of camera



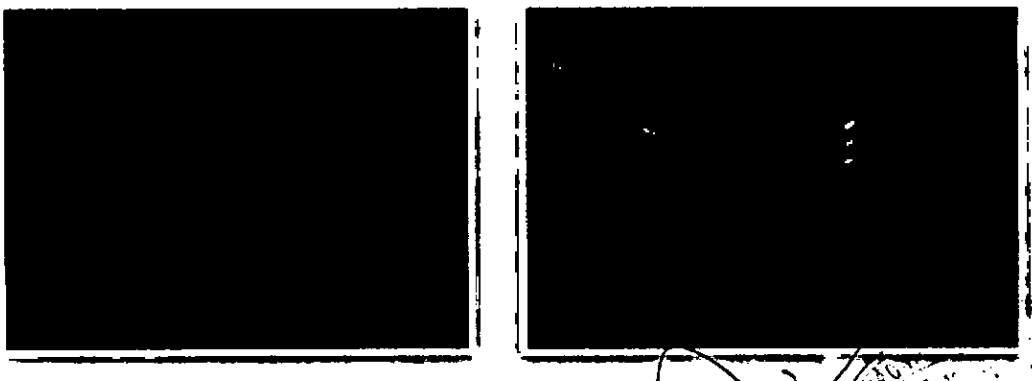
5. **Two Wheeler Number plate capture**

ANPR cameras are required to capture "Two wheelers" number plate also apart from other vehicles



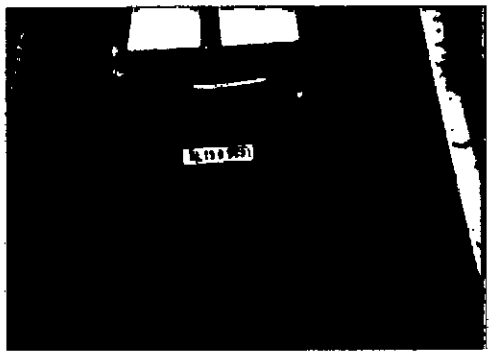
6. **Normal and Retro-reflective number plate capture**

ANPR camera is required to capture both "Retro reflective" and "Non-reflective" number plates found in India



7. **Significance of high quality vehicle image capture**

If some number plates are not automatically recognized, the number plate images should be available for manual recognition. Vehicle identification by image is also important for crime investigation, hit and run vehicle identification, anti-terrorism



4.2.1. AI - ANPR CAMERA SYSTEM SPECIFICATIONS

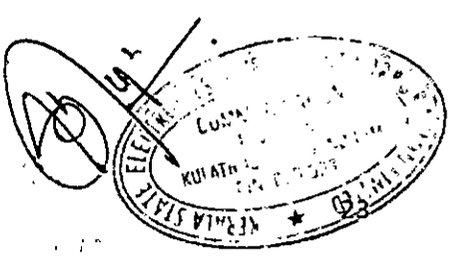
ANPR Camera Specification	**Resolution: 3, 5 Mega** pixel as per requirement Color images for day, monochrome images for night, True ICR feature CMOS Global shutter sensor Exposure time 10uS-maximum 1 millisecond Trigger out : Global shutter sync flash strobe out Interface: Ethernet, RS 485 Lux sensor for Exposure control Video compression: JPEG Sensor: Sony pregius sensor or equivalent, Pixel size: 3.45 micron minimum Equivalent resolution mega pixel lens Vehicle speed up to 200 KMPH Frame rate: configurable Minimum illumination: zero with synchronized pulsed IR flash Capability for radar triggering Power 12V DC nominal

KELTRON

<table>
<tr><td>IR illuminator Specification</td><td>Infrared flash for image capture at night Synchronized flash with global shutter of camera
Power in 12V, built in 48 V boost voltage converter
Flash strobe input
Wavelength: 850nm,
FOV: 26 / 36 deg depending on number of lanes
Flash power sufficient to capture vehicle images also at night.
Capability to capture retro reflective and non-reflective number plates.
Peak power up to 300 watts</td></tr>
<tr><td>AI- Visual Processing Unit Specification</td><td>
<table>
<tr><th>Description</th><th>Requirements</th></tr>
<tr><td>Processor</td><td>At least 64-bit Quad Core, SIMD ISA capable: SSE4+/NEON CPU with operating freq >= 1GHz, (additional good to have: CUDA-based or TPU or Myriad X based dedicated hardware accelerator for vector ops)</td></tr>
<tr><td>RAM</td><td>At least 2GB SRAM (OK, if shared with GPU)</td></tr>
<tr><td>Networking</td><td>802.11b/g/n/ac, dual channel (2.4G, 5G), 10/100 MBPS (Gigabit Ethernet,), 4G LTE hat and SIM Slot</td></tr>
<tr><td>Storage</td><td>On-board flash/eMMC or MicroSD (at least 16 GB in total, MicroSD IO, at least 98mbps)</td></tr>
<tr><td>USB Ports</td><td>At least 2 USB2.0 or USB3.0 ports</td></tr>
<tr><td>GPU</td><td>Must support OpenGL ES 2.0 at least 24 GFLOPS, with at least 1080p30 H.264/MPEG-4 AVC high-profile decoder and encoder</td></tr>
<tr><td>Additional Storage features</td><td>Expandable Storage (through MicroSD / SSD up to 128GB), Anti-tamper with siren shall be part of systems</td></tr>
<tr><td>OS</td><td>Linux</td></tr>
</table>
</td></tr>
</table>

Communication ... Group, ...
Monvila, Thiruva...

Solar Power system	**Input**	
	Operating voltage	10vdc-14.8vdc
	Maximum panel connectivity	150watts
	Panel Voc	22vdc max , 10 A max
	Mppt converter efficiency	85-90 %
	Battery	12.8V-30 Ah, Li FE PO4
	Output	
	Output voltage	5.0 & 12 V dc
	Protection	
	Battery over Charge , under voltage, short circuit	Yes
	Backup duration	24 Hours
DC UPS (For Mains powered use cases)	• AC side over, under voltage protection, surge protection • DC power supply - industrial (up to 100W) • DC UPS with 5A charger with Battery protection (over/under) & zero sec change over • output = 10.5-14 VDC: 5V DC out • Battery: 18-40AH	
Enclosure	• Pole mounted outdoor type, with rugged, with Rain canopy etc. All connectors, cables etc. Shall be of industrial grade and any hardware shall be easily replaceable	
Connectivity	• 4G / ADSL / OFC	



Communication F...
Manvila, Thiruvan...

KELTRON

5. RED LIGHT VIOLATION DETECTION SYSTEM

Undisciplined driving with scant respect for Signals at intersections is one of the major causes for unwanted accidents and loss of life and destruction of national property across the country. RLVD systems are designed to detect any vehicle crossing the stop line when the signal turns Red.

The RLVD systems employ the latest vision sensor technology to provide a high accurate detail of the vehicle jumping the signal.

The system is designed to detect and record evidence of red light jumping by vehicles at traffic signals. Unmanned detection should be provided for day and night.

It consists of number of ANPR grade cameras installed at the road, on a cantilever / gantry and connected to the Central control room. A junction may require one set of cameras for each road of the intersection. The number of cameras on each road could be increased based on the number of lanes. The rear number plates should be captured by the system, in all cases.

The system at each intersection should be linked to the traffic signal lights. Number plates of vehicles crossing the stop line, during red light should be captured. Video analytics could be used to detect vehicles violating the red signal lights.

One common camera should be used to take wide angled shots of all the lanes along with the traffic signal light post. Minimum one wide angle image showing the vehicle violating red signal and the Red traffic signal together should be captured to act as court evidence.

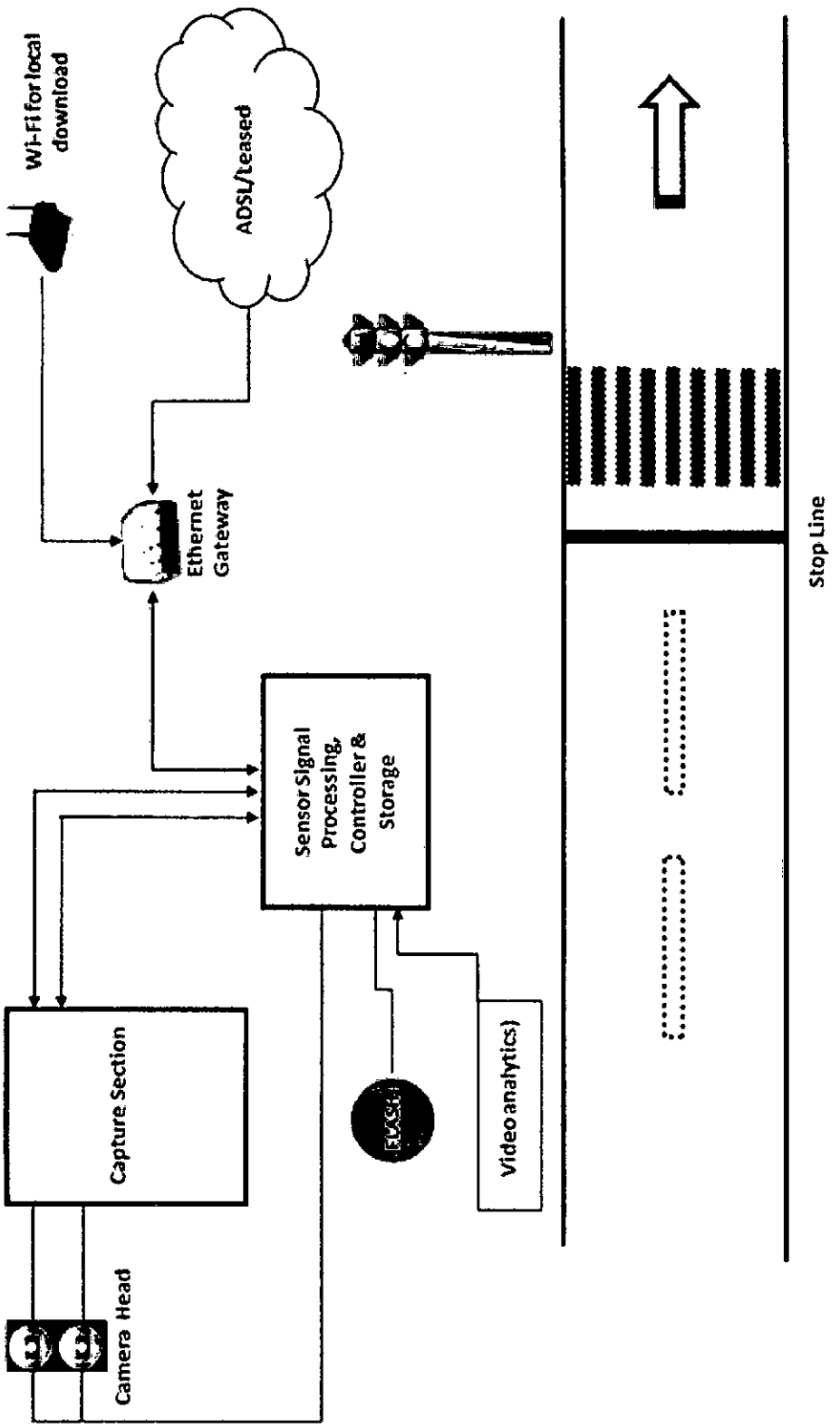
The road side cameras should also be connected to respective high power Infrared flash, for night time capture. The system should also be able to capture clearly both Retro type and Non-retro type number plates which are common in Indian condition.

Most important considerations for RLVDS system are,

- ANPR camera capable of capturing images of vehicles including 2 wheelers, retro – non retro number plate capture at night with infrared high power flash Un-blurred high quality vehicle image and number plate image capture, greater than 1200 pixels per lane resolution, global shutter technology etc.
- Red light jumping, stop line violation sensing for vehicles including 2 wheelers, using vide analytics technology.

Court evidence camera with one wide angle shots showing Red traffic light and vehicle together.

Block Diagram of the RLVDS



Night Time Violation Capture: The system is capable of capturing the "RED traffic light" even when using IR flash at night

GOPAKUMAR S P
Head of S
Communication Projects Group, KC
Mobile, Thiruvananthapuram-695 58

KELTRON

5.1. RLVD TECHNICAL SPECIFICATION

Sl. No.	Category	Specification
1.1	Camera for License Plate Capture	ANPR 2 or 5 Mega pixel camera depending on 1 or 2 lanes (True day and night violating RED signal and stop line in day and night conditions. All types of number plates reflective type and standard type should be captured. Vehicle image also should be captured under all conditions. Image compression JPEG. Connectivity Ethernet. Configuration one 2 mega pixel per lane or one 5 mega pixel per 2 lanes can be used.
		True day & night camera
		Color images for day, monochrome images for night
		CMOS Global shutter sensor
		Exposure time maximum 1millisecond
		Interface: 10/100 base T Ethernet
		JPEG compression, Trigger in, Flash strobe out
1.2	Camera for evidence capture	2 Mega pixel camera (True day and night): one per Road to capture in wide angle image of violation with violating vehicle and Traffic signal. Image compression JPEG. Connectivity Ethernet. Should work for day and night condition, acting as court evidence with red traffic light.
		True day & night camera
		Color images for day, monochrome images for night
		CMOS Global shutter sensor

Head Of
Communication Projects Group, KC
Manvila, Thiruvananthapuram-695 5

KERALA STATE ELECTRONICS COMMUNICATION LIMITED
KULATHOOR, TRIVANDRUM-695 583

		Exposure time maximum 1millisecond
		Interface: 10/100 base T Ethernet
		JPEG compression, Trigger in, Flash strobe out
2	Vehicle sensing method	Video analytics, REAR side capture , detection
3	Infrared Flash for Illumination	Infrared flash for image capture at night
		Flash power sufficient to capture vehicle images also at night. Should be capable of capturing all types of number plates, including two wheelers at night.
		Capability to capture retro reflective and non-reflective number plates
4	ANPR (automatic number plate recognition) accuracy	High ANPR accuracy - > 90% for standard four wheeler number plates at day and night,
5	Traffic light interface / visibility	Optically isolated interface. Red signal light should be visible in the evidence camera image along with image of violating vehicle
6	RLVDS Configuration	3 Road, 4 Road Junctions with 2 / 3 lanes per road
7	Power supply	Power input: 170-240VAC,
		DC - UPS for road side hardware with min 3 Hr back up,
		Utility power supply with power meter required at site meeting State electricity boar requirements)
8	Protection	Protection against lightning, under / over voltage should be provided (under these condition operation from Battery power is recommended).
9	Camera mounting	Suitable Cantilever / gantry

Communication Pr... Group, K...
Menvila, Thiruvana... 695 5...

KELTRON

Sample Challan

ChargeMemo - Red-Light System Violation

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL01BZ4834	[redacted]	PATTOM_RLVDS	2018_09_01_16.02.55	Lane-1

ChargeMemo - Red-Light System Violation

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL01BF7852	[redacted]	PATTOM_RLVDS	2018_09_01 16:05:00	Lane-1

GOPAKUMAR S P
Head SCG
Communication P... ACC
Menvila, Thiruva...

KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED
COMMUNICATION
KULATHOOR
...

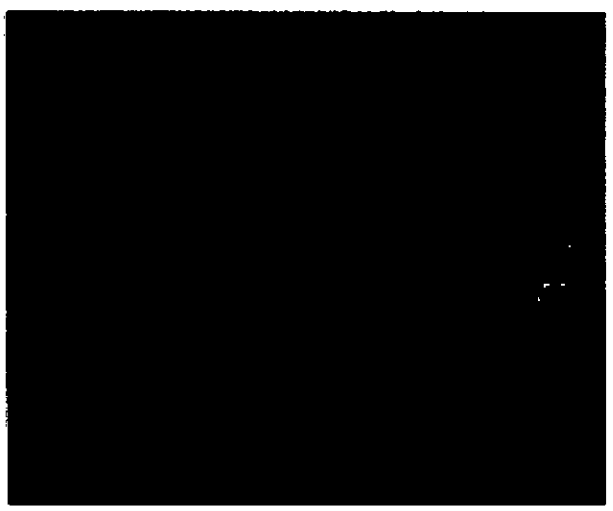
KELTRON

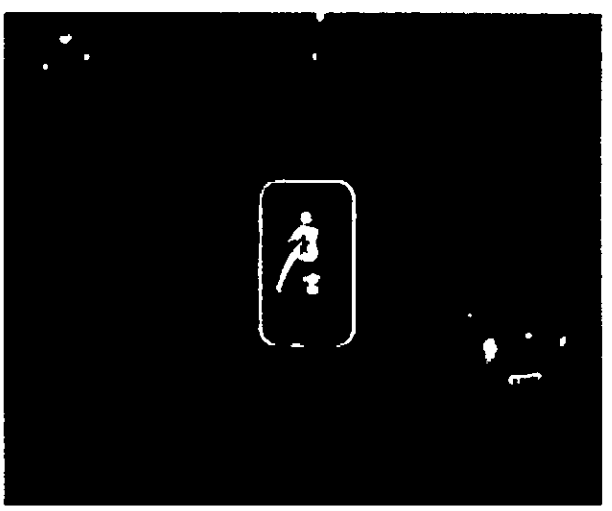
ChargeMemo - Red-Light System Violation

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL01AZ4464	[redacted]	PATTOM_RLVDS	2018_09_01_20.14.32	Lane-1

ChargeMemo - Red-Light System Violation

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL21N4574	[redacted]	PATTOM_RLVDS	2018_09_01_20.08.18	Lane-1





GOPAKUMAR C P
Head DPG
Communication Pro[illegible] Group, KCC
Monvila, T[illegible] 5 583

6. SPEED VIOLATION DETECTION SYSTEM

The Fixed Speed Violation Detection system (SVDS) should detect and record evidence of over speeding vehicles. Unmanned detection should be provided day and night.

It should consist of a number of ANPR grade cameras installed at the road, on a cantilever / gantry (Capture Point Units) connected to the Central control room. It should be possible for a number of such Capture Point Units to be connected to the same Central control room.

Vehicle speed should be detected by physical Sensors like 3D Doppler vehicle tracking radar. The sensors should detect any violating vehicles and give capture command to the camera for capturing images of the number plate of the violating vehicle. Single radar should be able to capture speed of vehicles on up to 4 lanes.

One common camera per road should be used to take wide angled shots of all the lanes. Two wide angle video shots spaced in time should be taken to prove that the vehicle was moving on the road, for each violation (This is a mandatory requirement for treating the images as Court room proof, to show that the vehicle was speeding on the road). Stretches which have two roads in opposite directions should be covered by two sets of cameras (one for each direction). The number of cameras could be increased based on the number of lanes. Rear number plates should be captured by the system, in all cases.

The road side cameras should also be connected to respective high power Infrared flash, for night time capture. The system should also be able to capture clearly both Retro type and Non-retro type number plates which are common in Indian condition.

The field system should consist of electronics for speed calculation / sensor interface, camera control, control room communication, local storage of violations, Power back up, surge protection, etc. Storage greater than 256 GB should always be provided per road, for buffering violation data, since control room may not be always online.

