

F. No. 15011/14/2022/WS-IV
Government of India
Ministry of Home Affairs
(Women Safety Division)

North Block, New Delhi
Dated: 7 August 2023

To,

The Centre for Development of Advanced Computing (C-DAC)
[Attn: Shri Kalai Selvan A., Director]
Vellayambalam, Thiruvananthapuram.
Kerala - 695033.
(Email: kselvan@cdac.in)

Subject: ERSS Phase II: Work Order for implementation of ERSS Phase II through C-DAC Thiruvananthapuram for period from 01st April 2022 to 31st March 2026

I am directed to refer to the Project Implementation Plan (PIP) [enclosed] submitted by C-DAC, Thiruvananthapuram to the Women Safety Division (Ministry of Home Affairs) for the implementation of ERSS Phase II, being administered by Ministry of Home Affairs, and to inform that the Competent Authority has approved the proposal wherein C-DAC, Thiruvananthapuram shall be the Total Service Provider (TSP) for the NextGen ERSS-112 executing the project on turnkey basis.

2. Hence, C-DAC, Thiruvananthapuram is requested to take necessary action for execution and completion of the project within the prescribed timeline.

Project Name:	Implementation of ERSS Phase II
Project Duration:	01 st April 2022 to 31 st March 2026
Scope of Work:	As mentioned in the Section 5 and 6 of the referred PIP Document
Project Timeline:	As mentioned in the Section 7 of the referred PIP Document
Project Cost:	₹ 531.24 Cr
	As mentioned in the Section 8 of the referred PIP Document
Payment Plan:	As mentioned in the Section 9 of the referred PIP Document


7/8/23

Terms and Conditions:

- i. All work shall be conducted in accordance with the specifications, regulations and guidelines provided by the Ministry of Home Affairs.
- ii. C-DAC, Thiruvananthapuram shall ensure compliance with all applicable laws, regulations, and safety standards.
- iii. C-DAC, Thiruvananthapuram shall maintain proper records, documentation and reports related to the project/service and make them available upon request.
- iv. C-DAC, Thiruvananthapuram will maintain accounts including details of expenditure and submit the UC & SOE, periodic progress report made under the project for ERSS Phase II to the Ministry.
- v. The Ministry of Home Affairs reserves the right to inspect the work progress at any time during the project/service duration.
- vi. Other conditions will be followed as per GFR 2017.

3. This issues with the approval of the competent authority.

Encl.: As above.

Yours sincerely



(Santosh Kumar)

Commandant (WS)

Women Safety Division

Ministry of Home Affairs

Ph: 011-23071083

Copy to:

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Pune University Campus,
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North Block, New Delhi – 110001.
3. PPS to AS (WS)
MHA, North Block, New Delhi – 110001.
4. PS to JS (WS)
MHA, North Block, New Delhi – 110001.

Next Generation ERSS

(Modernization of Emergency Response Support System)

Project Implementation Plan

submitted to
**Women Safety Division,
Ministry of Home Affairs,
Govt. of India**

by
Emerging Technologies Group
Centre for Development of Advanced Computing
Thiruvananthapuram, Kerala



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1 Introduction

1.1 Background

Emergency Response Support System (ERSS) has been the vision of Ministry of Home Affairs (MHA), Govt. of India, to launch 'ONE INDIA ONE EMERGENCY NUMBER 112', as a nationwide, unified emergency response system with a single emergency number '112', for reporting and addressing all kinds of emergencies from across the country.

To facilitate the development and deployment of a uniform ERSS solution, a MoU was signed between MHA and C-DAC, Thiruvananthapuram, on 17th July 2015. MHA, GoI has defined the guidelines for the core solution and implementation model. Accordingly, C-DAC developed a full-stack enterprise solution in line with the vision and requirements of MHA. Subsequently, a separate contract was signed between the MHA and C-DAC, Thiruvananthapuram, on 8th December 2017 in which MHA declared C-DAC as the Total Service Provider (TSP) for the implementation of ERSS in the country. The contract was later amended on 21st May, 2019 extending C-DAC's role as TSP till December 2022. As per this contract, MHA entrusted C-DAC with an end-to-end responsibility of ERSS related activities.

1.2 C-DAC – The Total Service Provider (TSP) for MHA

C-DAC has efficiently architected the complete solution for the realization of ERSS. The system has been implemented nationwide, integrated with various departments, customized as per the state-level requirements and operationalized adhering to timelines. C-DAC being a nonprofit R&D organization under the MeitY, charged the States / UTs on actuals basis for the procurement of hardware and services, which is very minimal compared to industry standards. This enabled MHA to get a financial gain of more than 500 crore in the implementation of this project. All the financial details were open and transparent as per the GFR. As a TSP, C-DAC played a key role in the execution of the following tasks:

- Study the state-level infrastructure and needs.
- Identification of the hardware requirements for meeting the goals.
- Procurement and establishing the network connectivity as required by the States/ UTs.
- Assisting and providing guidance to setup the Control Room infrastructure in all States/ UTs.
- Installing the hardware and software in the SERC and Districts
- Resource management and maintenance.
- Operationalization of ERSS, management, support and maintenance for the agreed period.
- Timely completion of the contractual obligations subject to the terms of payment specified in the MoU / Proposal.
- Provide, administrative and managerial support in an open and transparent manner to produce mutually agreed outcomes.
- Provide technical guidance for the states as and when required.
- Took part in all the high-level meetings in the ERSS context sharing idea, knowledge and experience.
- Tendering and procuring hardware and connectivity through government agreed GeM procedures and providing transparency in every step of the procurement process.



As per the guidelines of MHA, the first phase of ERSS for One India - One Emergency Number - 112 has been successfully developed and implemented by C-DAC in all 36 States/UTs of the country. In 28 States/UTs, C-DAC's ERSS core solution is deployed while in the remaining 8 states ERSS integration is done with third party 112 solutions. The system which was first launched in the year 2018 is now fully operational across the country.