6.1. SVDS- TECHNICAL SPECIFICATION

Functional Requirements & specifications	
3D Doppler Radar (1 per road)	Advanced Tracking Doppler Radar - , Detects and measures speed of vehicles. > 240 Km/hour. Refresh Time – 50msec, Multi lane operation. Speed Accuracy better than 97%. Heavy vehicle classification (trucks / Bus etc.) should be possible by Radar.
ANPR Camera for License Plate Capture (1 per lane)	ANPR Camera should be 2 Mega pixel type IP cameras, min HD Mega pixel, True day & night camera Colour images for day, monochrome images for night CMOS Global shutter sensor Exposure time maximum 1millisecond, with motorized zoom lens.
Camera for evidence capture (1 per road)	Evidence Camera (wide angle road view) should be 2 Mega pixel type IP cameras, min HD Mega pixel,, True day & night camera Colour images for day, monochrome images for night CMOS Global shutter sensor, with Lens.
Infrared Flash for Illumination (1 per lane)	Infrared flash for image capture at night Synchronized flash with global shutter of camera Wavelength: 850 nm, Flash power sufficient to capture vehicle images also at night. **Capability** to capture retro reflective and non-reflective number plates.
Violation images.	For each speed violation one lane – ANPR image of vehicle with clear number plate images and 2 evidence images should be captured.
Vehicle image Capture	Along with number plate, high quality image of vehicle, also to be captured at Day and Night conditions for all vehicles. Evidence camera should capture wide angle shot of full road and surroundings with minimum two images of vehicle moving on the road.
Speed Enforcement Method	**System should support & enforce both Spot speed and Average speed,** ANPR camera captures vehicle image / License plate number, based on trigger from Radar sensor with time stamp and speed

Communication Projects Group, KCC

KELTRON

	information. Accurate time stamp synchronized with GPS or NTP servers required for Average speed enforcement.
All vehicle – ANPR capture Mode	Captures all vehicles passing through the installed location. All vehicle images and numbers are kept in data base for real time alerts / search for crime analysis. Vehicle images should be captured even if the number plate is not automatically detected ,(example: damaged / unreadable license plates or even absence of number plates)
ANPR accuracy	High ANPR accuracy > 90% all around capability for standard or near standard number plates with maximum 1 character error.
Vehicle detection rate (percentage of vehicles captured), classification, Marking	High vehicle detection rate: greater than 95% of all vehicles captured under all conditions, irrespective of number plate quality, in free flow traffic conditions. Also system should be able to classify different types of vehicles.(min 4 types) Violating vehicle should be marked on the image to distinguish between other vehicles.
Vehicle speed accuracy,	Speed measurement accuracy better than 97%, Speed > 240 KMPH. With national or international metrological calibration certificate for speed sensor.
Road side processing hardware and software, storage, network switch	Road side Embedded hardware, network switch etc. Local storage with 256GB or more storage site. All industrial grade hardware should be provided.
SVDS Configuration	2 lanes per road or as required
Power supply	Mains power with lightning protection, isolation transformer & Energy Meter box
Health Monitoring and control. (from control room),	Temperature, battery status, Power supply working status, vibration sensor **(Anti tamper with siren)** status, Camera status. Remote control of system.
Field Enclosure	Pole mounted outdoor type, with rugged, with Rain canopy etc. All connectors, cables etc. Should be of industrial grade and any hardware should be easily replaceable.
Camera mounting	Suitable Cantilever / Gantry should be provided,

7. MOBILE SPEED ENFORCEMENT SYSTEM

Standalone fixed speed enforcement systems, even though reduces accidents at the spot has an inherent disadvantage. Once the position of systems are identified, drivers has tendency to reduce speeds at these spots and again speed away.

Mobile speed enforcement systems are usually vehicle mounted and hence can be positioned randomly at any point on the roadsides. This has inherent advantage of capturing more violations, at same time ensuring overall speed reduction of vehicles since position of the system is unknown to drivers. This results in better accident reduction on the roads.

Combining the state-of-the-art modular components, this portable speed enforcement radar system gives you the opportunity, freedom and flexibility to enforce speed limits automatically at any location for any set speed.

The state of the art Automatic Mobile SVDS, is an ideal solution to this requirement, to fully track and capture images and number plates of speed violating vehicles moving in a stretch.

These Speed measurement devices are to be installed on normal vehicles with slight modification. This allows enforcement authorities to measure speeds of vehicles passing the designated area, with the enforcement vehicle parked alongside the road. The speed enforcement system will be integrated without altering the appearance of the vehicle, thus avoiding recognition.

The unit comprises a 3D Doppler radar capable of tracking two lanes, with an accuracy of 97% up to speeds of >200 kmph. The infrared Flash unit used can capture images at night and the entire unit operates on 12 V batteries. These can also be tripod mounted as required.

Features:

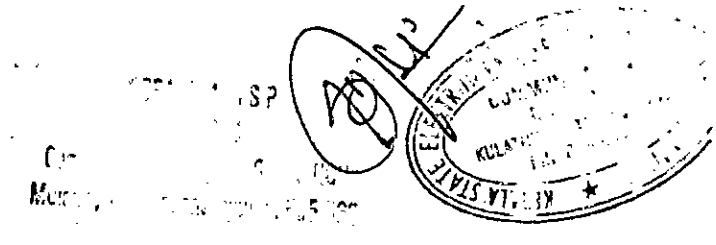
- Speed accuracy >97% using 3D Doppler Radar
- Single radar covers up to 2 lane
- International speed calibration certification
- Min 2 Mega pixel high resolution ANPR camera
- Capable to capture both retro & non-retro reflective license plates.
- Marking on image for identification of violated vehicle

3-D Doppler radar Technology

State-of-the-art technology used – better than 97% accuracy (German/US make Radar used – "Swiss Federal Institute of Metrology METAS certified")

Capable of tracking multiple vehicles simultaneously

Vehicles moving within the radar lobe are tracked and their movements / speed analyzed.



KELTRON

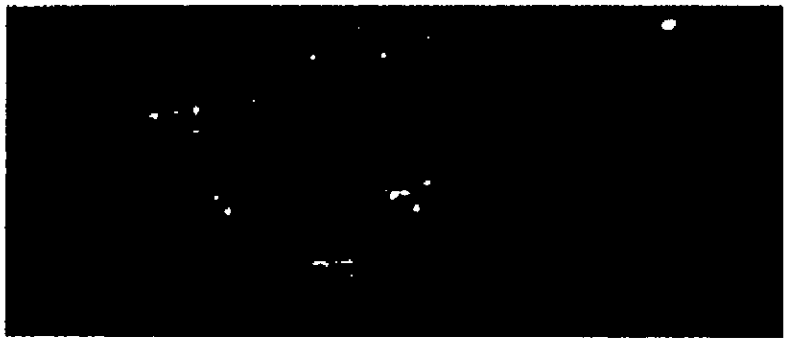
7.1. MOBILE SPEED ENFORCEMENT SYSTEM SPECIFICATION

Sl. No.	Category	Specification
1	Doppler Radar	Advanced Tracking Doppler Radar - , Detects and measures speed of vehicles. > 200 Km/hour. Refresh Time – 50msec, Multi lane operation. Speed Accuracy better than 97%. Heavy vehicle classification (trucks / Bus etc.) should be possible by Radar.
2	Camera for License Plate Capture	Camera minimum 2 Mega pixel total resolution, True day & night camera, min 2 lane coverage
		Color images for day, monochrome images for night
		CMOS Global shutter sensor
		Exposure time maximum 1millisecond
		Interface: 10/100 base T Ethernet
		JPEG compression, Trigger in, Flash strobe out
		Lens: Mega pixel or better, Day & night, IR corrected, lens. Motorized zoom, focus preferred.
3	Infrared Flash for Illumination	Infrared flash for image capture at night
		Synchronized flash with global shutter of camera
		Peak pulse power >400 watts, Average power < 25Watts
		Wavelength: 850 nm, Flash power sufficient to capture vehicle images also at night. 40 deg. angle
		Capability to capture retro reflective and non-reflective number plates.
4	Image brightness, contrast control	The method of gain, exposure control should give optimum image quality under all conditions, 24x7, under all conditions of illumination, independent of road orientation.
9	Vehicle speed accuracy,	Speed measurement accuracy better than 97%, Speed > 200 KMPH. With national or international metrological calibration certificate for speed sensor.
10	Vehicle Marking	The captured vehicle will have marking on image for identification of correct vehicle.

11	Road side processing hardware and software,	Road side Embedded hardware, Local storage with 240 GB or more storage site. Industrial grade Network switch (0-60 deg. C), 10/100 base T.
13	Power supply	Runs on Battery
15	Camera mounting	Vehicle mount

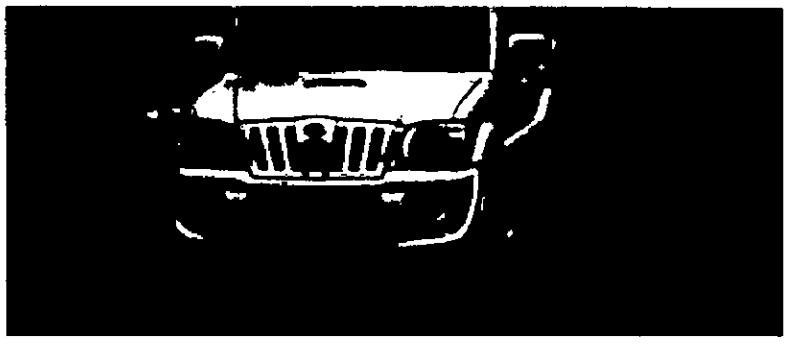
MOBILE SVDS-VIOLATION CHALLAN

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL-01-AC-397	[redacted]	Location-R1	2018_10_17-17:23:22	Over Speed



MOBILE SVDS-VIOLATION CHALLAN

Registered Number	ANPR	Location	Date & Time of Detection	Details
KL-01-AX-2898	[redacted]	Location-R1	2018_10_17-17:30:41	Over Speed



GOP...

Commu...

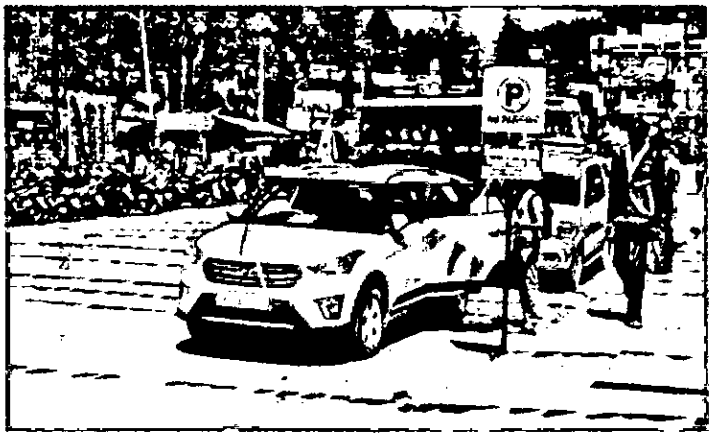
Morvila, T...

KELTRON

8. PARKING VIOLATION DETECTION SYSTEM

Parking Violation Detection System (PVDS) Combination of AI Engine and associated PTZ cameras can be used for parking violation as described below.

- Preset Zones can be marked in these PTZ camera images to identify, non-parking areas in a junction.
- On site vision AI hardware will detect parking violations and these preset View images will be send same to control room. This will result in minimum bandwidth per site.



8.1. TECHNICAL SPECIFICATION OF PVDS

PTZ camera for Parking violation system	Image Sensor	1/1.9" large area progressive scanning CMOS sensor or Better
	Aperture/Focal Length	F1.5~F4.3, f=4.3~129mm / F1.5~F4.8, f=6~180mm
	Optical zoom	30X or Better
	Digital zoom	16X or Better
	Focus	Auto/Manual
	Shutter Speed	Auto, Manual (adjustment range PAL: 1/1 to 1/32000s or Better
	Video compression	H.265, H.264 switchable M-JPEG independent encoding
	Encoding Capability	1080@60fps

	Alarm Port	2 input, 1relay out
	White Balance	Auto/Manual/Outdoor
	WDR	Supports multi-frame composite pattern wide dynamic with a range up to 120dB
	S/N Ratio	>55dB
	Noise Reduction	3D
	IR Lamb	Built-in
	IR Wavelength	850nm
	IR Illumination Distance	100m
	Presets	512 or Better
	Patterns	12 or Better
	Autopans	12 or Better
	Tours	16 Groups (each tour can be associated with 14 acts, including preset 1~32, pattern 1~4, autopan 1~4)
	Timing Tour	Shall be available
	Onvif	ONVIF Profile S
	Web Server	Shall be available
	Network Port	1 RJ45 10M/100M self-adaptive Ethernet port
	Mirroring	Horizontal, vertical
	Manual Horizontal Speed	Pan: 0.1° ~1000°/s
	Preset Speed	400°/s (max.)
	Pan Travel	360° continuous
	Tilt Travel	0° ~ 180° (auto-flip)
	Input Voltage	24VAC/24VDC self-adaptive

	Power Consumption at Idle Condition	<17W (max. Idle Condition)
	Power Consumption	<63W (max., heater on, IR lamp manually adjusted to Maximum)
Visual Processing Unit	Hardware Specification	Same as AI – ANPR Camera VPU
	Detection Model and Software License	Parking Violation detection AI model and software license

9. GENERAL ENFORCEMENT MANAGEMENT SYSTEM

Since all above systems captures vehicle number plate information also, other type of violations can also be detected as below.

Since the Control Room software application is integrated with MVD / VAHAN database, it is possible to verify the following type of violations,

a) **Valid Pollution test report**

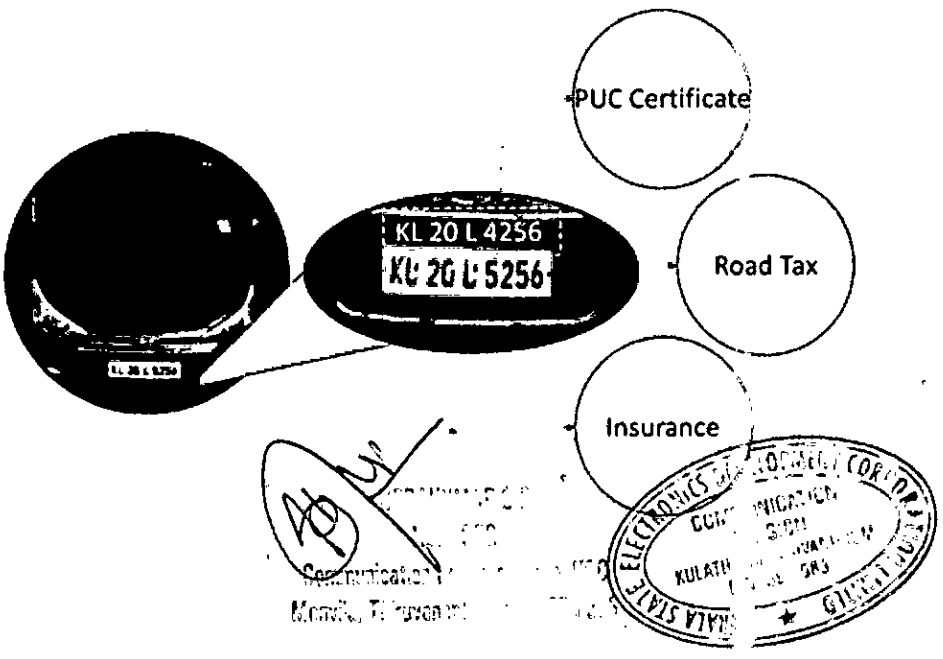
b) **Valid Insurance**

c) **Tax dues**

d) **Valid permit**

e) **Vehicle type, make etc. corresponds with database information.**

This will be additional revenue for the department.



10. CONTROL ROOM MANAGEMENT SOFTWARE

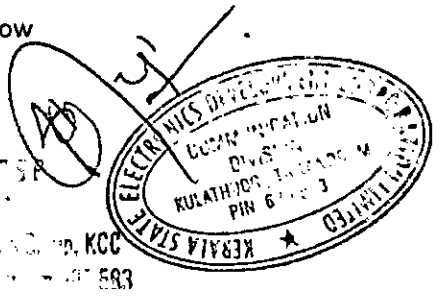
The Central Command and Control Centre shall be the central database of Motor Vehicle Department. Across in the state of Kerala, there will be more than 1000 units of AI-ANPR Camera with Edge AI devices connected with 4G network and solar power ups. The number of filed devices can be increased further. Camera video stream will be analyzed by Edge AI devices in real time. The system will perform the analysis day and night. Identified incidents will send to central database. The entire incident data capturing and enforcement application will be hosted in the Data Centre. Events from each camera location with supporting metadata will come to Central Data Centre with proper indexing. The data shall include the evidence against each incident from each camera location.

BASIC functions - SCCR

- All violation data from field hardware (AI- ANPR cameras, RLVD, SVDS etc.) directly downloaded to SCCR servers & storage.
- Any subsequent automatic processing of data like AI & ANPR will be also carried out in central servers.
- SCCR has back up devices, high speed connectivity and power backup suited for 24x7 operation.
- ALL subsystems are designed with 100% redundancy for fail safe, uninterrupted operation.
- Violation data with images available in SCCR can be downloaded by District Enforcement Control Room for verification, printing & dispatching. Processed challan data is pushed back to SCCR for archive and for transferring to payment management software.

BASIC functions -DECR

- There will be 14 district enforcement offices across Kerala with client terminals & operators.
- Violation data from SCCR can be downloaded to the client terminals using a web interface.
- Operators perform verification of challans and approving of same with supervision of MVD officials.
- Extracting vehicle owner address from MVD data base also happens in DECR.
- Approved challans are printed and dispatched by email and post. SMS notifications are also sent to violators. It is also possible to get required violation reports.
- Once challans are sent for fine collection, same data is automatically passed to payment management module, for fine collection and accounting.
- Overall operational scheme is presented below



KELTRON

GOPAKUMAR S P
Head CCG

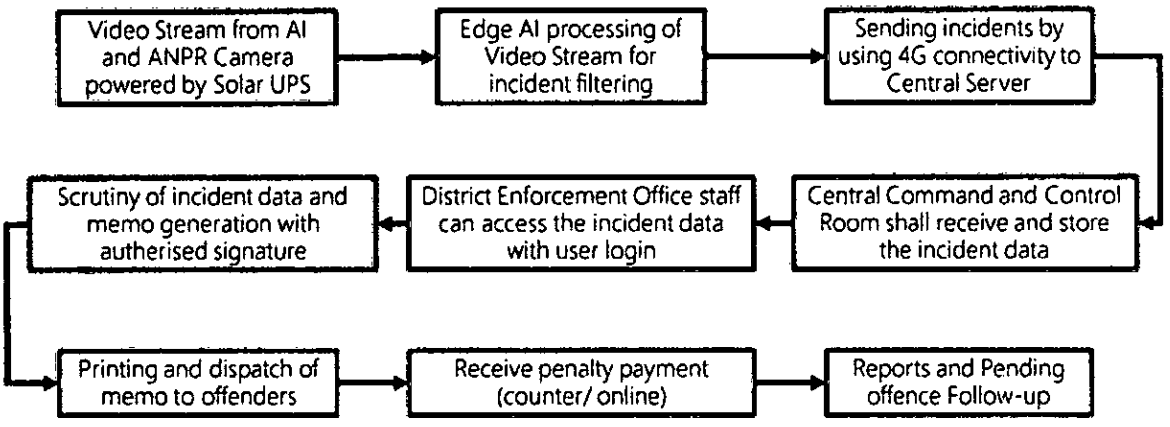
KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED
KULATHOOR

10.1. CHALLAN PROCESSING SOFTWARE

Overall challan processing flow:

Once a traffic violation has occurred, the violation images and data should be sent to control room from the field hardware on the road.

The Violation memo / Challan processing software should be capable of preparing the charge memo / Challan and printing the same for dispatching to the vehicle owner.



The Processing of offence challans could be handled by

1. Operator
2. Approving officer
3. Challan dispatch section.

The process flow could be as given below.

Server periodically downloads offence data from the field units as programmed / scheduled. Vehicle numbers from the number plates are extracted automatically by ANPR software. The Operator views them and does any correction if required.

Corresponding to vehicle registration number, vehicle owner data base is required for offence processing, which could be obtained from the motor vehicle department server, with suitable software interface.

At DECR, once challan is ready for approval, and the challans are moved to the server under proper database category. Challans that cannot be processed, can be moved to a rejected database with reasons for the same.

The Officer authorized to approve the challans (using User Name / Password specific to the officer,) views the challans, approves them, and marks them for fine collection. The data goes to 'approved'

category database. (These challans cannot be further modified by any other Operator / person). The Officer can also reject any challan if required).

The Operator prints and issues the authorized challans and takes hard copies as required. He also issues same to offender by email/ post. All issued challans are then moved to server database under Category 'Issued'.

Once challans are issued, the same data is moved to Payment management software / server for payment collection processing.

Possible Offence Details from the violation processing system

Unique ID of Challan , Date and time, Number plate image, (day / night with flash) , Registration number, address of owner, Court evidence images, Location Name and lane number, MVD rules, Fine to be paid, last date etc. any other details of violation, etc.

Functional requirements: Challan Processing software

Sl. No.	Category	Specification
1	Violation memo Format	There will be violation images with evidence images or sequence of images along with violation report. Minimum one image with Vehicle License plate visible clearly. Also should have information like date, time of offence, location ID, Violation ID, speed, Violation details , Motor vehicle applicable Law/ Act, fine amount, due dates, etc.
2	Violation processing Software	Automatic download of captured violations by server software from multiple locations should be possible. There should be Automatic Number Plate recognition by System Software while downloading
		Configure the capture stations – It should be possible to perform Machine ID Settings / Sensor / Flash / Camera Parameters / Date & Time / Connection Parameters / Access Settings, etc. through system software running on the server
		User should be able to use any standard web-browser to access violations downloaded by the server software
		Options for penalizing and dispatching violations should be available. Also, it should be possible for the Megapixel image to be zoomed/ processed by user for creating Challan
		It should be possible for the Challan format to be modified according to the project/ system requirements

		User Management – It should be possible to create Multiple user ID for using the Challan Processing Software and set the privileges.
		It should be possible to get vehicle/owner information from State Motor Vehicle database and embed it into the Challan
		Challan data information should be customizable. Settings should be provided for changing Fine Amount, Header, Footer, Logo, Challan Printing Office etc., for Administrator privilege
		Various reports like Search Vehicle, User's Report, Violation Analysis Report, Dispatch Report, System Events Report etc., should be available

10.2. PAYMENT MANAGEMENT APPLICATION

Payment management system should be a state / city wide web based system that automates the process of fine collection by the Authorized Department, for offences committed by vehicle owners. Its server computer should be located at the central control room.