1.3 Overview of ERSS Phase I

An overview of the ERSS Phase I is shown in Figure 1. The major components of the existing ERSS in each state include an Emergency Response Centre (ERC) also known as Public Safety Answering Point (PSAP) implementation at the State/UT capital, District Coordination Centre (DCC) extensions at each district with associated Emergency Response Units - ERU (vehicles fitted with Mobile Data Terminals), and the National Support Services (NSS) implementation at national capital.

The ERC or PSAP has all the necessary signal receiving equipment and backend processing systems in high availability mode, to receive various distress signals originating from the state. The main front-end applications in PSAP are Call Taker, Dispatcher and Supervisor. The District Coordination Centre (DCC) is a district level central location for Police, Fire Force, Health, and Disaster Management departments to effectively dispatch Emergency Response Units (ERU) in the regional location. These ERUs have a Mobile Data Terminal (MDT) which communicates with Dispatchers. All data is stored and processed at the backend in ERC.

In addition to the above, '112 India App' - a mobile application software was developed to be used by the public, to send Panic SOS signal to PSAP in case of emergency. The alert sent to PSAP will carry the user's address, geographic location, emergency contact details, etc. It is also provided with a SHOUT facility so that the victim can get immediate help from the neighborhood. This mobile app is available in Play Store and App Store.

The National Support Services (NSS) hosts all common services, optionally used by the States/UTs to enhance the facilities in the PSAP solution. Services like LBS (Location identification using location-based services), Telephone subscriber's information service, Interstate information exchange, and 112 Web Portal for public are hosted in NSS. The NSS portal provides an interface for the visualization of the central and state wise key statistical data related to ERSS.

The Infrastructure for the Single Control Room, coordinating the district level activities has been set up in each state (PSAP). In Phase I, DCCs were set up in 632 districts which covered 87% of the districts in the country addressing the various challenges like connectivity, changes in district counts, geographical challenges etc. In Phase I, ERSS was integrated with police, medical and fire services.

The system enabled a quick and easy process for recording FIR in the emergency events. Digitization of the entire activity helped in reducing the manual process of record keeping and generation of instant event related reports. ERSS records each and every action from the instance of call landing to the closing of the event. This record keeping ensures efficient utilization of every second available for addressing the distress / emergency situation. The automation and the quick response facility provided through ERSS was able to save lakhs of lives and prevent heinous crimes by effectively responding in time.

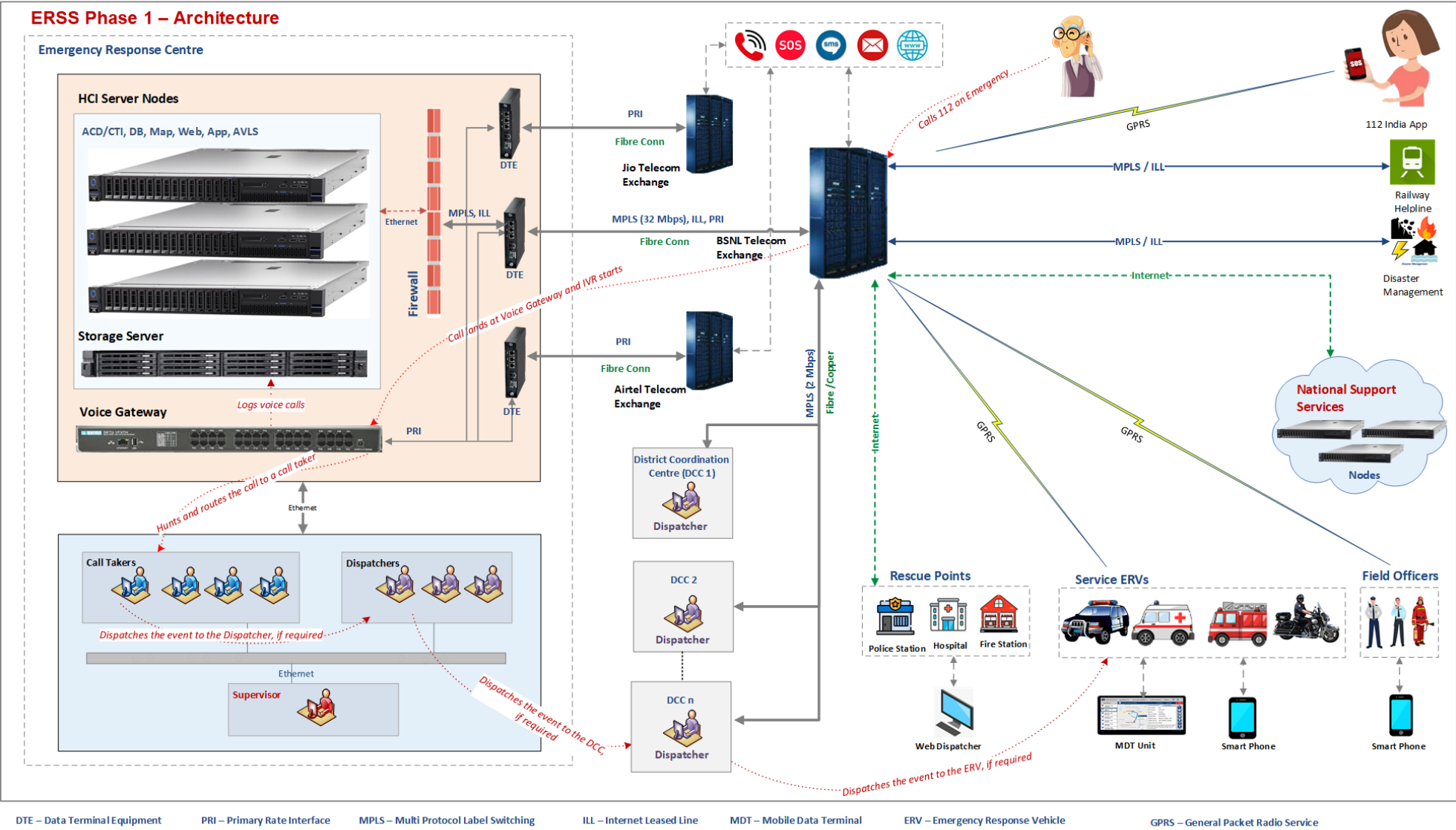


Figure 1: ERSS Phase I Overview



The system provides complete transparency of the actions taken for the reported emergency request. This helps concerned Law Enforcement Agencies (LEAs) to take actions without any sort of bias. This also gained the trust of the general public in operations of the emergency response system and the actions taken.