Suitable NIC – Vahan solution can be used as available.

Two modes of fine payments are possible,

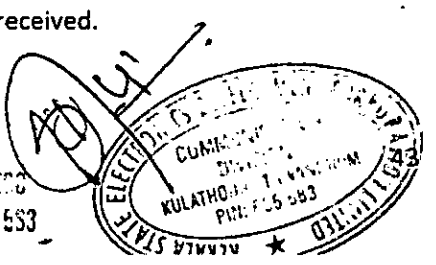
- Fine can be collected by designated cash counters at various police stations / offices across the state / city.
- Fine can also be collected by internet electronic payment using debit / credit card or bank transfer & mobile wallets.

Once a traffic violation has occurred, challan is prepared and sent to the vehicle owner, by the Challan processing software as described in section 6.1. Corresponding "Fine payment to be collected information" is subsequently sent to the payment management server running payment management software.

Cash Payment Collection

Cash payment collection could be as follows:

The offender comes to the cash counter of any of the authorized offices in the state and remits the fine, with help of a web connected PC linked to central Payment management server. An online receipt is also printed by the central server, once cash has been received.



The total collection received as fine every day is remitted in the bank/treasury by the collecting officer. A Challan number received from bank/treasury for each remittance is entered in to the Payment System software for reconciliation.

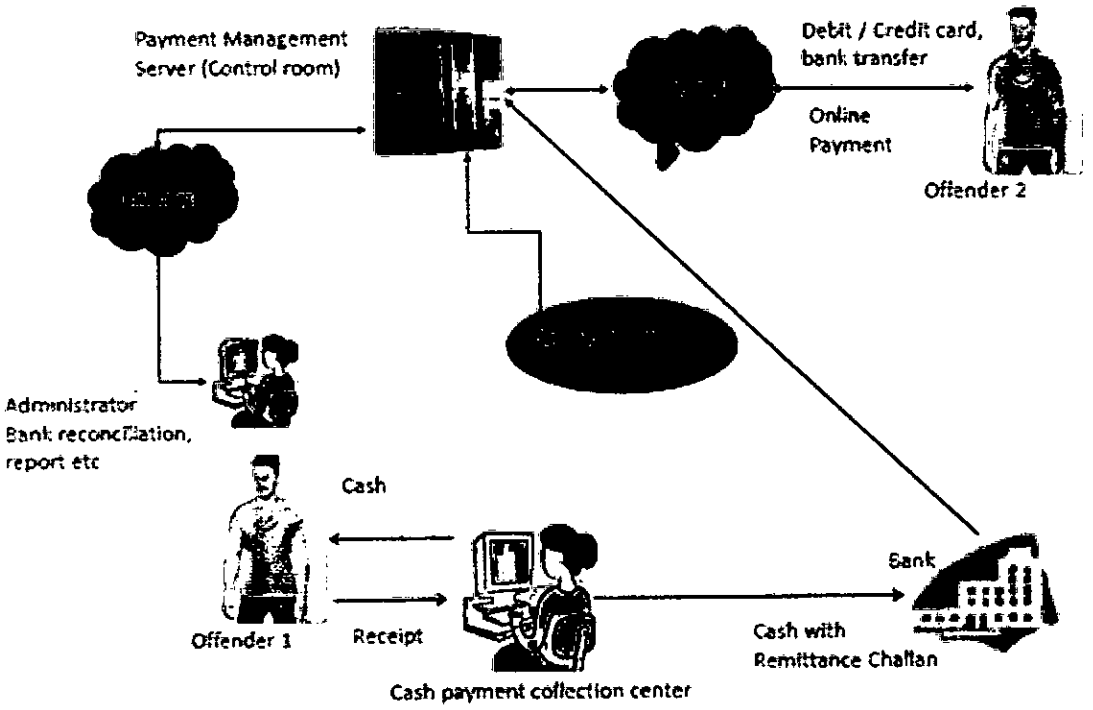
During each fine collection, the details of the driver involved in that particular offence (given by the vehicle owner) are also entered into the Payment System software.

If the offender does not remit the payment in the stipulated time, one or more reminders should be sent to the offender. If he/she still does not pay the fine after a prescribed number of reminders, the case should be recorded as 'Non Remittance'. Such cases are included in the list of offences to be submitted in the court.

Various reports on all the activity like daily collection per office, amount remitted in bank etc. should be available for viewing by the administrator.

Online Payment

There should be a provision for online payment through internet from home using Debit card / credit card payment through a Payment gate way like Bill desk.



In the case of Credit Card or Debit Card payment the Payment Gateway software should act as a middleware connecting the PMWA and the Core Banking software of the bank that issued the offender's Credit or Debit card. In the case of Net Banking also it should act as a middleware between the Core Banking software of the bank in which the offender has account, and PMWA.

Functional requirements of Payment management software (PMS)

Sl. No.	Category	Specification
1	Payment Management Software	Web based software application, should include both Cash Counter and Online Payment modes
2	General Requirement:	Should be a highly secured multi-level Authorization and Authentication system
		Should have Data security through Encryption
		Should use Secured Socket Layer for financial data transfer through internet
3	Cash collection management software:	It should be possible for the Administrator to create username and password users with different privileges, and assign type of privileges as required
		It should be possible for the users to manage the system from their terminals using their username and password, according to the powers assigned to them
		It should be possible for the Administrator to back up the data at a particular interval
		It should be possible for the Administrator to get report on cash collected on daily basis for any cash collection location or for all locations
		Data received from challan processing software should include, (XML File).
		1. Unique Chelan Id.
		2. Vehicle registration number.
		3. Name of the registered owner.

Communication Projects Group KCC
Monvila, Thiruvananthapuram-695 583

KELTRON

		4. Address of the registered owner.
		5. Location of Offense.
		6. Offense Type and its nature.
		7. Date and time of detection.
		8. MVD Rules.
		9. Fine Amount.
		10. Details regarding violation.
		It should be possible for the Administrator to get reports regarding
		treasury remittance
		It should be possible for the Administrator to get the Statutory reports
		which are to be submitted to the government.(Details after further study)
		It should be possible for the Administrator to get MIS Reports for periodic reviews and for statistical purposes. (Details after further study)
		It should be possible for the Administrator to generate reports of total charge memos received, paid / non – paid cases and send reminders for payment non – collected cases.
		This software should also print receipt for each collection with details as below, Unique Chelan Id, Name of the registered user, Fine Amount, Date of Payment, Mode of

Communication Project Group, KSC
Maruda, Thiruvananthapuram 695 583

		Payment, Collecting Officer Id, RT Office Id, Counter No, etc.
		The software should have a facility send reminders (with increased fine) if the payment is not received by the due date
		If the payments are not received after response time mentioned in the final reminder, the offense cases should be forwarded to the court for legal procedures by the authorized person
		On closing the counter, at the end of the day a consolidated list should be generated. The list should contain:
		1. Fine Amount (Daily Summary)
		2. Date and time.
		3. Counter number.
		4. Officer Id.
		5. RT Office Id
		It should be possible for the consolidated list to be verified by a higher officer or the authorized person—from his/her terminal
		The cash (Consolidated amount for a day) collected should be remitted in the bank / treasury and the corresponding "Chelan Id" provided by the treasury should be entered into the PSM by an authorized person thereby closing the account
	Online Payment Mode	A user (offender) should be able to access the page of online payment by simply clicking link in a web Page of

Communication Projects Group, KELTRON
Monvila, Thiruvananthapuram-695 583

KELTRON

		the govt. department or browsing with web address of the online payment system
		After entering the Vehicle Registration No. and then clicking on a submit button the user should get a list of all Charge memos pending for payment
		He/she should be able to verify the details of all charge memos – Date & Location of violation, fine amount, compound fee(if any), Total, etc.
		He / She can make payment of all or select charge memos
		After selecting the Charge memos which he/she wishes to pay for and clicking the submit button he/she should get the details of each Charge memos which includes –
		i. Date& Time,
		ii. Location of violation,
		iii. Fine amount,
		iv. Compound fee(if any),
		v. Total,
		vi. Grand total of all select charge memos etc.
		On clicking the proceed to payment button another screen should display where he/she would be able to make payment using any one of the following mode of online payments
		i. Credit card
		ii. Debit card

GOPAKUMAR S ?
Head CPG
Communication Projects Group, KCC
Monvila, Thiruvananthapuram-695 583

		iii. Net banking
		The online payment should be done through a third party Payment Gateway (PG). The PG would necessary underground work to fulfil the online payment
		PG would return notifications –whether a transaction had been a success or failure. The DB of PMS should store this notification
		Online payment should be done as per the stipulated guidelines of RBI
		Money should reach the bank account of govt. department within T+ 3 days
		In the case of failed transactions money should be returned to the offender (customer) account within 4 days
		The system should use highly secured data transfer through internet- with SSL technology
		Payment could involve the participation of almost all nationalized and scheduled banks (more than 60 nos)
		It should be possible for the Administrator to generate reports of cash collection of Online payment between 2 given dates
		It should be possible for the Administrator to generate reports of refunded cases (failed) and settled cases (succeeded)
5	Bank Reconciliation	At the end of each day the concerned officer in the bank generates a statement of transactions of the account in

Comm... Projects Group, KCC
Monvila, Thiruvananthapuram-695 583

KERALA STATE ELECTRONICS ... KULATHOOR ... PIN. 6..

		which Online payment and Cash Counter payment are remitted
		He/she sends this statement as email attachment to a specified email id of the department
		PMS should periodically check this mail id and on finding the mail it should open it, read contents and store it in its Database
		PMS should make a comparison of records already available in the Database regarding each remittance and should notify discrepancy, if any

11. STATE CENTRAL CONTROL ROOM INFRASTRUCTURE

There will be a state Central Control Room (SCCR). 14 district enforcement offices will connect to central control room server and access offence data for further processing of the offence data, challan generation and despatch. The central Control room server also will receive hit from various RTO and other penalty payment receiving logins also the hit will come from online users who are making penalty payments.

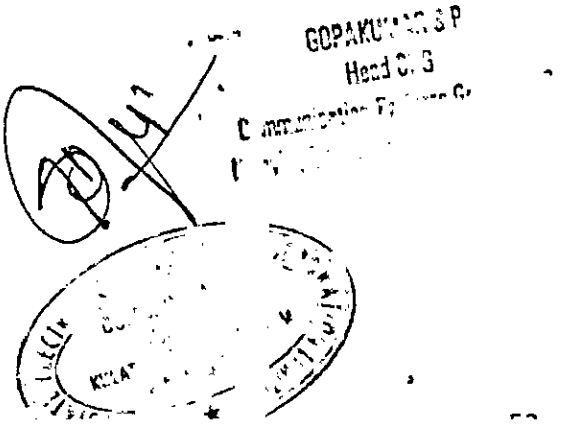
11.1. PROPOSED BOM- SCCR

Sl. No.	Networking	Qty.
1	**Core switch:** 48/52 port 10 G BASE-T/ SFP+/ Converged Modular Switch Full Layer 3 functionality managed switch having minimum 4 QSFP	2
2	Next generation firewall- UTM	2
3	24/28 port GbE Web managed L2 access switch having 4 SFP ports/POE	2
3A	16Gb FC/10GbE 100m SFP+ Transceiver	As required
3B	10G SFP+ Single mode transceivers	As required

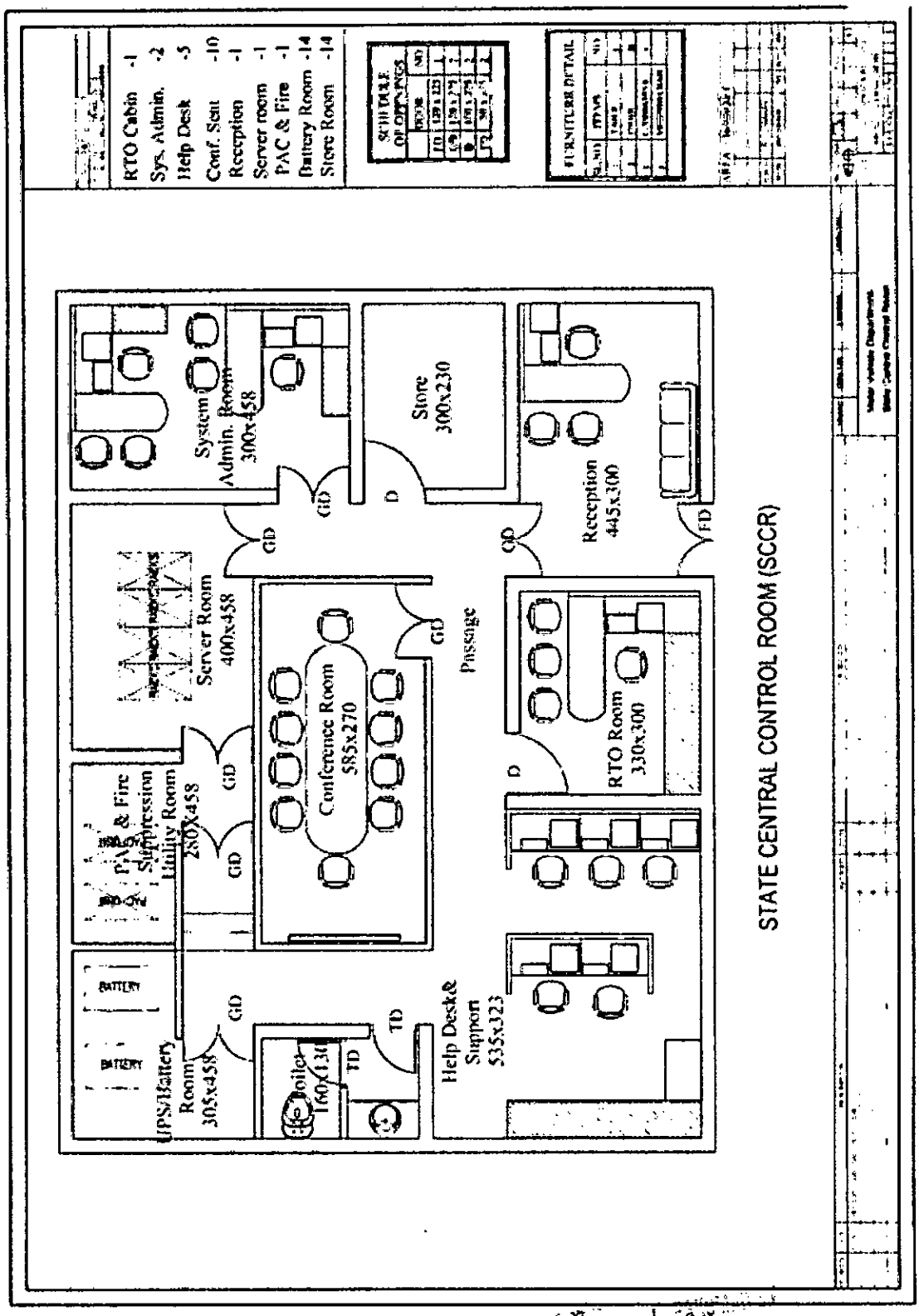
4	**SERVER**	
	RACK SERVER as per specs attached: Intel family: Latest generation, 64 Bit processor, E5-2690 V4 and above with at least 8 cores and above, minimum 2.1 GHz or above , with 11MB Cache or above, Each with at least 64 GB DDR4 expandable up to 1.5 TB, 3 x 1.2TB SAS 12G Enterprise 10K SFF, storage controller, network adapter, redundant power supply as per specs	14
5	**Storage** The storage array should support industry-leading Operating System platforms including: Windows 2012, HPE-UX, Vmware and Linux. The Storage units: 48TB x 3 B usable Capacity with RAID 1+0 / RAID 6	3
6	**TAPE DRIVE , BACKUP SERVER AND SOFTWARE**	1 set
	Tape Drive Library	1 set
7	NAS 48 TB, Giga bit Ethernet & redundant power supply.	1
	DESKTOP COMPUTER	
8	**Client PC:** Desktop Computer, i5, Monitor, HDD, 8GB RAM	**8**
9	**ANPR STATION:** Desktop Computer I7, Monitor HDD, 16GB RAM, with GPU ANPR work station	10
10	Design and documentation, Installation of Server , Storage, Firewall, Router , Desktops, Core switch, Implementation, Data centre build , Civil and electrical work and related documentation, Training , hand-holding and Knowledge transfer, Warranty & Support for 5 years with necessary Manpower support	1
11	**CONTROL ROOM BUILD UP & INTERIOR**	
	Interior Design/ POP, false ceiling , flooring, entire modular furniture, Manager Cabins , officers cabins, Server room integration, Power wiring, UPS wiring, Generator wiring ,Industrial earthling, Networking for entire equipment's, Fire and Smoke detector, IP camera, NVR, Biometric access control and Attendance / Hr management system, Passive cabling ,Backbone connectivity with 10G solution, Rack to Rack connectivity with 10G solution ,MPO cassettes , comfort AC	1

KELTRON

	with automatic change over system,100MBPS Dual leased line connectivity from different ISPs	
12	**PRECISION COOLING SYSTEM AND RACK**	
	COOLING SYSTEM	As per design
13	42/45 U RACK- APW/ RITTAL/VALRACK with high density cable manager, Power distribution Unit and other accessories	As required
	UPS	
14	60 KVA UPS with 30- 60 min back up with MCBs and Accessories –Parallel connection with Hot standby mode.	2
	GENERATOR SET	
15	150 kVA with auto ON and OFF with AMF panel and other Accessories	1
16	**CONTROL ROOM SOFWARE**	
16a.	Violation download server software	As required
16b.	Payment management server software	As required
16c.	ANPR software	As required
16d	Charge memo preparation software(server & Client)	As required
16e	Database suite	As required
16f	HR Management Software	As required



11.2. SCR LAYOUT



KELTRON

11.3. TECHNICAL DETAILS OF MAIN HARDWARE COMPONENTS

(OR **equivalent specification devices will be used)**

MINIMUM TECHNICAL SPECIFICATIONS

	RACK SERVER : 14 nos DELL/HP/CISCO **(Plus additional requirements for connecting existing enforcement systems)**
	Should support Hot Pluggable & Redundant Management
	Modules with onboard KVM functionality.
	Should provide detailed technical information.
	Vendor should be registered in Gartner Leader magic quadrant for Server
	Minimum 1RU rack mounted form factor
Power	Should offer a Dual phase power subsystem
Processor	For each Server:
	a) 2 Socket processor required
	b) Intel family: Latest generation, 64 Bit processor, E5-2690 V4 and above with at least 8 cores and above, minimum 2.1 GHz or above , with 11MB Cache or above
Memory	Each with at least 32 GB DDR4 expandable up to 1.5 TB
Hard disk drive	2 x 1.2TB SAS 12G Enterprise 10K SFF SAS internal Hot swappable HDD in each server. , compatible with OS mentioned under specs, expansion options and matching configuration with infrastructure. Minimum 2 I/O slots, with 2 port 8/16 Gb/s Fiber or equivalent channel with RAID 5 installation.
Storage Controller	Integrated PCIe 3.0 based SAS Raid Controller with RAID 5 Support
Networking Interface	Minimum 2x10G interface with SR 10G transceivers and 2x1/10G interface with 1G transceivers
Interfaces	Minimum of 4 * internal USB 3.0 port
Bus Slots	Minimum of 3Nos of PCIe 3.0 based mezzanine slots. One PCIe x16 based and one PCIe x8 based supporting Ethernet, FC adapters, Infini Band and SAS based adaptors

GOPAKUMAR S P
Head CPD

Graphics Memory capacity	Upto 16 MB
Supply of OS and support	Support of following OS: Win Server 2016 R2 (64 bit) Red Hat Enterprise Linux 6.x (64 bit), Suse Enterprise Linux v11, Oracle *Linux*
Virtualization software and Support	The virtualization software shall be licensed for the entire server.
Warranty	5 years
Provisioning	Essential tools, drivers, agents to setup, deploy and maintain the server should be embedded inside the server. There should be a built -in Update manager that can update firmware of system by connecting online.
Remote Management	System remote management should support browser based graphical remote console along with virtual power button, remote boot using USB/ CD/ DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using media/ image/ folder. It should support server power capping and historical reporting and should have support for multifactor authentication. Server should support automated firmware update. Server should support agent less management using the out-of-band remote management port.
	The server should support Active monitoring of System Health and record changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur. Should support remote console sharing up to 2 or more users simultaneously during pre-OS and OS runtime operation. Full Remote management should be available over the browser. It should support encrypted Microsoft Terminal Services Integration.
Server management	Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD. Should support automatic event handling that allows configuring policies to notify failures via e-mail, or SMS gateway or automatic execution of scripts.
	Should support scheduled execution of OS commands, batch files, scripts, and command line apps on remote nodes
	Should be able to perform comprehensive system data collection and enable users to quickly produce detailed reports for managed devices. Should support the reports to be saved in HTML, CSV or XML format.

KELTRON

	Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/ firmware components. The Server Management Software should be of the same brand as of the server supplier.
Administrator Dashboard	Software should support certain kind of dashboard view to quickly scan the managed resources to assess the overall health of the server. The Dashboard should preferably display a health summary of the following:
	Server Profiles
	Server Hardware
	Enclosures
	Logical Interconnects
	Appliance alerts
	The status of each resource should be indicated.
Firmware management	Software should support firmware management for the managed devices centrally by offering baseline firmware version to keep the systems on supported version of firmware.
	Software should maintain firmware repository to download firmware from website and update on managed nodes when required.

STORAGE- DELL/HP/CISCO/JUNIPER	**Functionality QTY – 48TB - 3 nos**
OPERATING SYSTEM & CLUSTERING SUPPORT	- The storage array should support industry-leading Operating System platforms including: *Windows 2012, HPE-UX, VMware and* Linux. - Offered Storage Shall support all above operating systems in Clustering.
CAPACITY & SCALABILITY	- The Storage Array shall be offered with 48TB x3 with RAID 1+0/ RAID 6 - For narmoure power saving, Storage narmoure shall be supplied with 2.5" Small form factor SFF drives however storage subsystem shall also support LFF drives with the addition of required disk enclosures. - Storage shall be scalable to minimum of 180 number of drives or greater than 160TB using 900GB SFF SAS drives.

GOPAKUMAR S P

FRONT-END PORTS	- Offered Storage system shall be supplied with minimum of Dual 16Gbps FC ports and Dual 10Gbps ISCSI ports per controller. - Offered storage shall have flexibility to use all above ports either as FC or ISCSI by replacing the requisite SFP. Vendors shall provide the additional SFP accordingly. In case, vendor doesn't support this feature, then every controller shall be populated upfront with 4 x 16Gbps FC ports and 4 x 10Gbps ISCSI ports.
BACK-END	- Offered Storage subsystem back-end engine shall be running on latest SAS (6Gbps) loop speed.
ARCHITECTURE	- The storage array should support dual, redundant, hot-pluggable, active-active array controllers for high performance and reliability
NO SINGLE POINT OF FAILURE	- Offered Storage Array shall be configurable in a No Single Point of configuration including Array Controller card, Cache memory, FAN, Power supply etc.
DISK DRIVE SUPPORT	- For SFF drives, Offered Storage Array shall support minimum 300/600/900/1200 GB hot-pluggable Enterprise SFF SAS hard drives, 400/800/1600/3200GB SSD along with SAS MDL 1TB / 2TB drives. 2. For LFF drives, offered Storage Array shall support minimum of 4TB / 6TB / 8TB SAS MDL drives. 3. Offered storage array shall also have support for self-encrypted SAS and SAS MDL drives.
CACHE	- Offered Storage Array shall be given with Minimum of 4GB cache per controller in a single unit after removing the operating system overhead. - Cache shall be backed up in case of power failure for indefinite time either using batteries or capacitors or any other equivalent technology. - Offered Storage shall also have optional support for Flash cache using SSD / Flash drives. Offered storage shall support at-least 2TB Flash Cache. - Offered storage shall have at-least 2GB additional cache per controller for Metadata and System OS. Vendor shall clearly provide the document about the overall cache requirement for Metadata and System OS
RAID SUPPORT	- Offered Storage Subsystem shall support Raid 0, 1 , 1+0 and Raid 6 with Dual Parity Protection
POINT IN TIME AND CLONE COPY	- Offered Storage array shall be configured with array based Snapshot and clone narmouredty and shall be configured for minimum of 64 snapshot licenses.

KELTRON

	- Offered Storage array shall support at-least 512 point in time copies (Snapshots).
REPLICATION	- Offered storage subsystem shall support storage based replication to DR location.
VIRTUALIZATION AND THIN PROVISIONING	- Offered storage shall be offered and configured with virtualization capability so that a given volume can be striped across all spindles of given drive type. - Offered Storage shall be offered and configured with Thin Provisioning capability.
DATA TIERING	- Offered Storage shall also have optional support for Sub-Lun Data tiring in real time fashion across different type of drives within a given pool like SSD, SAS, NL-SAS etc.
GLOBAL AND DEDICATED HOT SPARE	- Offered Storage Array shall support Global hot Spare for offered Disk drives. - At least 2 Global hot spare drive shall be configured for every 30 drives. - Storage subsystem shall also have the flexibility to assign dedicated spare for raid sets.
LOGICAL VOLUME & PERFORMANCE	- Storage Subsystem shall support minimum of 512 Logical Units. Storage Array shall also support creation of more than 100TB volume at controller level. - Offered Storage shall have inbuilt performance management software. Configuration Dashboard shall show overall IOPS and MB/sec performance
LOAD BALANCING & MUTI-PATH	- Multi-path and load balancing software shall be provided, if vendor does not support MPIO narmouredty of Operating system.
Warranty	- 5year Warranty with 24X7,NBD replacement support

TAPE DRIVE & BACKUP SOFTWARE- DELL/HP	**Description of Requirement - QTY – 1 nos**
DRIVE TECHNOLOGY SUPPORTED	- LTO-8 - LTO-7
MAXIMUM NUMBER OF DRIVES	- 2
MAXIMUM CAPACITY	- 720TB (LTO-8, 24 slots)
MAXIMUM DATA TRANSFER	- 2.16 TB/hr (2 LTO-8 drives)
DRIVE INTERFACE	- 8 Gb Native Fibre Channel 6 Gb/sec SAS

FEATURES	- It should have Exceptional storage density: 720 TB, 1.44 PB with (2.5:1 compression) using LTO-8 tape cartridges. - - Should be Easy-to-use web-based remote management - It should have Integrated bar code reader - It should have Tool-free tape drive upgrades - Ut should have Leverage tape drives - It should have Customer upgradeable redundant power supply - It should have Multiple interface choices available (FC or SAS) - It should have Removable magazines with user-configurable mail slots - It should be Easy-to-enable AES 256-bit embedded hardware encryption with compression - It should have Extensive OS and software compatibility testing - It should be Proactively monitor utilization, operational performance, and overall life and health of the drives and media with Tape Assure Advanced.
SUPPORT AND WARRANTY	- Provides end-to-end management of your backup integration process. - Professional backup and recovery planning that aligns with customer's business needs and implementation that reduces project execution time and risk to the storage environment. -
DATA RATE MATCHING	- It should optimizes performance and maximizes overall efficiency, allowing the drive to respond immediately to any data speed changes from the host. - It should minimizes rewinding and repositioning of the tape, significantly reducing physical wear and increasing reliability. - It should minimizes the power requirements for the drive by reducing the number of repositions

KELTRON

RELIABILITY	- With a rating of 2,000,000 robot load/unload cycles, the Tape Libraries should provide necessary high reliability for today's demanding environment. To improve reliability and longevity, Ultrium products feature Data Rate Matching (DRM). This allows the tape drive to dynamically and continuously adjust the speed of the drive, to match the speed of the host or network. This increases performance, reduces mechanical wear on the tape drive and extends tape life.
BACKUP	- It should be Fast and reliable backup and recovery - It should meet organization's data protection expectations by reducing the time it takes to back up and recover critical information, apps and servers - Advanced integration with Vmware and Hyper-V. - It should minimize backup windows, decrease network traffic and reduce disk space required for storing backup data. - It should also reduces the total cost of ownership (TCO) with comprehensive dedupe to cloud that can save storage and infrastructure cost. - It should easily integrated with Vmware, Microsoft and Linux platforms

DESKTOP- DELL/HP/ACER	**Description of Requirement**
PROCESSOR	- Core i5
RAM	- RAM – 8GB, DDR4, 2400MHz
HARD DRIVE	- Min. 320 GB 5400 RPM hard drive
OPERATING SYSTEM	- Windows 8/10
GRAPHICS CARD	- Any with Display Port/HDMI or DVI support

MONITOR	- 23" widescreen LCD with Display Port/HDMI or DVI support
WARRANTY	- 5 year warranty

DESKTOP- DELL/HP/ACER	**ANPR – PC,**
PROCESSOR	- Core i5
RAM	- RAM – 8GB, DDR4, 2400MHz
HARD DRIVE	- Min. 320 GB 5400 RPM hard drive
OPERATING SYSTEM	- Windows 8/10
GRAPHICS CARD	- 1050 GTX or better
WARRANTY	- 5 year warranty

CORE SWITCH – CISCO/HP/DELL	DESCRIPTION OF REQUIREMENT - QTY – 2 NOS
I/O PORTS AND SLOTS	- The above Switch should be scalable to provide 40G SFP+ uplink. - should support combination of converged ports and SFP+/10GBASE-T. - Should have 1 RJ-45 out-of-band management port. - Shall have USB support to copy switch files to/from an USB flash drive
LAYER 3 ROUTING	- Should support both Ipv4 and Ipv6 IP addressing and protocol. - RIPv1 and RIPv2 routing - OSPF (Ipv4) and OSPFv3 (Ipv6) - Border Gateway Protocol (BGP) and Policy-based routing - Shall include Equal-cost Multipath (ECMP) capability - Multicast routing – PIM Sparse and PIM Dense modes - All Features should support day 1 itself -
DUAL FLASH IMAGES	- Provides independent primary and secondary operating system

KELTRON

	files for backup while upgrading - Multiple configuration files to allow multiple configuration files to be stored to a flash image
RESILIENCY	- Hitless patch upgrade. - Ultrafast protocol convergence (<50 ms) with BFD or equivalent.
HIGH-PERFORMANCE SWITCHING	- Switch need to have non-blocking architecture.
REVERSIBLE AIRFLOW	- Enhanced for data center hot-cold aisle deployment with reversible airflow—for either front-to-back or back-to-front airflow
STACKING	- Should support of stacking of switches
JUMBO FRAMES	- Support With frame sizes of up to 10,000 bytes
QUALITY OF SERVICE (QOS)	- Quality of service with advanced traffic management capabilities
PACKET FILTERING AND REMARKING	- Source-port filtering or equivalent feature to allow only specified ports to communicate with each other
TRAFFIC PRIORITIZATION	- Traffic prioritization based on IP address, IP Type of Service (ToS), Layer 3 protocol, TCP/UDP port number, source port, DiffServ etc
SECURITY	- IEEE 802.1x to provide port-based user authentication with multiple 802.1x authentication sessions per port - Media access control (MAC) authentication to provide simple authentication based on a user's MAC address - Web-based authentication to provide a browser-based environment to authenticate clients that do not support the IEEE 802.1X supplicant
DYNAMIC ARP PROTECTION	- Dynamic ARP protection blocking ARP broadcasts from unauthorized hosts
POWER SUPPLIES & FAN SLOT	- Should have redundant power supply and fan slots-populated on day 1
PROCESSOR	- Switch should have packet buffer size of 16 MB
MAC-BASED VLAN	- Should support Mac based VLAN
VLAN SUPPORT	- Provides support for 4,096 VLANs
PERFORMANCE	- Support 280K MAC addresses.

	- Throughput of 1000 Mpps or better. - Routing and Switching capacity of 1400 Gbps or better. - Shall provide Gigabit (1000 Mb) Latency of < 4 µs and 10 Gbps Latency of < 3 µs. -
ENVIRONMENT	- Operating temperature 32°F to 113°F (0°C to 45°C) - Operating relative humidity 10% to 90%, noncondensing -
SAFETY & ELECTRICAL CHARACTERISTICS	- Shall support IEEE 802.3az Energy-efficient Ethernet (EEE) to reduce power consumption - Safety and Emission standards including EN 60950; IEC 60950; VCCI Class A; FCC part 15 Class Should support OpenFlow for investment protection and SDN environments.
RADIUS/TACACS+	- RADIUS/TACACS+ for switch security access administration.
WARRANTY & SOFTWARE UPGRADE	- 5Years warranty with advance replacement and next-business-day delivery - Software upgrades/updates shall be included as part of the warranty.
RACK SIZE	- Switch must have 19" 1U form factor.

10G SFP+ SINGLE MODE TRANSCEIVERS	
TRANSMIT POWER	–8.2 to +0.5
RECEIVE POWER	–14.4 to +0.5
CENTRAL WAVELENGTH (NM)	1310
FIBER MODE	SMF
TRANSMISSION DISTANCE	10 km (6.21 miles)

16Gb FC/10GbE 100m SFP+ Transceiver.	
TRANSMITTER POWER (DBM)^3	Maximum -14 Minimum -7.8
RECEIVER POWER (DBM)^3	Maximum -1 Minimum -11

KELTRON

WAVELENGTH	840 to 860 nm
FIBER MODE	MMF
COMMERCIAL TEMPERATURE RANGE	0 to 70ºC (32 to 158ºF)
STORAGE TEMPERATURE RANGE	-40 to 85ºC (-40 to 185ºF)

ITEM – 24/28 PORT GBE WEB MANAGED L2 ACCESS SWITCH WITH 4 SFP PORTS-CISCO/DELL/HP	**QTY – 2NOS**
MANAGEABILITY	- Switch must have front end console cable.
RACK SIZE	- Switch must have 1U form factor.
PERFORMANCE	- Switch should have packet buffer size of 512 KB. - Support 32K MAC addresses and 4094 VLANs. - Throughput of 40 Mpps or better. - Switching capacity of 55 Gbps or better. - Shall provide Gigabit (100 Mb) Latency of < 5 µs and 1Gbps
AUTHENTICATION	- Should support Authentication Flexibility Like: IEEE 802.1X Web based authentication Mac based authentication
LAYER 3 SERVICES	- Should support Dynamic ARP protection, DHCP protection and Secure FTP.
LAYER 3 ROUTING	- Should support Policy based routing support.
ENVIORNMENT	- Operating temperature 32°F to 104°F (0°C to 40°C) - Operating relative humidity 10% to 90%, noncondensing
WARRANTY	- Lifetime warranty.

24/28 PORT GBE ,L2 POE+ ACCESS SWITCH HAVING 4 SFP PORTS- CISCO/DELL/HP	**QTY – 2NOS**
MANAGEABILITY	- Switch must have front end console cable.
RACK SIZE	- Switch must have 1U form factor.
PERFORMANCE	- Switch should have packet buffer size of 512 KB. - Support 32K MAC addresses and 4094 VLANs. - Throughput of 40 Mpps or better. - Switching capacity of 55 Gbps or better. - Shall provide Gigabit (100 Mb) Latency of < 5 µs and 1Gbps Latency of < 5 µs
AUTHENTICATION	- Should support Authentication Flexibility Like: IEEE 802.1X Web based authentication Mac based authentication
LAYER 3 SERVICES	- Should support Dynamic ARP protection, DHCP protection and Secure FTP.
LAYER 3 ROUTING	- Should support Policy based routing support.
ENVIRONMENT	- Operating temperature 32°F to 104°F (0°C to 40°C) - Operating relative humidity 10% to 90%, noncondensing
WARRANTY	- Lifetime warranty.

NEXT GENERATION UTM- FIREWALL- FORTINET/CHECKPOINT	**2 NOS**
INTERFACES, POWER SUPPLY AND STORAGE	- The appliance shall be supplied with at least 8 nos 10/100/1000 Gigabit ports. - Firewall should have local in-built storage of minimum 200GB SSD. - Firewall should have minimum 8GB memory.
GENERAL FEATURE	- 9 Gbps of firewall throughput

KELTRON

	- 690 Mbps of NGFW1 - 395 Mbps of Threat Prevention - 150,000 connections per second, 64 byte response. - Solution should be an integrated Next Gen Firewall platform which includes firewall, application control, IPS, Anti-Spyware, URL Filtering and Advanced Persistent threat Prevention capabilities in a single appliance, configured in High Availability Mode. - Firewall must have minimum 500 Mbps of real world multiprotocol throughput including firewall, IPS, application visibility, Anti-Bot, Anti-Spyware, URL Filtering and Advanced Persistent threat Prevention features running at the same time. - Network Security Firewall should support "Stateful" policy inspection technology. It should also have application intelligence for commonly used TCP/IP protocols like telnet, ftp etc. - Appliance should have granular visibility with respect to user and group policy. - The proposed solution shall support DNS proxy. - Proposed solution support Multi Link Management and should support minimum two ISPs. - Should provide clear indications that highlight regulations with serious indications of potential breaches with respect to Access Policies, Intrusion, Malwares, BOT, URL, Applications etc. - Required software license for providing above features shall be included in the solution. - It should be able to scan SSL & TLS traffic.
VPN	- 2.16 Gbps of AES-128 VPN throughput - Firewall should support 3DES/AES IPSEC VPN throughput of at least 300 Mbps.

	- It should support the Firewall and IPSEC VPN as integrated security functions.
ADMINISTRATION, AUTHENTICATION & GENERAL CONFIGURATION	- The Firewall should support authentication protocols like Active Directory, LDAP and have support for Firewall passwords token-based products and X.509 digital certificates - and integrate with Windows 2012 Active Directory for user authentication.
IPS	- 1.08 Gbps IPS - The IPS should IPS Engine should support Vulnerability and Exploit signatures, Protocol validation, Anomaly detection, Behaviour-based detection, Multi-element correlation. - IPS should be able to detect and prevent embedded threats with in SSL traffic. - The proposed solution must be able to support DoS protection.
WEB CONTENT AND APPLICATION FILTERING	- Application control must identify applications, its different categories, URLs, HTTPS inspection, Malware content sites, IP and/or user-based policies. - Solution must have a URL categorization and URLs filtering database. The solution should have the capabilities to block, permit, allow & log, protocols other than HTTP, HTTPs, FTP, SFTP. - Should scan outbound URL requests and ensure users do not visit websites that are known to distribute malware.
SECURITY FEATURE	- The solution should also have the scalability to scan & secure SSL encrypted traffic passing through gateway. Should perform inspection to detect & block malicious content downloaded through SSL. - Granularly define exceptions for SSL inspection to protect user privacy and comply with corporate policy. - Solution should have capability to integrate

	with APT system to detect & Prevent bot outbreaks and APT attacks. - Solution should be able to detect & Prevent the Bot infected machine. - Solution should be able to detect & Prevent Unique communication patterns used by BOTs i.e. Information about Botnet family. - Solution should be able to detect & Prevent attack types i.e., such as spam sending click fraud or self-distribution, that are associated with Bots - The solution should eliminate threats and remove exploitable content, including active content and embedded objects. - The solution should provide the protection from zero-day attacks, known & un-known attacks. - The solution should support detection & prevention of Cryptors & ransom ware and variants (Crypt locker , Crypto Wall etc) through use of static and/or dynamic analysis. - The solution should be able to scan & find for unknown threats in executable, archive files, documents, JAVA and flash like: 7z ,cab,csv,doc,pdf, ppt, pptx, rar, rtf, scr, swf, tar, docx, , jar, xls, , xlsx, zip etc.
MANAGEMENT, LOGGING AND REPORTING	- Upon malicious files detection, a detailed report should be generated for each one of the malicious files. - Firewall central management reporting, logging and narmour solution must be in dedicated appliance foot print. - Centralized Firewall management should be able to manage all functions specified in Firewall, NIPS, AntiBot specification from central console. - Firewall should be able to provide central logging, Analysis and granular reporting. - Management (Management, reporting, analysis) System Support for role-based administration of firewall. - Solution should support analysis of traffic pattern using graphs and charts

UPS 60KVA- Hykon/APC/GE/VERTIV	**QTY – 2 nos**
CAPACITY	60kVA
QTY	2 nos
TYPE	True Online Double Conversion, pure sine wave, Microprocessor based DSP controlled, UPS System connected in Parallel Redundant Load Sharing Configuration with Echo mode, SNMP/ Mod Bus protocol supported.
PARALLELING	Each UPS unit should have inbuilt Parallel Kit. UPS should be capable of connected in Stand alone Configuration, Cold start future.
GALVANIC ISOLATION	Inbuilt Isolation Transformer
OVERALL EFFICIENCY	> 95%
INPUT VOLTAGE	380V/400V/415V VAC (3 phase+N+E)
INPUT VOLTAGE RANGE	208-478VAC
RECTIFIER & INVERTER	IGBT Rectifier & IGBT Inverter
INPUT CURRENT HARMONICS (THDI)	< 2% at full load (without use of any additional filters)
INPUT POWER FACTOR	0.99 or better
INPUT FREQUENCY	40 Hz to 70 Hz
OUTPUT VOLTAGE and Frequency.	400V, 3phase 50Hz. Settable for 380V / 400 V / 415 V AC (3Ph+N+PE), 50Hz+/-0.1Hz
OUTPUT VOLTAGE REGULATION	+/- 1% for 100% unbalanced loads
RATED POWER FACTOR	0.9 or better
RECOVERY TIME	</= 20ms (within one cycle) for 100% load change
WAVE FORM	Pure sine wave

OUTPUT DISTORTION	</= 2% for linear load, < 5% for non linear load
OVERLOAD CAPACITY	115% for 10 minutes, 130% for 1 minute
BYPASS	Automatic & Manual Bypass switch facility to be provided
SWITCHGEARS	Inbuilt Input, Output & Battery Isolators
COMMUNICATION SOFTWARE & CONNECTIVITY	SNMP Network monitoring
BATTERY TYPE	Sealed Maintenance Free for 30 Minutes for each UPS
BATTERY MAKE	Amarraja/Panasonic /Exide
BATTERY VAH REQUIRED	Minimum 54000 per UPS
STANDARDS	ISO 9001:2015, ISO 14001:2015, CE,ROHS, OHSAS OR Equivalent certification

GENERATOR-	**Description of Requirement - QTY – 1 no**
GENERATOR KVA RATING	- 150/160KVA with AMF control Panel comprising
ENGINE	- diesel engine, water cooled, Stamford or superior make Alternator and potential free contacts and digital out facility and should have all provision for future DG automation without adding any components in the DG set and complete with control Panel, fuel tank of suitable capacity and battery with leads and anti-vibration pads and residential type silencer. The DG set shall conform to detailed specifications attached with this schedule.