A robust and fully featured ERSS-112 solution was architected, developed and commissioned successfully by C-DAC (T), as per the MHA guidelines. The success of ERSS and its effectiveness in handling emergency situations is highly evident in the operations of the State Emergency Response Centre. ERSS has aided in saving thousands of lives in a timely manner. Some of these success stories are hosted in States' web portals.

1.4 Need for Modernization of ERSS (NextGen ERSS)

The need for ERSS Modernization is proposed based on the following factors:

- **Continuation of Emergency Support Services**

ERSS Phase I achieved the first level of realization of MHA's vision to operationalize the Single Number Emergency System in 36 States /UTs. C-DAC continues operation and maintenance of the system in all states. Since this is a critical service, any disruption in this service will defeat the very purpose for which it was set up. Hence, it has to be supported and maintained for seamless operation for which support beyond the warranty period is required for all the system components.

- **Provision for upgrading DC setup at ERC**

Currently more than ten server applications (eg:- Call Distribution and Voice Logger, Business Processing, Vehicle Location and Communication, External System Integration, Signal Gateways, System Admin, Internal Communication, Resource Management, Report and Message Logger, Queuing and Scheduling) are deployed in the backend system at ERC and a good amount of existing computing resources are used for running all these servers. One of the main functionality which consumes the computing resources in large amount is the compression of all received voice calls and its logging. As the call statistics of Phase I is showing a trend of increasing call volume, the existing resources will become insufficient in near future. The number of server applications in the ERSS system will also have to be increased with the introduction of additional services/intelligent features utilizing AI/Analytics/Big Data.

Storage capacity also needs to be increased as 80% of the existing storage space is used up in most of the states/UTs. In a few states, the provided storage capacity is already consumed completely and backup in external systems had to be taken.

Provisions to upgrade the hardware infrastructure at ERC to address all the above requirements needs to be included in NextGen ERSS.

- **Coverage of all districts**

For the decentralized dispatching to district centers, DCCs need to be setup and connected to the ERC. In Phase I, 632 DCCs were setup and linked to the ERC. There are districts which are newly formed and others which are not connected due to low or no network coverage. NextGen ERSS aims to cover these districts and remote areas to ERC, thereby achieving 100% coverage over the span of India.



- **Increase in Call Volume**

The general public who earlier used different numbers to seek emergency help from different services (Police, Fire, Health services etc.), have now started using this single number for all their emergencies. The call statistics of Phase I shows a trend of increasing call volume over time which needs to be addressed in NextGen ERSS.

- **Provision for dual connectivity**

All the connectivity services used in Phase I for data exchange, i.e., MPLS (to both SERC and DCC) and ILL do not have any redundant links and hence any failure in any one of these will cause disruption in the services provided by ERSS.

- **Emergency Response Vehicle Tracking and Communication**

High Availability of the Mobile Data Terminals (MDTs) mounted in all the Emergency Response Vehicles, including the Ambulance and Fire service vehicles depending upon the requests received from the state/UTs, shall be achieved with Dual SIM Cards in place. This will avoid chances of any disconnection while ERVs tend to lose connectivity to ERC due to poor coverage, if any, of the Telecom Services. The MDTs/smartphones provided in these vehicles shall be used only for the purpose of ERSS services and hence all other applications will be restricted in these devices.

- **Provision for Disaster Recovery**

Another major concern is the non-availability of a Disaster Recovery (DR) system in ERSS as DR was not provisioned in Phase I. DR is necessary for a critical service like ERSS for ensuring redundancy at all levels to avoid any single point failure. DR systems will be setup at two locations - Mumbai and Hyderabad.

- **Value additions**

The success achieved through the automation of ERSS Phase I has been instrumental for strengthening and modernizing the core solution with powerful features and value-additions in terms of improving processing speed, analysis and hence response time. The new features being incorporated will improve the services being provided and will help in decision-making. For example, in case of a patient being taken to a hospital using ambulance services, the video calling facility in MDT can facilitate timely service by providing remote assistance from medical professionals. Detailed list of new features is given in section 2.3.5.

- **Integration with other services**

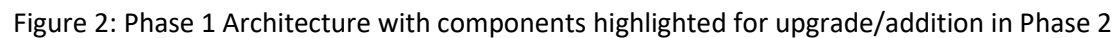
Basic emergency and helpline services (Police, Fire and Ambulance) have been already integrated with ERSS. Integration of Railway Helpline-139 is already complete and Disaster Management is nearing completion. Other critical helpline services like Women and Child Helpline, National Disaster Helpline, Coastal Helpline etc. have already taken necessary initiatives for effecting the integration of their respective helpline numbers to the ERSS.

All these factors stress the necessity for upgrading ERSS to meet the increased demands on signal reception, computing and generating quicker responses while also ensuring a fail-safety system. In line



with these thoughts, the Govt. of India (Ministry of Home Affairs) has approved extending support to address the new problem statements identified during the operations of ERSS, by strengthening the current system with modern, additional powerful features and leveraging various advanced technologies.

Figure 2 shows the Phase I architecture with some components highlighted in yellow which will be upgraded /added in NextGen ERSS to strengthen the existing ERSS system.