OPERATING CONDITIONS	- The engine alternator shall be capable of working at any ambient temperature between 0 Deg C to 50 Deg C with relative humidity upto 95% condition. - The working KVA rating at site condition after accounting for de-rating shall be obtained at 0.8power factor. - When there is an electrical main supply failure it will be required to work continuously for a period which may even exceed 24hour at a time. - The set shall be capable of taking 10% overload for a period of one hour during every 12hours.
OUTPUT VOLTAGE FREQUENCY AND WAVE FORM	- Nominal output voltage shall be 415Volt with + 1% manual adjustment at all conditions of the load. Frequency shall be 50Hz + 3% Hz in output waveform.
SILENCER	- Residential silencer with approved make/supplied by the engine manufacturer shall be provided. Silencer shall be supported on both ends and located as per engine manufacturer recommendations. Silencer shall be provided outside the canopy. The exhaust system of the generator must not be positioned to make any mark on the fence, containers or tower.
SPEED AND GOVERNING	- The engine shall operate on 1500 RPM, and be able to meet site conditions with regard to Voltage, Speed, Frequency and regulation equipped with governor of required accuracy.
BATTERY CHARGING	- The battery charging shall be done through alternator and solid state battery charger.

ACCESSORIES	- Heavy duties fly wheel. - Coupling with guard. - Fuel Pump suitable for lifting the fuel from fuel tank provided below E/Asets. - Governor. - Pre filters, Fuel Filter - Pre-filter in lift pump/button filter. - Lubricating oil filter. - Residential exhaust silencer. - Electrical Starter motor - Blower fan. - Charging Alternator. - Digital electronic Governor Stainless steel exhaust flexible coupling - Radiator - Coolant inhibitor - Air Cleaner - All accessories included in the standard set like safeties, solenoid valve etc. shall be got from manufactures as a part of equipment.
INTEGRATED CONTROL SYSTEM	- Microprocessor based generator set monitoring , protection and electronic governing system .The monitoring system should be designed for the genset environment, provides genset protection, engine control and displays genset parameters (both engine & alternator), eliminating use of multiple conventional controls & metering.
AC INSTRUMENTS	- 3-phase AC Amps - 3-phase AC volts - KW - VA - Power factor - Frequency
MEASUREMENTS/INSTRUMENTATION	- Lube oil pressure - Coolant temperature - Engine speed - Hours run - Battery voltage

ENGINE PROTECTION	- High coolant temperature (Audio-visual alarm & trip) - Low lube oil pressure (Audio-visual alarm & trip) - Fail to crank (trip) - Fail to start (trip) - Over speed (trip) - Low /High battery voltage (Audio-visual alarm) - Low coolant level shutdown(trip) - Engine shuts down due Charge alternator failure (Audio-visual alarm) - Engine shuts down due to lack of fuel (Audio-visual alarm)
ALTERNATOR	- The alternator shall be shall be self exited, self regulated copper wound and totally enclosed for screen protected class-H insulation, designed and constructed to with stand tropical condition. Voltage regulation shall be + 1%. With digital automatic voltage regulator - The winding shall be star connected and neutral shall be brought out to the terminal box for earth with two independent earths. The terminal of the alternator output shall be enclosed in the terminal box. The AC/ DC wiring shall be separated from each other.

11.4. CIVIL WORKS

The proposed data centre shall have non-permissible airtight, thermally insulated and fire rated Partition Walls. Both the real ceiling and real flooring to be leak proof, air tight and thermally insulated. For server room, rigid floor-to-ceiling partition walls having 2-hour fireproof rating are to be considered.

Opening in the walls/partitions at required place shall be provided for Electrical and LAN cabling entry to the server room and then sealed.

Partition with Fire , Moisture Resistant with thermal properties preferably block size of 600 x200 x 200 with cement mortar 1:4 plastering including racking joints curing scaffolding etc.

Partition walls of the Power room shall be built with burnt country bricks and should be plastered wall with super plaster / cement mortar12mm thick inside and outside.

False ceiling:

The false ceiling shall be of Aerolite lightweight Calcium Silicate ceilings/Mineral fibreboard modular and grid type (600x600 tiles type), including covering the beams with fire rated board. All the ceiling tiles with grid shall be supported on suitable powder coated galvanized steel/hot dipped galvanized steel white shade suspension as per manufacturer specification. The ceiling shall be provisioned with cut-outs for lighting, Fire detectors, nozzles etc.

Horizontal level False Ceiling grid using hot dipped galvanized steel

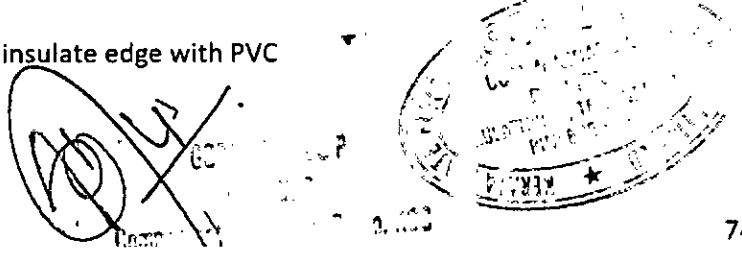
Flooring:

The Server room and Power room should have Epoxy access flooring with antistatic properties.

Access floor systems shall conform to EN 12825 standard. The entire access floor system shall be made from Calcium sulphate, Cement and steel, solid fire resistant material to provide adequate fire properties, acoustic barrier and air leakage resistance. The system shall be able to with stand a UDL of 1631kg/Sq.m. point load of 305 kg .The pedestal shall withstand Axial load of 2200kg size. The Ratio of UDL concentrated load should be minimum 5 times.

For server room the under-structure system shall be rigid-grid with 24" (600 mm) Clearance between bottom of tile and top of treated real floor. Assembly shall provide a means of levelling and locking at a selected height. Assembly shall provide 30mm adjustment.

For non-full tiles (cut out tiles): treat / insulate edge with PVC



The access floor panel shall be laminated with finishes as required and same shall be factory laminated on semiautomatic lamination lines leaving no chance for human error. The finish shall be either High Pressure Laminate/ Antistatic Vinyl flooring of required shade protected on its edges with PVC beading with mitred corners which shall factory fit or integral trim design.

Fire Suppression System

To minimize the risk of damage caused by Fire, an environment Friendly Clean Agent Based Automatic Fire Suppression System has been proposed for the Server Area, Workstation area, UPS Room, Battery Room.

VESDA (Very Early Smoke Detection System)

Early detection of smoke would be the key factor in preventing the fire from developing. The earlier a fire is detected and extinguished, the less damage will be caused. It is an aspirating smoke detection system that provides the earliest possible warning to incipient fires.

Door Access control System

- 300 fingerprints
- 30,000Event buffers
- 1:1 Authentication & 1:N Identification
- Stand-alone/Network communication via RS232/RS485 and TCP/IP
- FX50u Standalone Access
- control system 1:1 Authentication & 1:N Identification
- Standalone/Network communication via RS232/RS485 and TCP/IP
- Up to 3fingerprint templates per registration
- Up to 3 fingerprint templates per registration
- FAR (False Acceptance Rate) with less than 0.0001%
- FRR (False Rejection Rate) with less than 0.1%
- Language Support: English,
- Voltage:3A/12V DC
- Standard Current:50mA
- Operating Current: 400mA

12. DISTRICT ENFORCEMENT CONTROL ROOM (DECR)

Sl. No.	Districts	MVI& AMVI (Laptop)	Staff (Desktop)	Power charge	FMS	RTO (Laptop)	Firewall	Heavy duty printer	6KVAOnline UPS with 3 hr backup	48 port Gigabit switch	Networking/ Electrification	Control room build-up	Estimated Built-up Maximum area (Sq .Ft.)
1	Trivandrum	32	11	Included	Included	1	1	1	1	1	1	1	600-1000
2	Kollam	28	11	Not Included	Included	1	1	1	1	1	1	1	600-1000
3	Pathanamthitta	20	7	Not Included	Included	1	1	1	1	1	1	1	550-650
4	Alappuzha	24	7	Included	Included	1	1	1	1	1	1	1	550-650
5	Kottayam	24	8	Included	Included	1	1	1	1	1	1	1	550-850
6	Idukki	24	7	Not Included	Included	1	1	1	1	1	1	1	550-650
7	Ernakulam	32	11	Not Included	Not Included	1	1	1	1	1			
8	Thrissur	28	11	Not Included	Included	1	1	1	1	1	1	1	600-1000
9	Palakkad	24	8	Not Included	Included	1	1	1	1	1	1	1	550-850
10	Mala ppuram	24	11	Not Included	Included	1	1	1	1	1	1	1	600-1000
11	Kozhikode	32	11	Not Included	Not Included	1	1	1	1	1			
12	Wayanad	12	6	Included	Included	1	1	1	1	1	1	1	500-600
13	Kannur	24	8	Not Included	Included	1	1	1	1	1	1	1	550-850
14	Kasaragod	12	7	Not Included	Included	1	1	1	1	1	1	1	550-650
	Total	340	124	4	12	14	14	14	14	14	12	12	

12.1. DECR- SUB SYSTEM SPECIFICATIONS

Firewall

IPS Throughput (Mbps)	325
Firewall, 1518 byte UDP packets (Mbps)	2000
VPN, AES-128 Throughput (Mbps)	275
IPsec VPN Tunnels	980
IPS (Mbps)	50
Antivirus (Mbps)	50
Connections per Second	20000
Concurrent Connections	500,000
Firewall Throughput (Mbps)	900
Threat Prevention (Mbps)	100
Security	Firewall, VPN, User Awareness, QoS, Application Control, URL Filtering, IPS, Anti-Bot, Antivirus, Anti-Spam and SandBlast Threat Emulation (sandboxing)
Unicast, Multicast Routing	OSPFv2, BGPv4 and 4++, RIP, PIM (SM, DM, SSM), IGMP
Mobile Access User License	100 in default package, 150 maximum
WAN	1x 10/100/1000Base-T RJ-45 port
DMZ	1x 10/100/1000Base-T RJ-45 port
LAN Switch	6x 10/100/1000Base-T RJ-45 ports

KELTRON

Wi-Fi (optional)	802.11 b/g/n/ac MIMO 3x3
Radio Band (association rate)	1 radio band: 2.4Ghz (max 450 Mbps) or 5Ghz (max 1300 Mbps)
Console Port	1x RJ-45, 1x Mini USB
USB Port	1x USB 3.0
3G/4G Modem Support	Yes
DSL (optional)	VDSL: G.993.1 (VDSL), G.993.2 (VDSL2), G.993.5 (VDSL2 Vectoring), G.998.4 (G.INP) VDSL2 profiles: 8a, 8b, 8c, 8d, 12a, 12b, and 17a ADSL: Annex A (POTS), Annex B (ISDN), G.992.1 (ADSL), G.992.3 (ADSL2), G.992.5 (ADSL2+), Annex M (ADSL2/2+) ,Annex L Reach-extended (ADSL2) Dying Gasp, DSL Forum TR-067, TR-100, TR-114 Conformity
Enclosure	Desktop
Operating / Storage	0ºC ~ 40ºC / -45ºC ~ 60ºC (5~95%, non-condensing)
AC Input	110 – 240V, 50 – 60 Hz
Power Supply Rating	12V/3.33A 40W desktop adaptor
Power Consumption (Max)	25W (non-Wi-Fi), 30W (Wi-Fi)
Safety/Emissions/Environment	UL/c-UL, IEC 60950 CB / EMC: EN55022 Class B, FCC: Part 15 Class B / RoHS, REACH, WEEE

Heavy Duty Printer

Print speed black	Normal: Up to 23 ppm
Duty cycle (monthly, A4)	Up to 50,000 pages per month
Print technology	Laser
Print quality	Optical: 600 x 600 dpi

GOPAKUMAR S P

DEVELOPMENT CORPO... COMMUNICATION DIVISION TRIVANDRUM

Display	4-Line LCD
Processor speed	600 MHz
Connectivity	High speed USB 2.0, Built-in Ethernet 10/100 Base TX networking
Memory	128 MB
Paper handling input	100-sheet multi-purpose tray 1, 250-sheet input tray 2, automatic two-sided printing
Paper handling output	Up to 250 Sheets
Maximum output capacity	Up to 250 Sheets
Duplex printing	Plain, Mid-weight, Light, LaserJet, Colored, Pre-printed, Recycled, Intermediate, Letterhead, Pre-punched, A4, A5, B5(JIS), Letter, Executive, Statement, A3, B4(JIS), B5(JIS), 8K, 16K, 11x17, Legal, Oficio 216x340, Oficio 8.5 x 13 16 x 29 lb, (60 x 110 g)
Power	AC 220 – 240V: 50/60Hz, Normal Operation 550W, Ready 80W, Max/Peak 1.1kWh, Sleep/Power Off 1W/0.2W, TEC 0.998kwh
Power consumption	TEC: 0.998 kWh
Operating temperature range	10 to 30°C

6 KVA Online UPS

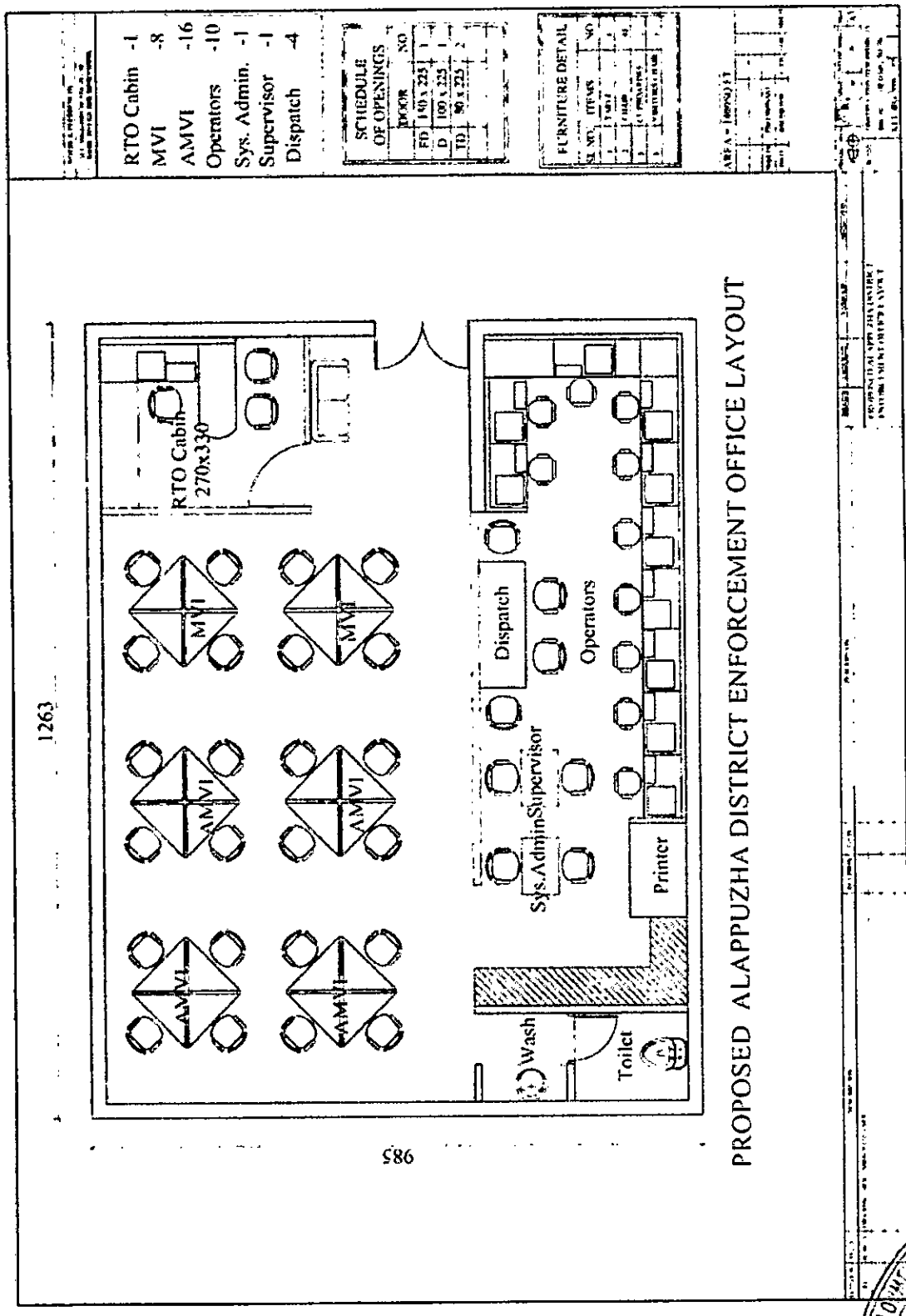
Power	6KVA
Input	Single phase & earth ground
Voltage range	184 – 288VAC @ 100% load
Frequency	40 – 70 Hz