2 Modernization of ERSS

The modernization of ERSS (Next Generation ERSS) intends to enhance and strengthen the existing ERSS system across the country, utilizing state of the art technologies, to be on par with systems anywhere in the world. Based on the experience gained from the performance of ERSS Phase I, C-DAC has proposed for the modernization of the existing system to ensure a fail-safe system with geographical coverage throughout the country. NextGen ERSS aims to implement a more resilient, reliable, secure and intelligent system with assured availability of emergency services.

C-DAC will be the Total Service Provider (TSP) for NextGen ERSS-112. As per the techno-commercial proposal submitted by C-DAC for the Next Generation ERSS, the project cost approved by Public Investment Board (PIB) and Cabinet Committee on Economic Affairs (CCEA) is summarized below:

Table 1: Total Project Cost Summary

Summary of Project Cost			
No	Item	Provision to	Total (with GST)
1	Hardware Infrastructure	State	₹ 1,93,08,32,000
2	Connectivity	State	₹ 90,24,63,000
3	COTS Software for ERCs	State	₹ 40,34,40,000
4	Facility Management Services (FMS)	State	₹ 27,65,45,000
5	Cost for Technical resources / Developers	TSP	₹ 90,23,34,000
6	C-DAC Services and Project Management	TSP	₹ 48,18,18,000
7	Cloud services for DR (all States/UTs)	TSP	₹ 22,67,77,000
8	Provision for Contingency (overall) *	Overall	₹ 18,81,91,000
Total Project Cost			₹ 5,31,24,00,000

* Contingency shall include Central Administrative expenses including IEC activities and shall be expanded with specific approval of MHA.

The total project cost covers the cost for hardware, software, connectivity, technical resources, C-DAC services and project management, travel expenses etc. subject to the **actual** cost incurred.

The provisions shown in Table 1 is intra-adjustable depending upon the functional needs. The Program Division of MHA will exercise the power for any change within the heads. The 'Connectivity head' includes two cost components - One Time Charges for connectivity which is to be provisioned to TSP and the connectivity charges for FIVE years to be provisioned to respective State/UT.

Detailed project costing is provided in **Cost Estimation**.

2.1 Project Objectives

The key objectives of NextGen ERSS are:

- To achieve 100% geographical coverage, by addressing the geographical challenges due to the diverse geographic of India.
- Provide redundancy at all levels to avoid single point failure and ensure 99.9% uptime.
- Incorporate Smart features (Refer 2.3.3) in the existing 112 India Mobile App.



- Machine to machine Integration with central and state agencies like CCTNS, NCRB, Cyber Crime and with other services and helplines like WHL, CHL, Coastal services, Wild Life and other upcoming systems like Smart City, Safe City etc. The NextGen ERSS architecture will facilitate easy integration of other critical services.
- Upgrade the ERSS by enhancing the existing features leveraging the advanced technologies, improvising the operational efficiency by automation of time-consuming tasks in the workflow.

2.2 Architecture for NextGen ERSS

An overview of the architecture for NextGen ERSS is shown in **Figure 3**. A hybrid architecture is envisaged in NextGen ERSS by using cloud services for Disaster Recovery (DR) and in-premise infrastructure for DC. The existing ERSS system will be enhanced and strengthened, utilizing state of the art technologies. This includes upgrade of hardware infrastructure, software and services. Table 2 shows the comparison of ERSS Phase1 architecture with ERSS Phase 2 architecture.

Table 2: Comparison of Architecture: ERSS-112 Phase 1 and 2

No.	Features	Phase-1	Phase-2
1.	Server nodes in Data Centre of ERC	2 or 3 nodes with 10/20TB Storage	3 nodes with 200 / 400 TB Storage
2.	Disaster Recovery Facility	NA	On Cloud
3.	Social media integration	NA	WhatsApp, FB, Twitter
4.	Redundancy for ILL, MPLS	NA	From BSNL and another TSP
5.	Location Identification Gateway	LBS only	LBS and Google ELS
6.	Devices for the Rescue Vehicles	eTablet	GPS Tracker, Smartphone, Camera
7.	Connectivity to MDTs in Vehicles	Single Sim	Dual Sim
8.	Paired communication devise for MDT fallback and redundancy	NA	Available
9.	Escalation levels	2 (DCC, Rescue Points)	Multiple (upto field personnel)

The major architectural changes in NextGen ERSS are **Redundant Connectivity, Provision for a DC-DR setup and Enhanced Security.**

Since redundant communication links are not provided for any of the connectivity used for data exchange in the existing ERSS system, failure in the communication path between any two points in the network caused disruption in the services provided by ERSS.



To avoid such failures, NextGen ERSS architecture has included redundant communication links between all communication paths. Dual connectivity will be established between PSAP and DCCs from different telecom service providers. Dual SIMs for MDTs/Smartphones and dual ILL connectivity for ILL is also provisioned. This ensures uninterrupted service by switching to the secondary connection at the time of any connectivity failure.

Another major concern regarding the existing system was the non-availability of a Disaster Recovery (DR) setup as DR was not provisioned in Phase I. In the event of a system failure, a DR system is necessary and to address this, a DR system leveraging cloud services is envisaged in NextGen ERSS. DR will be in passive mode and will be made active only when DC, which is in-premise, is down.

In addition to the next-generation firewall, the network monitoring and security measures for the ERSS system will be enhanced in NextGen ERSS with the use of Web based Security Information and Event Management (SIEM) system.

The ERSS software solution will also be enhanced with the introduction of new intelligent features leveraging technologies such as Artificial Intelligence/Machine Learning, Analytics, Big Data, IoT etc. Machine to machine integrations to major helplines and services like CCTNS, WHL/CHL, Safe city will be an integral part of NextGen ERSS. Since the requirement for computing and storage resources is expected to shoot up with the introduction of new intelligent features and other services, the hardware infrastructure at ERC will be upgraded in NextGen ERSS, with the specifications addressing these requirements.

While providing all these advanced features, the proposed architecture ensures that all the services provided in Phase I will continue to be available in NextGen ERSS also. Existing HCI Server Nodes at the ERC will be utilized for the backup of data and for deploying Report Server, CMAPs and Web portals.

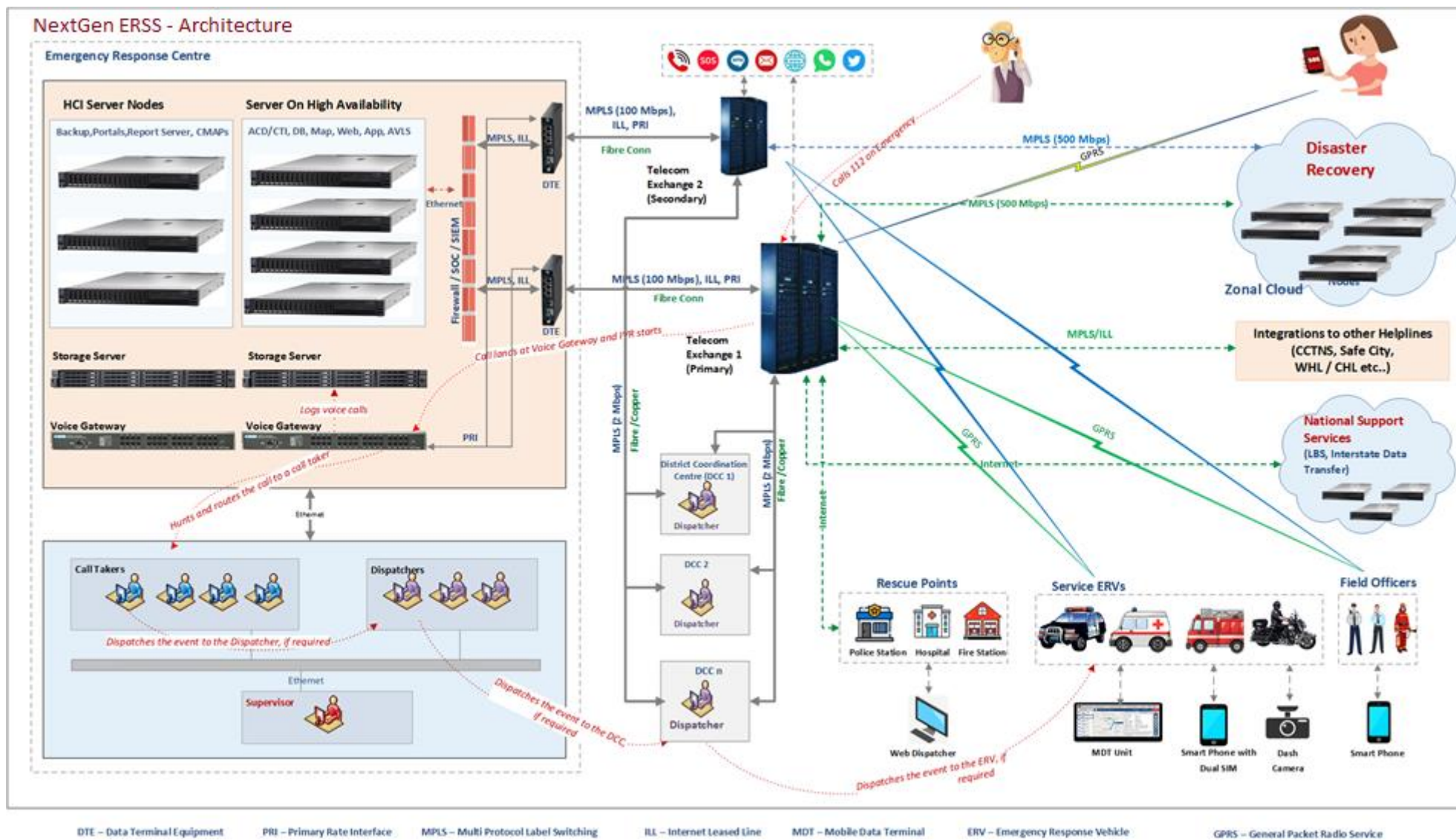


Figure 3: ERSS Phase – II Architecture



2.3 NextGen ERSS – Salient Features

All the services and features provided in ERSS Phase I will continue to be available in NextGen ERSS also. Major enhancements that will be undertaken in NextGen ERSS are as follows.

2.3.1 Geographical Coverage

NextGen ERSS aims to achieve 100% geographical coverage by:

- Setting up DCC in all districts where it is currently not available
- Establishing additional DCCs for regions with poor network coverage.
- Identifying and recommending TSP to establish connectivity for areas with no network coverage on high priority.

2.3.2 Achieving High Availability

To address emergency situations, the ERSS system must be available 24X7 with 100% uptime. Since this is practically impossible, measures need to be taken to ensure maximum uptime. To ensure high availability and uninterrupted service, fallback and fail-safety measures will be provided and a strong infrastructure for DC-DR with a hybrid architecture is proposed with following measures.