KELTRON

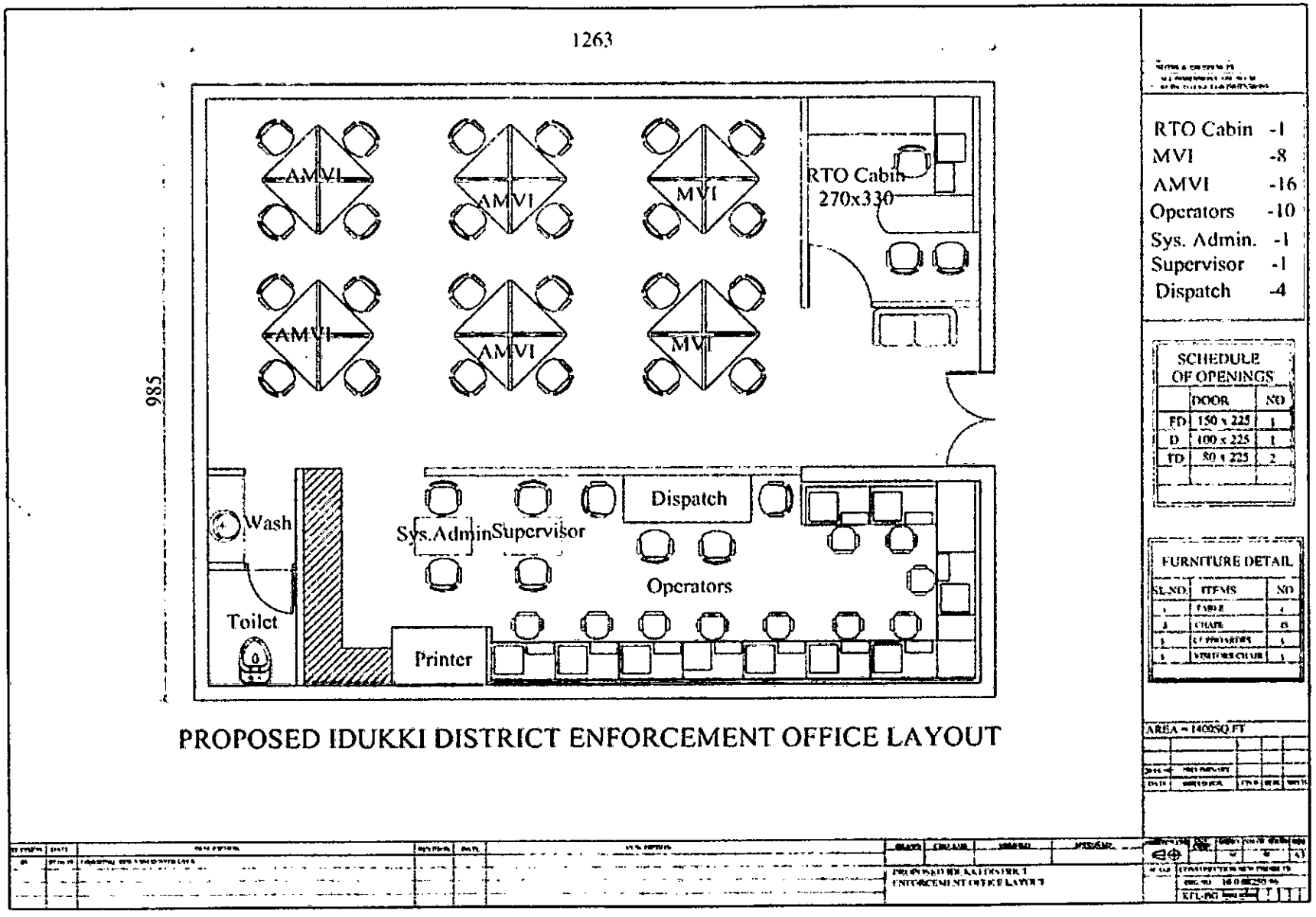
Output system	Single phase & earth ground
Output voltage	208V/220V/230V/240V settable
Output waveform	Pure sine wave
Output frequency	50Hz +/- 0.02% (free running)
Voltage regulation	+/- 1%
Battery Charging current	1-5A adjustable
Charger type	Constant voltage constant current
Overall efficiency @ full load	94%
Inverter efficiency @ full load	93%
Manual bypass	Optional
Protection	Short circuit, input over and under voltage, overcharging of battery, output over and under voltage
Audible alarm	Battery low, mains failure, over temperature, inverter overload, fan failure
Enclosure grade of protection	IP 20
Operating temperature	0 – 40 deg

GOPAKUMAR

12.2. DECR- LAYOUT



GOPAKUMAR S P

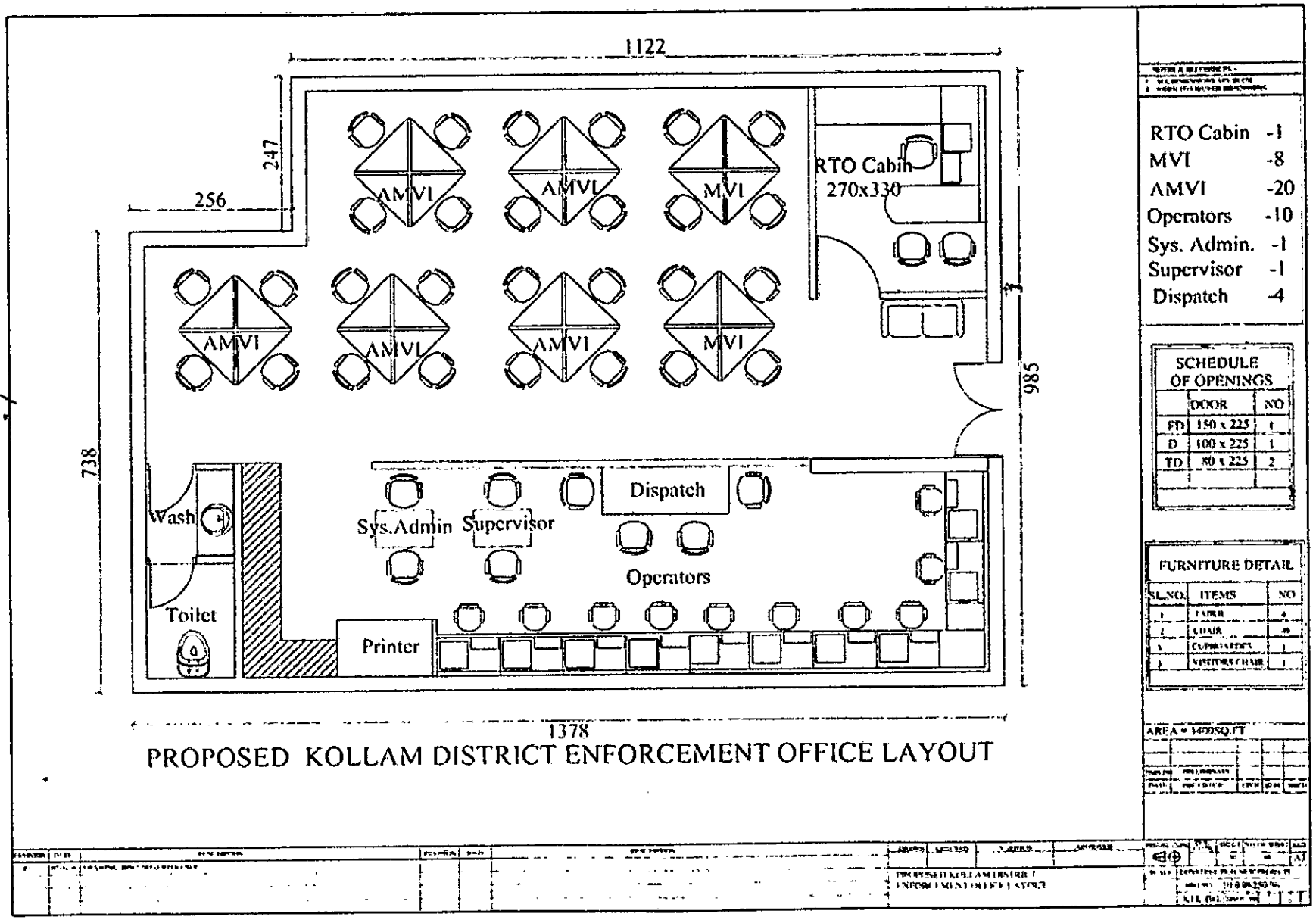


PROPOSED IDUKKI DISTRICT ENFORCEMENT OFFICE LAYOUT

GOPAKUMAR S P

STATE ELECTRONICS DEVELOPMENT CORP.