- a. Setting up of Data Center (DC) at ERC that adheres to all norms of a Tier-II Data Centre. It will comprise of:
 - Additional Server nodes
 - Enhanced compute and storage capabilities
 - Improved system performance with Load balancers
 - Multi-level security systems
 - Hybrid Data Repository (RDBMS, Big Data)
 - In-premise signal gateways and map service
- b. Establishment of the Disaster Recovery (DR) leveraging Cloud technology eliminating the need for hardware provisioning and maintenance in State/UT level. Cloud Services for DR will be provided with:
 - Infrastructure as a Service (IaaS) of Cloud platform
 - Two DR sites at geographically different locations, each catering to 18 States/UTs
 - Dual MPLS connectivity to DR sites with very high bandwidth.
- c. Eliminate single point failures through establishing redundant connectivity (MPLS, ILL and Multiple PRI lines) from different telecom service providers. There will be:
 - Dual MPLS connection for PSAPs, DCCs
 - Dual SIMs for MDTs/Smartphones
 - Dual ILL connectivity
 - Multiple PRI lines from all Telecom Service Providers
- d. Enhanced bandwidth for seamless exchange of data and voice
- e. Automated network monitoring system and generation of early alerts

2.3.3 112 India Mobile App Smart Features

The penetration rate of smartphones in India is increasing day by day and hence many important services including the emergency services are now made available via smartphone apps. In ERSS Phase I, the 112 India App was launched for availing emergency support. To make this App more effective and



user friendly, more smart features are envisaged in NextGen ERSS. Some of these features that will be incorporated are listed below:

- a) Smart alerts and push notifications for app
- b) Enhance the user friendliness and user experience aspects of the app
- c) Incorporation of Rescue Vehicle Tracking
- d) Ambience listening for emergency responses
- e) Secure communication from the App providing data privacy.

2.3.4 Machine-to-Machine Integration - Other Services

To realize the vision of 'ONE INDIA ONE EMERGENCY NUMBER 112' completely, it is important that all major helplines and services are integrated to the ERSS system. Currently, main public safety services like Police, Fire and Medical services are integrated with ERSS. Integration with other services and helplines is envisaged in NextGen ERSS, with the aim to increase the incident response rate and general public engagement.

The services and helplines which will be integrated are given below:

a) **Crime and Criminal Tracking Network & Systems (CCTNS)**

CCTNS maintains a centralized crime and criminal repository which includes criminal images and fingerprints. A forward and backward integration is planned in NextGen ERSS, for enabling interoperability, for sharing information which will further reduce manual workload and also to improve the effectiveness in policing and decision making. CCTNS integration with ERSS has already been done in Delhi.

b) **Cyber Crime**

The ERSS will be integrated with Cyber Crime Reporting Portal facilitating citizens to lodge complaints related to cyber- crime. This has been done in a few states like Tripura, Karnataka, Haryana, Delhi and Chandigarh with state specific customization.

c) **SMART /SAFE CITY Projects**

Integration of ERSS with Integrated Command Control Centre for the smart city, aiding to improve the quality of life by providing intelligent alerts to ensure the safety of the public. Under the Smart Cities Mission of some states, IoT based alerts have been implemented and integration of these IoT based smart alert/warning system will be done to enhance the services of ERSS. Similar Integration with Smart City projects like hybrid traffic management system for aiding distress response by speed tracking, vehicle tracking, signal violation etc. will be done in NextGen ERSS for improving the safety for the public.

d) **Coast Guard**

The coastal services will be integrated with the ERSS so that the details of the victims in distress will be shared between ERSS and control room of Coast Guard. This aids in the rescue mission for saving human lives at sea and also in safe guarding the coastal borders. A pilot version is setup at the Coast Guard Control Room, Vizhinjam, Kerala. A proposal for setting up automated Control Rooms for Coastal Services has been submitted and approval is awaited.



e) Women Helpline (181) and Child Helpline (1098)

Dedicated connections will be provided between ERSS and the Women and Child Control Room to achieve seamless integration. A robust, efficient Women and Child Helpline system is being deployed in every state.

f) Wild Life and Counter Wild Trafficking Helpline

Integration with Wildlife Helpline to provide the support services for the public who avail the services through the ERSS is also envisaged.

g) Integration with MoRTH

MoRTH has mandated Vehicle Tracking System (VTS) for the safety of passengers especially for women and children. A PANIC button is installed in vehicles for panic alert generation in emergency situation. Currently the alerts are sent to the Vehicle Tracking Control Room (VTCR). The filtered alerts from VTCR can be integrated with the ERSS for availing the emergency response services. Information regarding real time location of vehicle will be streamed to the ERSS from where it will be dispatched to the nearest aid (Police/Ambulance) for rescue services.

h) Khoya-Paya portal

ERSS will be integrated with Khoya-Paya portal, a citizen's corner for tracking missing children. This integration has been done at Delhi.

i) Other services

Some of the other services identified for integration with ERSS include:

- **NHAI** : Integration of the national highway support service with ERSS
- **VAHAN** : Vehicle details & license plate recognitions (Smart city in Pune)
- **Traffic Helpline**

Machine to machine integration will be done to the maximum possible extent. However, integration with services which may require major change in the ERSS software will be done based on a case to case basis. The cost of additional infrastructure pertaining to integration needs to be borne by the new system. This may require detailed study and submission of separate proposal.

2.3.5 ERSS Software Enhancement

The modernization of ERSS will include software enhancements for providing the emergency response system with intelligent and advanced features, leveraging state-of-the-art technologies. ERSS NextGen ERSS aims to increase the efficiency and effectiveness of the response system by receiving input from multiple sources in the form of voice call, SMS, email, Web request, SOS panic app, Internet of Things, panic buttons in public transport etc.

NextGen ERSS also aims to ensure high level of data security in the system. It also aims to enrich visual applications to improve the user friendliness of applications for better Call-Taking, Dispatching and Supervising services.

In order to address the new requirements and to incorporate advanced features, the main modules in ERSS will be enhanced as follows:



a. VoIP and Emergency Signal Processing

1. **SIP Trunking** - Migration to SIP trunk technology from the existing PRI to VoIP voice solution to enhance call capacity for emergency voice calls at ERCs. SIP Trunking is a method of sending voice and other unified communications over the internet. It enables both Voice and Data communication. Advantages of SIP Trunking:
 - Require only a reliable IP network connectivity to the system.
 - Reduces telecom service cost as it eliminates capital costs for physical phone lines.
 - Easily upgradable with no additional equipment.
2. Web based calls and Adhoc control room concept development
3. RoIP- VoIP integration for seamless communication between VoIP and Radio network
4. Development and integration of Video calling
5. Development of Voice messaging feature
6. Real-time call monitoring and logging
7. Call data analytics and pattern prediction
8. Development of TSP portal for call statistical reporting for each TSP and each state.

Initially, some features like the installation of SIP trunk connectivity will be done at R&D lab, C-DAC. Based on performance analysis, new features will be deployed in states/UTs. The deployment of features like SIP Trunking will also depend on its availability by the service providers in state/UTs.

b. Call-Taking

1. Handling of increased call volume
 - Customer self-services portal will be implemented for enquiry and information related calls, so that they don't need to call for referring resources.
 - Online chat tools allow customers to communicate back and forth with agents in real-time. These tools allow for instant communication while taking less time and energy than physical calls.
 - Online chat bots will be provided to reduce manual intervention.
2. Hot calls/VIP calls special handling facility
 - Partial dispatch: For emergency calls, dispatch option is available while in call and ERV will be assigned immediately.
3. Social Media integration (WhatsApp and Twitter)
 - Distress signals will also be received from integrated social media platforms like Twitter, WhatsApp. These signals will be handled by social media call taker. Victim is able to send distress signal via social media platform.
4. Standard operating procedure (SOP) driven automated workflow configuration and escalations matrix
 - Event handling based on the SOP assigned for the event sub type and the escalation matrix to send SMS to officials.
5. AI-driven Chatbot integration
 - Online chat bots will be provided to reduce manual intervention.
6. Automated call back for IVR dropped calls



- Dedicated call taker agents to be assigned to handle the automated call back for IVR drop cases.
- 7. Offline mode operations to run without connectivity – call takers to work even without connectivity.
- 8. Intelligent alerts and notifications – Alerts to indicate events like pending time exceeded.
- 9. Intelligent SMS filtering to reduce unwanted SMS from TSPs
- 10. Enhanced feature for handling Women / Senior Citizen requests - dedicated call takers for handling women or senior citizen related calls
- 11. Enhancement of web request signal handling with multimedia attachments

c. Dispatching

1. Enhancements for handling high volume call and dispatching
 - Customer self-services portal will be implemented for enquiry and information related calls, so that they don't need to call for referring resources.
 - Online chat tools allow customers to communicate back and forth with agents in real-time. These tools allow for instant communication while taking less time and energy than physical calls.
 - Online chat bots will be provided to reduce manual intervention.
2. Instant dispatch to ERU for Hot calls / VIP calls (Banks/ATMs/Residence of Senior Citizens)
 - Partial dispatch: For emergency calls, dispatch option will be provided while in call and ERV will be assigned immediately
3. Offline mode operations to run without connectivity
 - While the servers are down, client application will work with the LAN support and data will be locally saved in client machine and when connectivity is up, data will be synced back to server.
4. Automated notifications and escalations matrix
 - Automated SMS to officials/ based on escalation matrix will be sent for cases like cases aren't handled within default timer and based on event priority
5. Automation of call dispatching based on SOP
 - Automatically Call gets dispatched to CAD and to ERV. Technically ERV will be mapped based on victims location using certain algorithms
6. Social Media Integration
 - Distress signals will also be received from integrated social media platforms like Twitter, WhatsApp. These signals will be handled by dispatcher.
7. Web based model for dispatchers
 - Dispatchers can login through web application
 - Agents can work from anywhere at any time
 - Voice call handling in web application using Web Real Time communication.
8. Camera Feed/ Video streaming facility as per the demand by ERC



- For ERV unassigned routes, traffic camera feed will be provided live for all streets in real time.
9. Implementation of efficient algorithm for intelligent Routing, Search and address decoding
 - GIS map will select appropriate ERV considering live traffic congestion, shortest path for ERV
 - GIS will suggest best shortest routes for ERVs and an approximate of time and distance it will be taking to reach victim location
 - An alert will be provided to CAD regarding nearby ERVs location.
 10. Geo-fence based alerts dissemination
 - An automated alert will be sent to officials regarding district boundary violation
 - An automated alert will be sent to CAD and indication will be provided
 11. Integration with VAHAN for vehicle details & license plate recognitions
 - An API Integration will be provided for fetching a vehicle details.
 - AI based feature will be available for identifying vehicle number from a blurred image taken while a vehicle was violating traffic rule.

d. Supervisor

1. ERSS Network Monitoring service
2. Enterprise Application Monitoring service
3. Auto messaging based on event statistics
4. Auto alerts and escalation for system health monitoring
5. Auto report generation
6. Call snooping support, for listening quietly to conversations
7. Monitoring and handling of heinous calls

e. Mobile Data Terminal/Smart Phones paired with GPS trackers

1. Conference call feature for connecting victims and PSAP in real-time and intelligently dispatching to the nearest ERUs.
2. SOP driven incident handling
3. Offline mode operations for Mobile Data Terminals (MDTs) - Offline storage of the event based operation will be done in MDT and updated to server when connectivity is restored. Communication will be sent through SMS during offline mode.
4. Real time criminal identification using biometric (finger print) - Identification of criminals in MDT using finger print device integrated with Aadhar.
5. Real time challan, ticket and acknowledgement printing facility by integrating ticket printing machines
6. Video streaming facility to ERC from MDT - live streaming from incident location to Dispatcher agents in ERC
7. Efficient ERU tracking and improved accuracy for GPS location
8. Geo-fence alerts - Geo-fence alerts will be provided for MDT users using MDM (Mobile Device Management) solution



9. Scenario Reproduction solution - Case handling scenario can be reproduced in MDT with timestamp.
10. Intelligent solution for tracking, monitoring and management for MDT - Will be displayed in 112 India App, if a volunteer accepts an emergency request then the location of the Rescuer will be available for victim.
11. Display of proximate verified Rescuers' location on GIS Map
12. Effective man resource allocation for MDT based on scheduled and historical events- scheduled events are auto generated in Call Taker's console, and man allocation is done by Dispatchers
13. Facility for GIS Data Collection using ERSS GIS Mapper application

f. Geographic Information Systems (GIS)