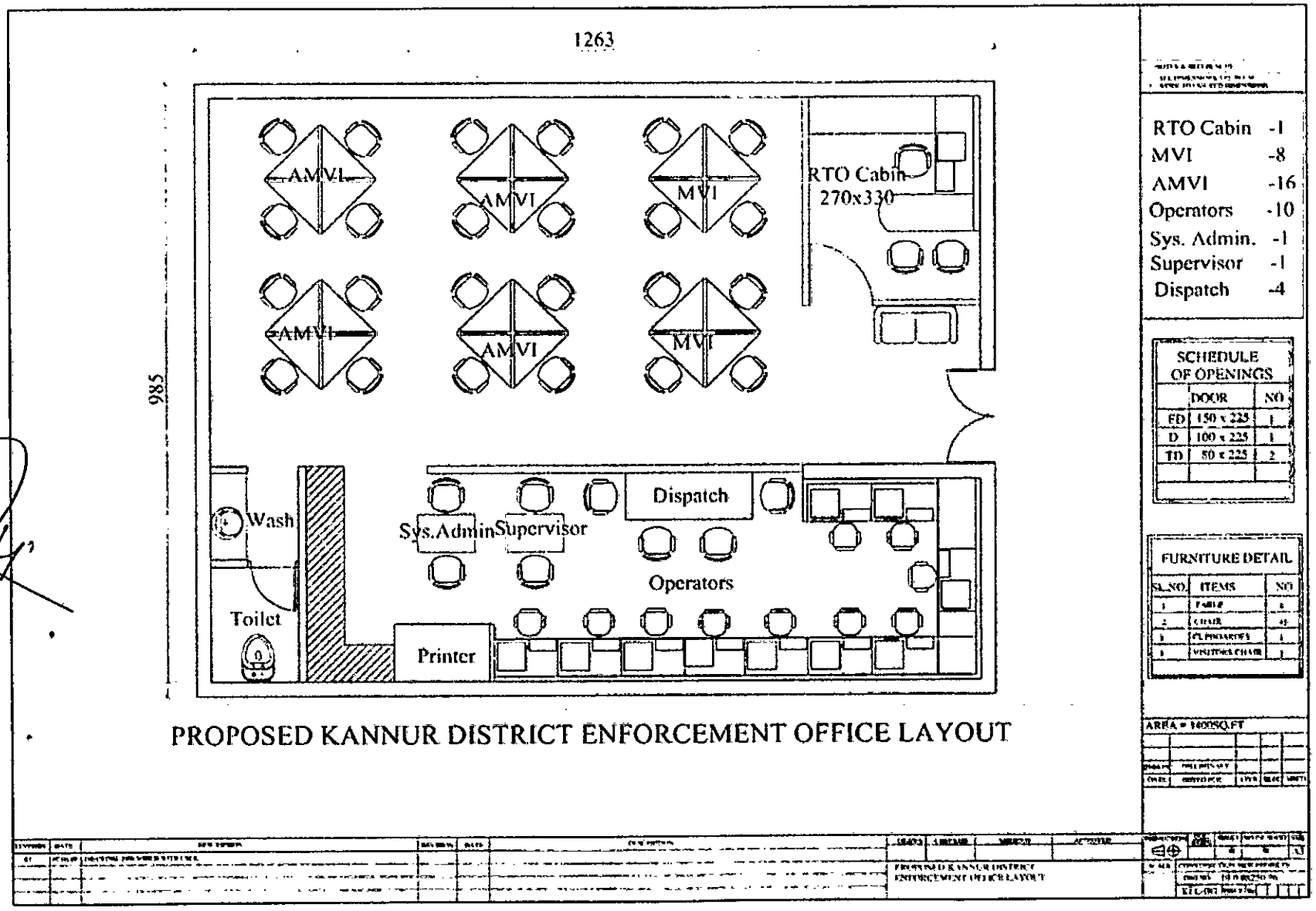
KELTRON



GOPAKUMAR S P
Head CPS

KELTRON

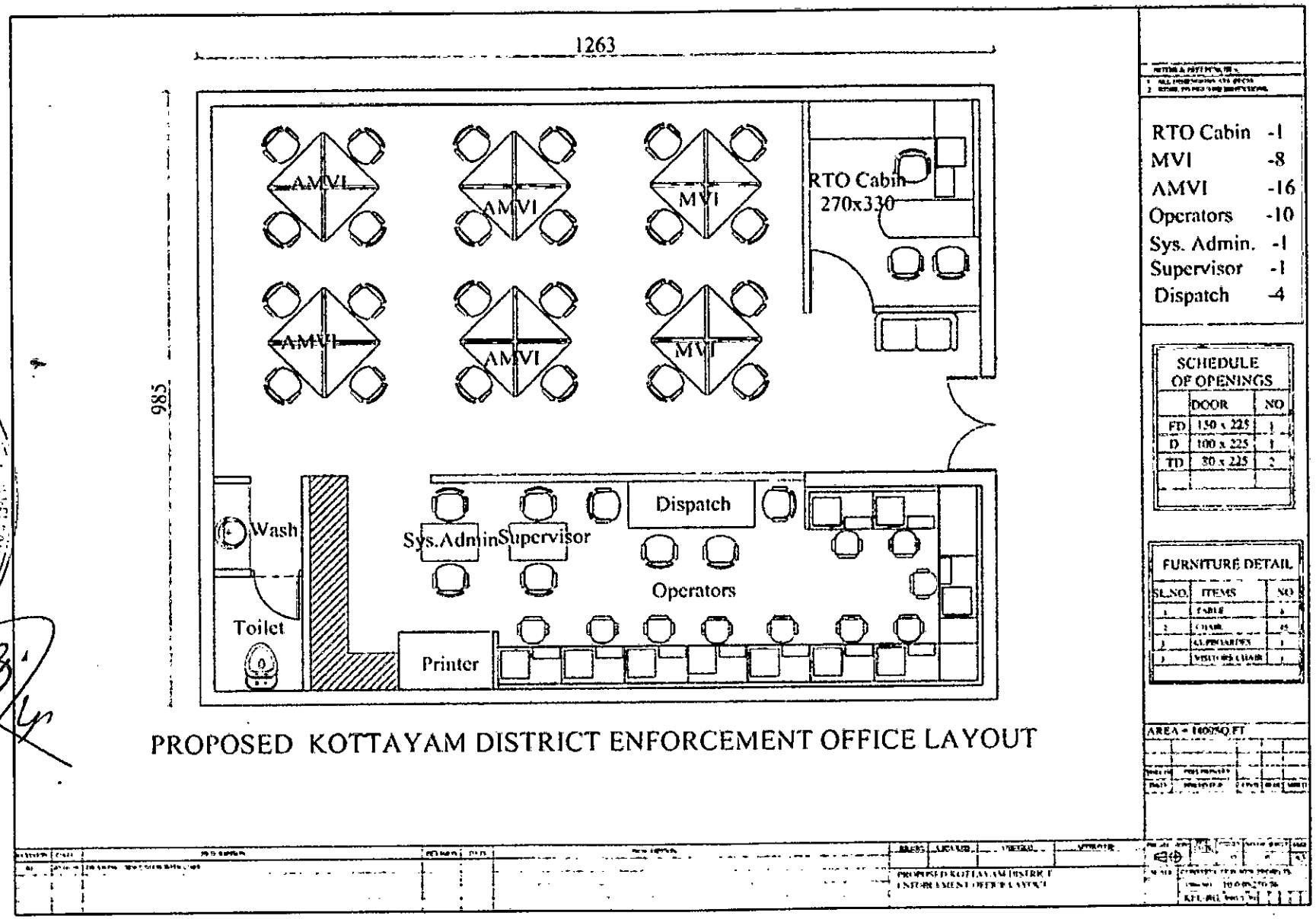
83



GOPAKUMAR G P
Head CC 3
Communication Projects Group, KGC

STATE ELECTRONICS DEVELOPMENT CORPORATION
COMMUNICATION DIVISION

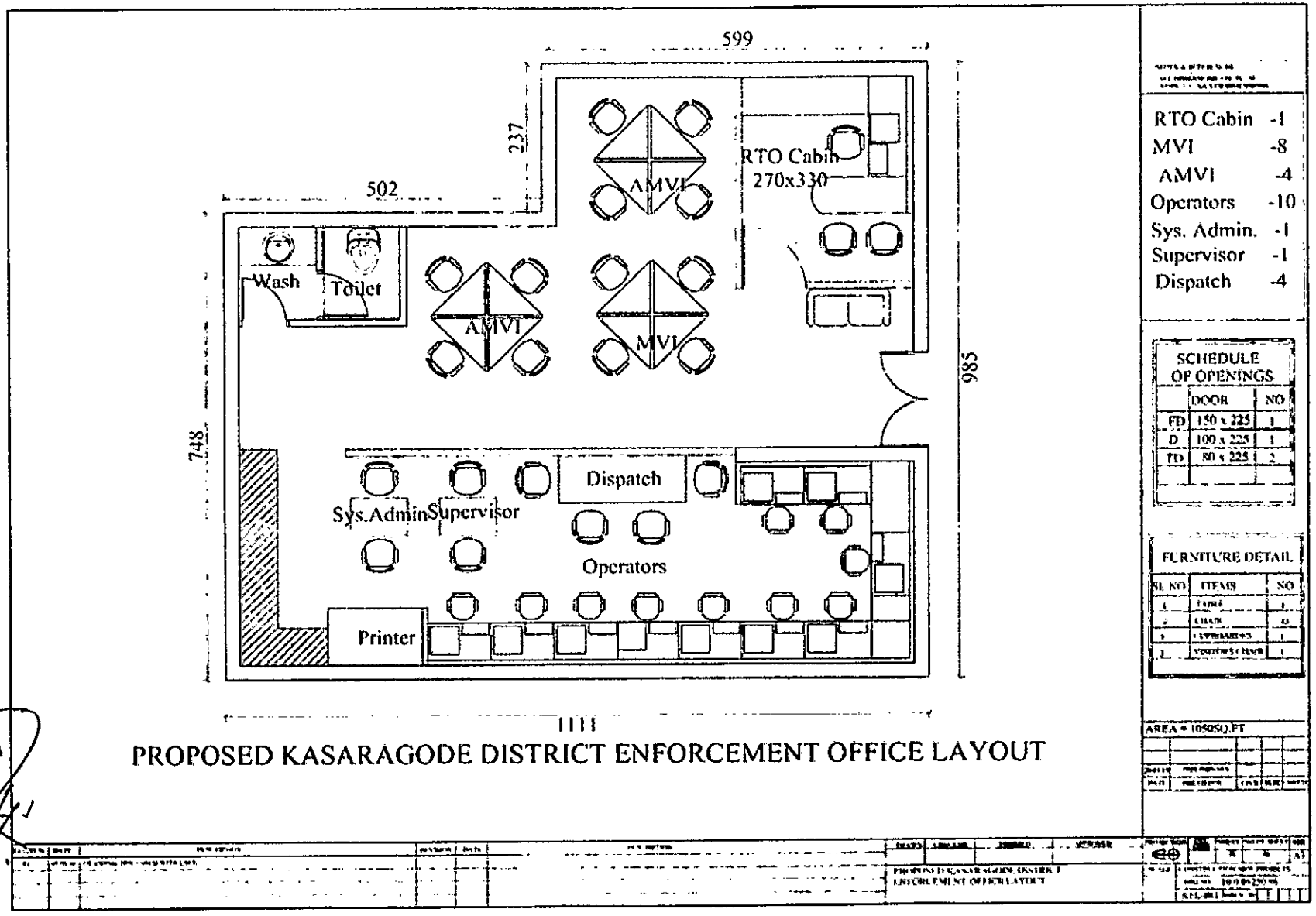
KELTRON



PROPOSED KOTTAYAM DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON

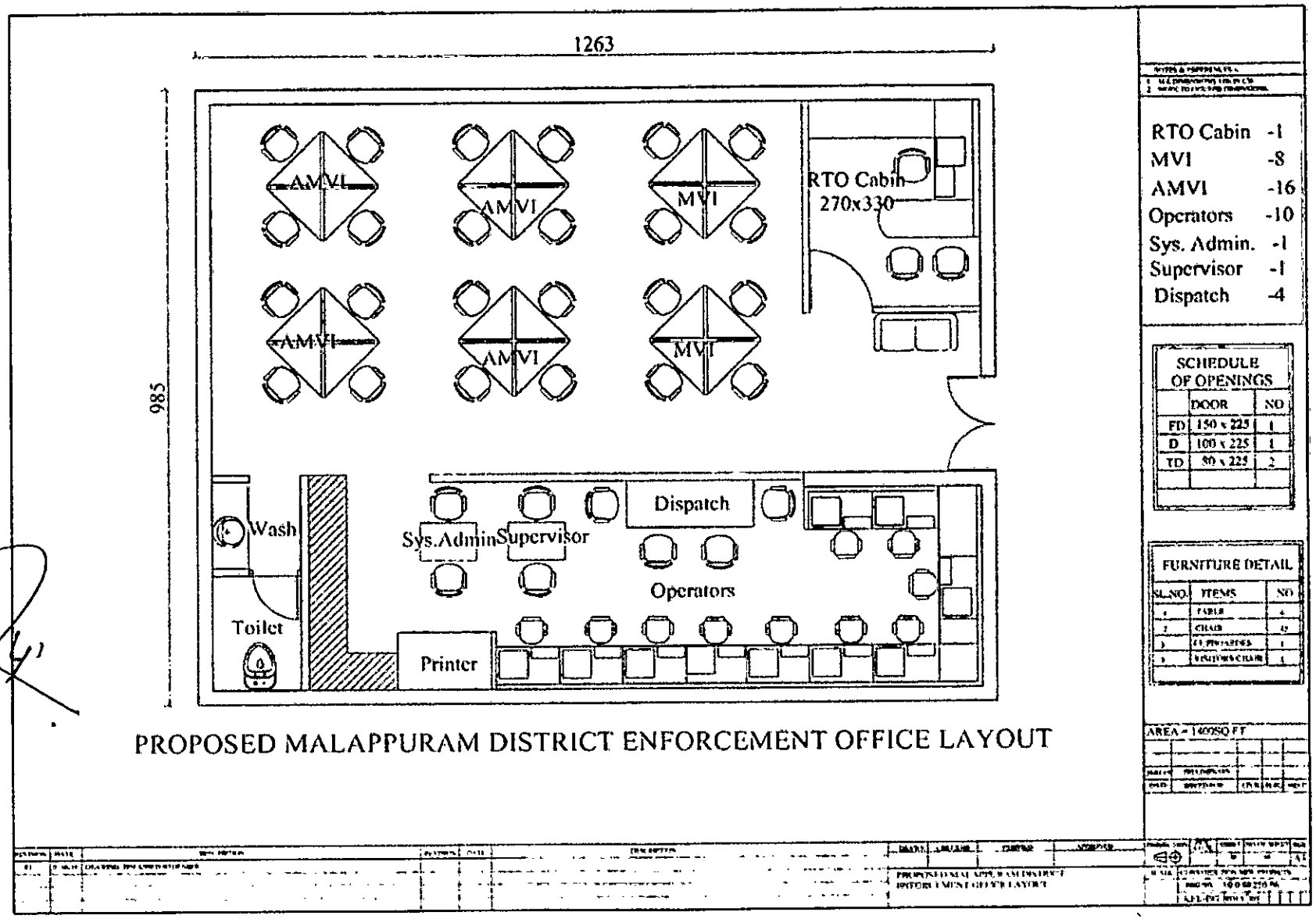
85



PROPOSED KASARAGODE DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON

98

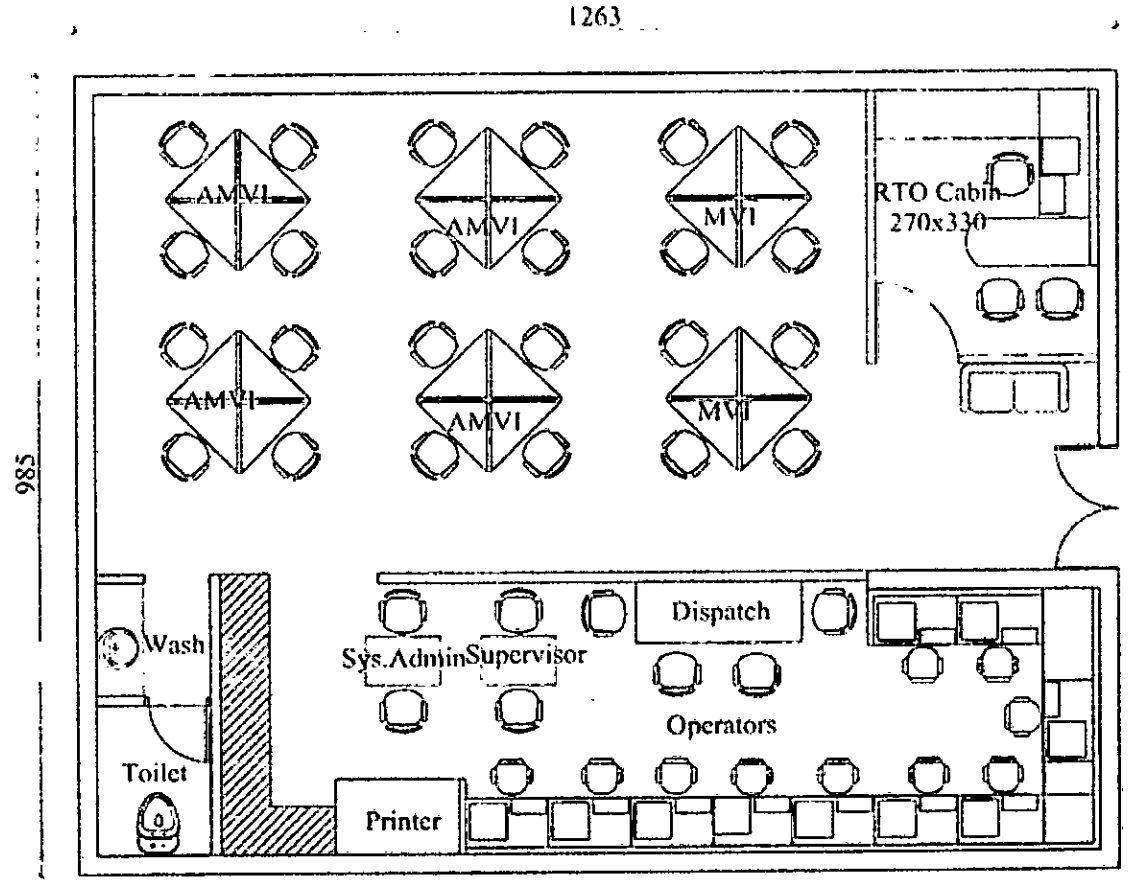


PROPOSED MALAPPURAM DISTRICT ENFORCEMENT OFFICE LAYOUT

GOPAKUMAR S P
Head CPG
Communication Projects Group, KCC
695 583

ELECTRONICS

KELTRON



PROPOSED PALAKKAD DISTRICT ENFORCEMENT OFFICE LAYOUT

RTO Cabin	-1
MVI	-8
AMVI	-16
Operators	-10
Sys. Admin.	-1
Supervisor	-1
Dispatch	-4

SCHEDULE OF OPENINGS

	DOOR	NO
FD	150 x 225	1
D	100 x 225	1
TD	80 x 225	2

FURNITURE DETAIL

SL.NO.	ITEMS	NO
1	TABLE	4
2	CHAIR	46
3	CUPBOARDS	1
4	VISITORS CHAIR	1

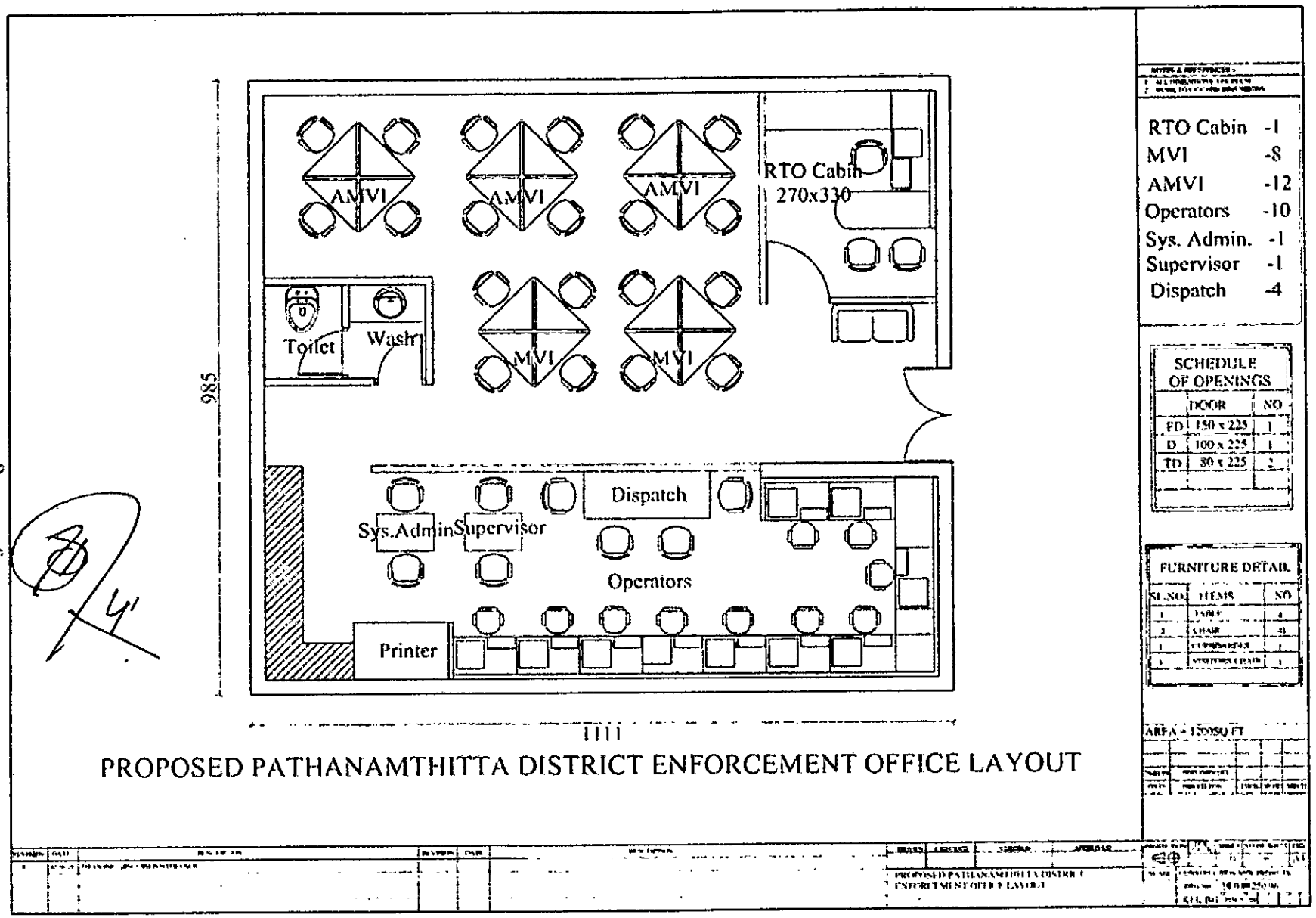
AREA = 1400SQ.FT

PROPOSED PALAKKAD DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON

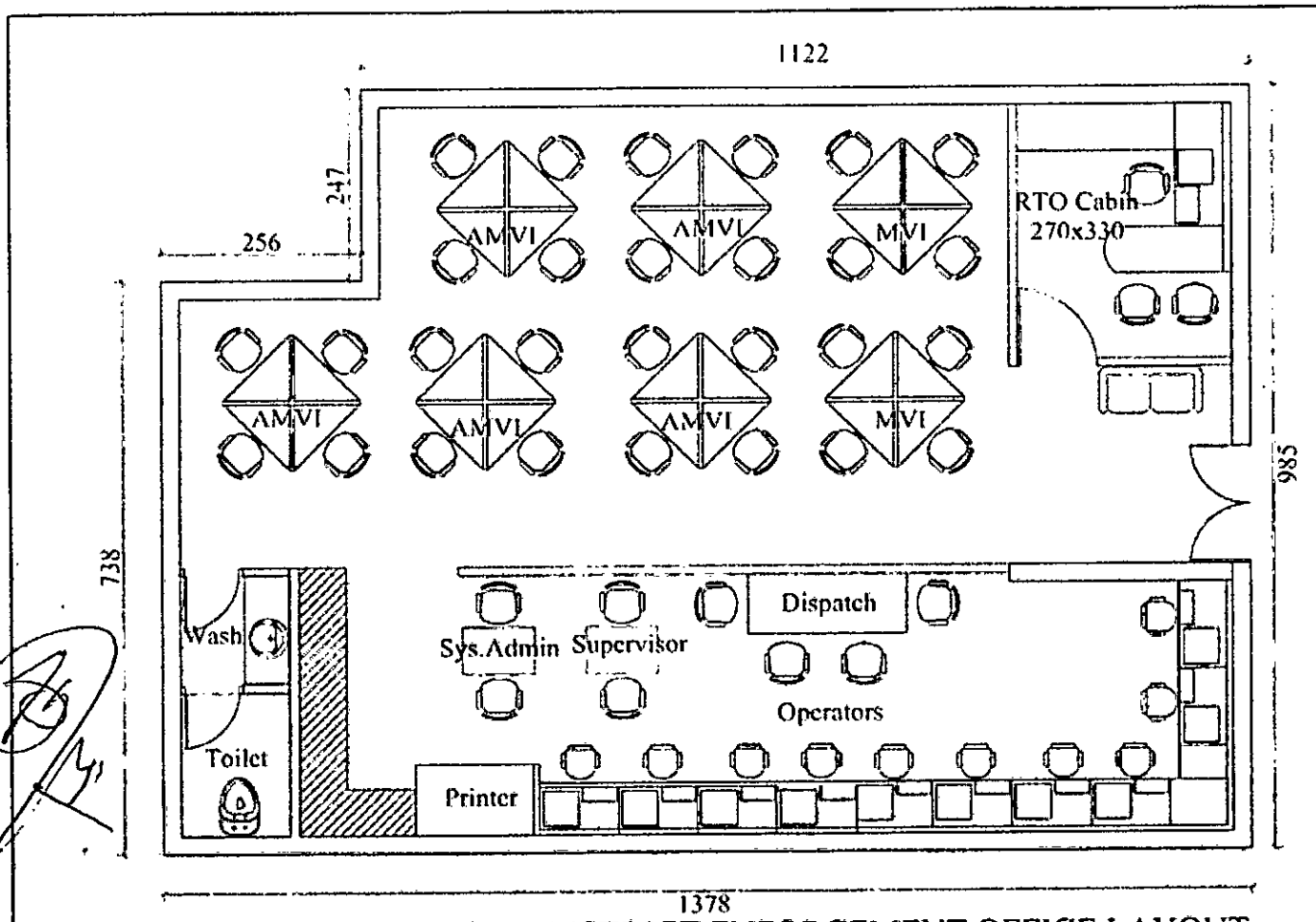
GOPAKUMAR G P
Head CPS
Communication Project Corp. KCC
Thiruvananthapuram-695 583

STATE ELECTRONICS DEVELOPMENT CORPORATION
COMMUNICATION DIVISION
KULATHOOR, TRIVANDRUM



GOPAKUMAR S P

KELTRON



PROPOSED THRISSUR DISTRICT ENFORCEMENT OFFICE LAYOUT

RTO Cabin	-1
MVI	-8
AMVI	-20
Operators	-10
Sys. Admin.	-1
Supervisor	-1
Dispatch	-4

SCHEDULE OF OPENINGS

	DOOR	NO
FD	150 x 225	1
D	100 x 225	1
TD	90 x 225	2

FURNITURE DETAIL

SL.NO.	ITEMS	NO
1	TABLE	4
2	CHAIR	20
3	CUPBOARDS	1
4	VISITORS CHAIR	1

AREA = 1400SQ.FT

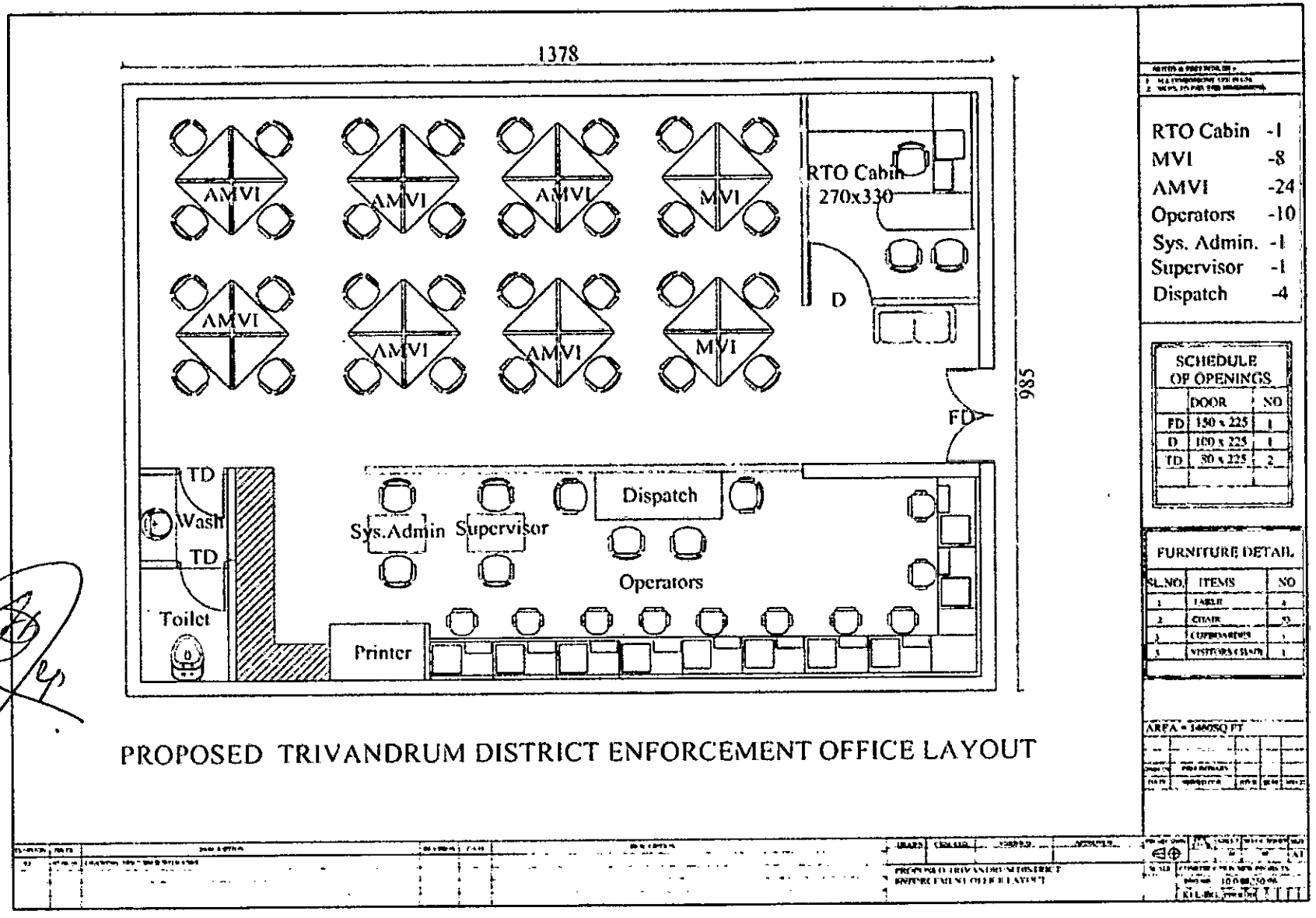
PROPOSED THRISSUR DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON

Communication Projects Group, KCC
Thiruvananthapuram-695 583

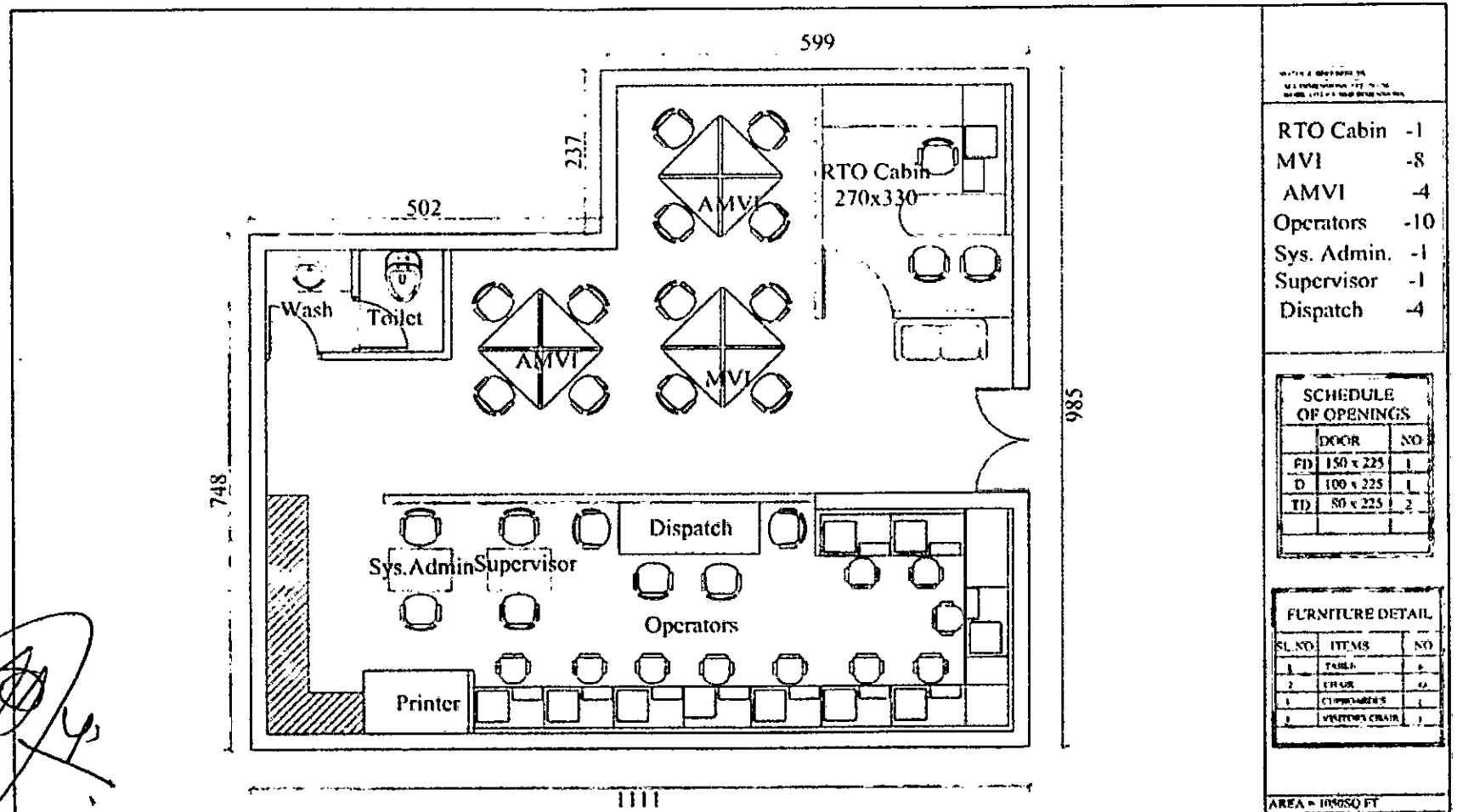
KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED

06



PROPOSED TRIVANDRUM DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON



PROPOSED WAYANADU DISTRICT ENFORCEMENT OFFICE LAYOUT

RTO Cabin	-1
MVI	-8
AMVI	-4
Operators	-10
Sys. Admin.	-1
Supervisor	-1
Dispatch	-4

SCHEDULE OF OPENINGS

	DOOR	NO
FD	150 x 225	1
D	100 x 225	1
TD	80 x 225	2

FURNITURE DETAIL

SL.NO	ITEMS	NO
1	TABLE	6
2	CHAIR	10
3	COMPUTERS	1
4	VISITORS CHAIR	2

AREA = 1090SQ FT

PROPOSED WAYANADU DISTRICT ENFORCEMENT OFFICE LAYOUT

KELTRON

92

1b

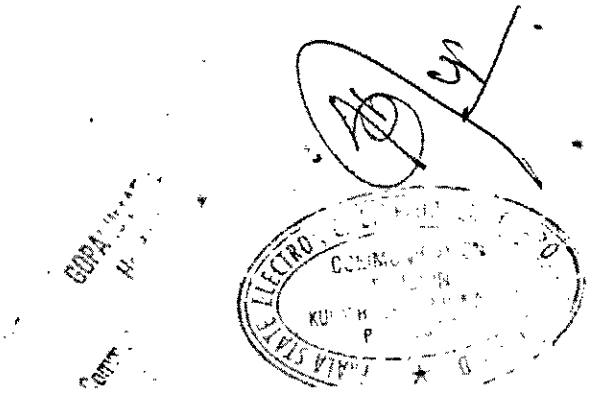
13. TOTAL ENGORCEMENT SYSTEM BOQ

13.1. PHASE 1

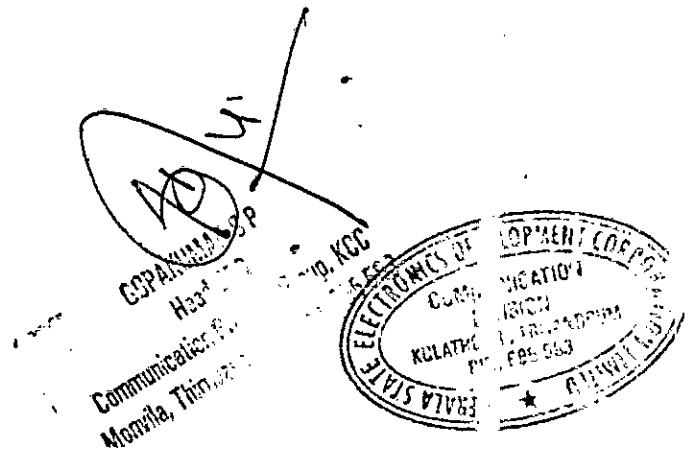
Sl. No.	Item	Qty
1	Smart AI – ANPR camera system 3M, 5M (50 x 14 districts)	675
2	Parking violation detection system	25
3	Red Light Violation Detection System	6
4	Mobile Speed Enforcement System	4
5	Fixed speed enforcement system	4
6	Control room software (central & district)	1
7	State Central Control Room HW including build up Area	1
8	District Enforcement Control Room HW & build up Area	12

13.2. PHASE 2

Sl. No.	Item	Qty
1	Smart AI – ANPR camera system 3M, 5M	700



PART B: COMMERCIAL PROPOSAL



1. CAPEX FOR 5 YEAR BOOT WITH QUATERLY ASSURED PAYMENT

Sl. No.	DESCRIPTION	Unit Price	GST @18%+ 1% CESS	Unit Price with GST & CESS	Qty.	Total with GST & CESS
1	Radar Based Speed enforcement system, 2L 1R	4,989,254	947,958	5,937,212	4	23,748,847
2	Mobile Radar based SVDS with vehicle	5,670,000	1,077,300	6,747,300	4	26,989,200
3	Red Light Violation Detection System (RLVDS) 3 ARM	7,737,345	1,470,096	9,207,441	6	55,244,643
4	3 Megapixel AI Based ANPR Camera System	916,839	174,199	1,091,038	175	190,931,722
5	5 Megapixel AI Based ANPR Camera System	945,945	179,730	1,125,675	500	562,837,275
6	PTZ- AI Based ANPR Camera System	975,051	185,260	1,160,311	25	29,007,767
7	State Central Control Room- Civil, Electrical, Furnishing, Supporting Infrastructure, IT Infrastructure supply, Installation, Configuration and Commissioning & support	179,760,000	34,154,400	213,914,400	1	213,914,400
8	District Enforcement Control Room- Civil, Electrical, Furnishing, Supporting Infrastructure, IT Infrastructure supply, installation, Configuration and Commissioning & support	11,550,000	2,194,500	13,744,500	12	164,934,000
9	Laptop (i5, 1TB Hard Disk) for MVI, AMVI, RTO	157,500	29,925	187,425	354	66,348,450
10	Desktop (RTO, MVI, Supervisor, System Admin, Operators)	126,000	23,940	149,940	124	18,592,560
11	Heavy Duty Printer (Challan Printing)	630,000	119,700	749,700	14	10,495,800

GOPAKUMAR S P
Head CES

12	6 KVA Online UPS with 3 Hrs. Backup (District Control Room)	735,000	139,650	874,650	14	12,245,100
13	48 Port Gigabit Switch (District Control Room)	126,000	23,940	149,940	14	2,099,160
14	Firewall (District Control Room)	420,000	79,800	499,800	14	6,997,200
15	Control Room Management Software and Integration for General Enforcement processing (Tax, Insurance, PUC etc.), SOFTWARE Violation Memo processing, ,payment management etc. as per proposal, and third party software, licenses, AI licenses, ANPR licenses and Data fetching S/W for enforcing other offences form Vahan & Sarathy	168,000,000	31,920,000	199,920,000	1	199,920,000
16	AMC for 4rt & 5th year (cost includes all installation, commissioning, onsite support, warranty support etc.)	44,000,000	8,360,000	52,360,000	2	104,720,000
	Total					**1,689,026,124**

TOTAL BOOT AMOUNT FOR FIVE YEAR =
Rs 1,41,93,49,648/-

GST 18% and CESS 1% =
Rs 26,96,76,440/-

TOTAL BOOT AMOUNT FOR FIVE YEAR INCLUDING GST & CESS =
Rs 1,68,90,26,124/-

2. FACILITY MANAGEMENT SERVICES (FMS)

A. MANPOWER DEPLOYMENT						
CENTRAL CONTROL ROOM - Trivandrum						
Sl. No.	Item Description	Qty	Salary/ Month	Yearly	GST @ 18% Plus 1% Cess	Total
1	C R Manager	2	34,000	408,000	77,520	971,040
2	System Admin	2	28,370	340,440	64,684	810,247
3	Supervisor	Nil				
4	Operator	2	24,500	294,000	55,860	699,720
5	Helper	Nil				
6	Driver cum Technician	16	24,500	294,000	55,860	5,597,760
7	Diesel expenses for 4 Vehicles (Liters)	65000Ltr		4,550,000	864,500	5,414,500
8	Vehicle maintenance	4		380,000	72,200	452,200
	Total					**13,945,467**

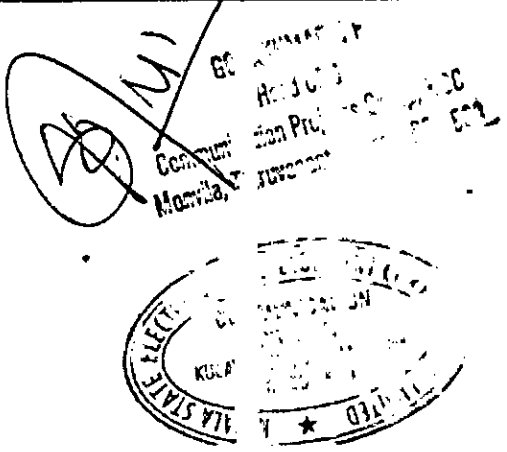
DISTRICT CONTROL ROOM - Trivandrum (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28,370	340,440	64,684	405,124
3	Supervisor	1	26,500	318,000	60,420	378,420
4	Operator	8	24,500	294,000	55,860	2,798,880
5	Helper	1	18,500	222,000	42,180	264,180
	Total					**3,846,604**

DISTRICT CONTROL ROOM – Kollam (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	8	24500	294000	55860	2798880
5	Helper	1	18500	222000	42180	264180
	Total					**3846603.6**

DISTRICT CONTROL ROOM – Ernakulam (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	8	24500	294000	55860	2798880
5	Helper	1	18500	222000	42180	264180
	Total					**3846603.6**

DISTRICT CONTROL ROOM – TRISSUR (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	8	24500	294000	55860	2798880
5	Helper	1	18500	222000	42180	264180
	Total					**3846603.6**

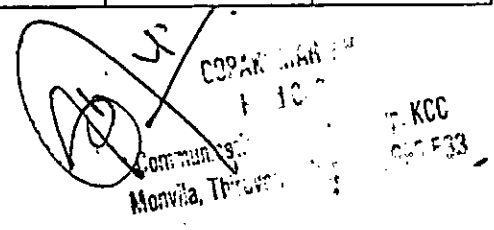
DISTRICT CONTROL ROOM – CALICUT (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	8	24500	294000	55860	2798880
5	Helper	1	18500	222000	42180	264180
	Total					**3846603.6**



DISTRICT CONTROL ROOM – MALAPURAM (CAT - A)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	8	24500	294000	55860	2798880
5	Helper	1	18500	222000	42180	264180
	Total					**3846603.6**

DISTRICT CONTROL ROOM – KOTTAYAM (CAT - B)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	5	24500	294000	55860	1749300
5	Helper	1	18500	222000	42180	264180
	Total					**2797023.6**

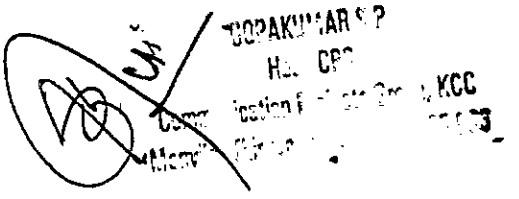
DISTRICT CONTROL ROOM -PALAKKAD(CAT - B)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	5	24500	294000	55860	1749300
5	Helper	1	18500	222000	42180	264180
	Total					2797023.6



DISTRICT CONTROL ROOM - KANNUR(CAT - B)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	5	24500	294000	55860	1749300
5	Helper	1	18500	222000	42180	264180
	Total					**2797023.6**

DISTRICT CONTROL ROOM – IDUKKI (CAT - C)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	4	24500	294000	55860	1399440
5	Helper	1	18500	222000	42180	264180
	Total					**2447163.6**

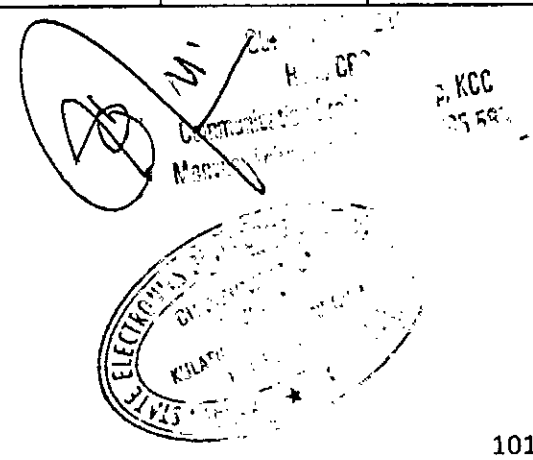
DISTRICT CONTROL ROOM – ALAPPUZHA (CAT - C)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	4	24500	294000	55860	1399440
5	Helper	1	18500	222000	42180	264180
	Total					**2447163.6**



DISTRICT CONTROL ROOM –PATHANAMTHITTA (CAT - C)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	4	24500	294000	55860	1399440
5	Helper	1	18500	222000	42180	264180
	Total					**2447163.6**

DISTRICT CONTROL ROOM – KASARAGODE (CAT - C)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	4	24500	294000	55860	1399440
5	Helper	1	18500	222000	42180	264180
	Total					**2447163.6**

DISTRICT CONTROL ROOM – WAYANAD (CAT - D)						
Sl. No.	Item Description	Qty	Salary/ Month	Salary/ Year	GST @ 18% Plus 1% Cess	Total
1	C R Manager	Nil				
2	System Admin	1	28370	340440	64683.6	405123.6
3	Supervisor	1	26500	318000	60420	378420
4	Operator	3	24500	294000	55860	1049580
5	Helper	1	18500	222000	42180	264180
	Total					**2097303.6**



B. RECURRING EXPENSES

Sl. No.	Item Description	Qty	Per Month	Per Year	GST @ 18% Plus 1% Cess	Total
1	Power Charge for Central Control Room	1	95000	1140000	216600	1356600
2	Power Charge for Category A Type Control Room	1	30000	360000	68400	428400
3	Power Charge for Category B Type Control Room	1	25500	306000	58140	364140
4	Power Charge for Category C Type Control Room	1	21600	259200	49248	308448
5	Power Charge for Category D Type Control Room	1	20000	240000	45600	285600
6	Main Lease line Charge at Central Control Room- 200 Mbps	1	260000	3120000	592800	3712800
7	Secondary Lease line charge - 50 Mbps	1	56000	672000	127680	799680
8	Lease line for District control room - 20 MBPS	13	29000	348000	66120	5383560
9	Diesel charges(Liter)	2000	70	140000	26600	166600
10	Power charges for RLVDS	6	2500	30000	5700	214200
11	Power charges for SVDS	4	1900	22800	4332	108528
12	Internet charges for RLVDS	6	2000	24000	4560	171360
13	Internet charges for SVDS	4	2000	24000	4560	114240
14	Internet charges for Mobil SVDS	4	2200	26400	5016	125664
15	Internet charges for AI - ANPR Cameras	700	350	4200	798	3498600
	Total					**17038420**

C. CHALLAN PROCESSING & DESPATCH EXPENSES

Sl. No.	Description	Unit Price	Qty	GST @ 18% Plus 1% Cess	Total/ Year
1	Paper	20	2500000	9500000	59500000
2	Pre Printed Stationary				
3	Pre Printed Envelope				
4	Postage				
5	Toner Cost				
6	Labour				
7	Maintenance Kit for Printer				
8	Pre mailing Expenses				
	TOTAL				**59500000**

TOTAL FMS FOR ONE YEAR =
Rs 11,24,71,040/-

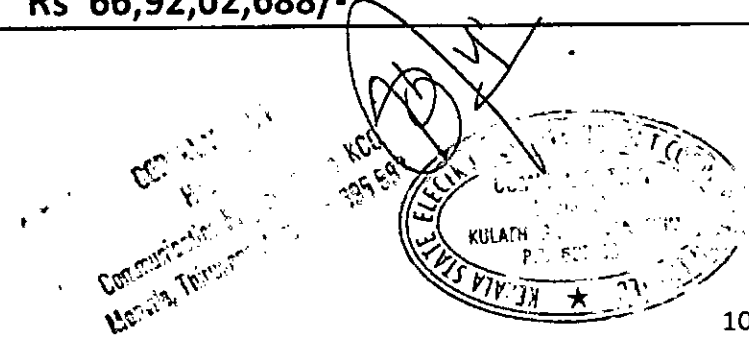
GST 18% and CESS 1% =
Rs 2,54,29,702/-

TOTAL FMS FOR ONE YEAR INCLUDING GST & CESS =
Rs 13,38,40,538

TOTAL FMS FOR FIVE YEAR =
Rs 56,23,55,200/-

GST 18% and CESS 1% =
Rs 10,68,47,488/-

TOTAL FMS FOR FIVE YEAR INCLUDING GST & CESS =
Rs 66,92,02,688/-



3. PROJECTED CASHFLOW FOR THE PROJECT

REVENUE FROM DIFFERENT ENFORCEMENT SYSTEMS

Sl. No.	Enforcement System	Total No.s	Total Offence per Day	Fine Amount	Total Fine per Day	Total Fine Per Year
1	SVDS	4	80	1,000	80,000	28,000,000
2	RLVDS	6	180	1,000	180,000	63,000,000
3	Mobile SVDS	4	200	1,000	200,000	70,000,000
4	AI - ANPR Camera	700	7,000	1,000	7,000,000	2,450,000,000
	TOTAL AMMOUNT FROM FINE WITHIN ONE YEAR (INR)					2,611,000,000

REALISATION OF FINE (Assuming 60% Fine Amount Realisation)- 1st YEAR =
Rs 156Cr.

REALISATION OF FINE (Assuming 30% Less Violations from Previous Year)- 2nd YEAR =
Rs 109Cr.

REALISATION OF FINE (Assuming 20% Less Violations from Previous Year)- 3rd YEAR =
Rs 87Cr.

REALISATION OF FINE (Assuming 20% Less Violations from Previous Year)- 4th YEAR =
Rs 70Cr.

REALISATION OF FINE (Assuming 20% Less Violations from Previous Year)- 5th YEAR =
Rs 56Cr.

TOTAL ESTIMATED COLLECTION WITHIN 5 YEARS =
Rs 478 Cr

TOTAL AMOUNT TO BE GIVEN TO BOOT VENDOR =
Rs 236Cr

BALANCE AMOUNT TO GOVERNMENT =
Rs 242 Cr.

GOPAKUMAR C P
Head CPG

4. COMMERCIAL PROPOSAL- ABSTRACT

TOTAL CAPEX AMOUNT FOR FIVE YEAR =
Rs 1,41,93,49,648/-

TOTAL CAPEX FOR FIVE YEAR WITH GST & CESS =
Rs 1,68,90,26,124/-

TOTAL FMS FOR FIVE YEAR =
Rs 56,23,55,200/-

TOTAL FMS FOR FIVE YEAR WITH GST & CESS =
Rs 66,92,02,688/-

QUATERLY ASSURED PAYMENT TO THE VENDOR INCLUDING CAPEX AND FMS
RS= 9,90,85,242/-

QUATERLY ASSURED PAYMENT TO THE VENDOR INCLUDING CAPEX AND FMS WITH GST AND CESS
RS= 11,79,11,440/-

KELTRON

5. TERMS & CONDITIONS

1. Delivery and Installation: 9 months from the date of Purchase Order.
2. Price: Quoted are inclusive of GST & CESS
3. Warranty is for five year comprehensive on site
4. AMC Charges for 6th and 7th year: 5% of the total quoted value per year extra
5. Training: Training and documentation for operation of system will be given without any additional charge to MVD personnel as required
6. Permission for installation of, Enforcement Camera Systems at road side should be provided by Government without any additional charges
7. Permission to access vehicle owner – license database should be provided by the Department.
8. Space for building up control room should be provided by Department.
9. All recurring cost like Power charges, connectivity charges, Consumable Charges, Challan processing and dispatch are included in the FMS
10. Permission from other Department: MVD shall facilitate other department permissions if any for performing the installation work
11. Payment: 20 equal assured installments on quarterly basis within 5 years.
12. Any deviation on taxes and duties at the time of billing is applicable
13. The proposed Project is on BOOT model for 5 years.
14. The total project cost proposed is inclusive of CAPEX and OPEX
15. Validity of the proposal is 6 Months

Thanking you,

Yours faithfully,

FOR KERALA STATE ELECTRONICS

DEVELOPMENT CORPORATION LTD.

Gopakumar S P
Head – Keltron Communications Division,
Monvila, Kulathur (PO), Thiruvananthapuram – 695583
Phone: 04712598948 Mob. No. 09447210533
Email: spgopan@yahoo.com, e-mail: keltronseu@gmail.com

KERALA STATE ELECTRONICS DEVELOPMENT CORPORATION LIMITED
COMMUNICATION DIVISION
KULATHOOR, THIRUVANDRUM
PIN: 695 583

സെക്ഷൻ ഓഫീസർ