1. Geo fence based alerts and message dissemination for checking the district boundary violation of an ERV
2. GPS-Tracker and Smart phone for improving Vehicle tracking
3. Search and other services based on speech to text conversion- System will generate some keywords for landmark search and vehicle search from voice.
4. GIS based tactical and Strategic Analysis
5. Intelligent map switching feature - The GIS Map has a layer switcher in which multiple base layers such as Google map, OSM Map, Here Map, State Map etc. are provided and user can swap between one base map to another and also between various overlays
6. Automated escalation based on SOP
7. Automated buffer analysis - The buffer tool helps to buffer or fence a place in map and the locations within that radius is popped up. The user can directly call that POI or else an emergency SMS to that locations in bulk whose phone nos. are available.
8. Scenario Reproduction solution - Vehicle trace is possible in GIS map using date and time. From that vehicle playback we can identify vehicle locations on different time period.
9. AI & Analytics based utility for identification of crime patterns, prediction and effective deployment of resources in delivery of emergency services
10. Offline Map services with purchased Map Data
11. Algorithm development for Routing, Search and Address decoding
12. Vehicle tracking reports from GIS Map
13. Display of verified Rescuer(s) location on GIS Map
14. Display of ERSS Network components and status on map
15. Show missing patrol locations based on vehicle tracking history

g. NSS Portal Enhancement

NSS portal will be enhanced mainly to facilitate common services like LBS and Inter-state data transfer and for providing additional statistics to support decision making.

1. Host Location Based Services (LBS)
2. Facilitate Inter-state data transfer
3. Automated generation of Pan-India Report



4. 360 degree report automation
5. AI based trends and analytics visualization
6. Alerts and notification based on historic events

h. General Enhancements

Additional features identified for improving /enhancing the ERSS system are:

1. Enhancing the system to enable access and usage for the differently abled
2. Equipping ERUs with GPS trackers, smartphones and dashboard cameras.
3. Enhanced security by continuous monitoring of the network at Data Centre and cyber threat alerting.
4. ERSS Network Monitoring Service, status display of PRI lines
5. Migration of existing copper pair MPLS links to optical fibre.
6. Vehicle mounted cameras and video streaming to PSAP, on demand by ERC
7. Implementation of Mobile Device Management for configuration and monitoring MDTs
8. Web dashboard and mobiles apps for dispatching / monitoring / system health checking.
9. Implementation of ERSS Kiosks (Smart Police Stations)

i. Advanced features using Big Data, AI and Analytics

Various prediction and warning systems and intelligent features will be incorporated to the ERSS system leveraging AI and Analytics to improve the overall performance of the system.

1. Early warning and prediction system based on AI and Analytics
2. Shortest route prediction, human activity monitoring, crowd monitoring etc. leveraging Big Data, AI and analytics
3. AI-driven Chatbot for automated information gathering
4. Prediction Crime – Trend analysis and Hotspot prediction
5. Enabling auto mode operations leveraging AI and Analytics
6. Monitoring and handling of heinous calls
7. Design database solutions using Big Data to improve speed, performance and accuracy of database query processing.
8. Artificial Intelligence (AI) based smart alerts, notifications and data driven decision support.
9. AI based video and audio analytics.
10. Big data analytics for prediction of events and planning preventive measures.

j. Exploration of Drone and IoT Technology for ERSS

Research work is being carried out in R& D lab at C-DAC for exploring technologies like drone and IoT to enhance the ERSS system. IoT based warning systems for ERSS and drones for surveillance and rescue operations is being explored.

Initially a lab deployment will be done and based on the results obtained, pilot deployment at selected places will be done.



k. Digital Mobile Radio Networks and its integration with ERSS

In regions with poor connectivity issues, deployment of Digital Mobile Radio (DMR) network integrated to ERSS will be a good solution for establishing communication between rescue vehicles and ERC. To explore and analyze the impact of this solution, a pilot deployment will be done in a selected state/UT.

In addition to the above, more features are explored through the research facility at C-DAC R&D lab. Once proven, it will be incorporated with NextGen ERSS at an additional cost. Annexure-3 provides a list of all software enhancements envisaged as part of NextGen ERSS and the team.

3 Design Considerations

Project implementation plan needs to be designed based on the objectives and functions of ERSS NextGen ERSS. In addition, it also takes into considerations the know-how and the status and requirements prevailing in the states. To achieve the task of implementing NextGen ERSS country wide, following are some considerations:

1. All States/UTs have implemented a State Emergency Response Centre (SERC) and operationalized in 36 States/UTs. Out of the 36, 28 States/UTs which includes all UTs established PSAP with the support of C-DAC and using the C-DAC's ERSS core solution. The remaining 8 States have implemented SERC from third party solutions. The complete transition to ERSS NextGen ERSS will be considered only in the C-DAC implemented states.
2. To reduce the on-site infrastructure costs per States / UTs, DC will be placed on-site and the proposed DR will be managed leveraging the cloud infrastructure.
3. Maintenance and management of the existing DC and the hardware infrastructure for firewall will be carried out in NextGen ERSS.
4. Immediate replacement of hardware will be considered for States where the warranty of existing hardware has expired or is going to expire. During this process, faulty hardware in other States will also be replaced.
5. In addition to police services, integration to other emergency services like medical, fire, women helpline etc. have already been done in many States/UTs. Currently integration with Disaster Management services is in progress for all states. For those States/UTs wherever, integration to emergency services / helplines is required, will be considered in this phase.
6. Currently, a single dedicated network connectivity is provided between PSAP and associated District Coordination Centres (DCCs) for exchange of data. An additional connectivity from a different Telecom Service Provider would be essential to avoid any chances of single point failures.
7. Interoperability between States will be facilitated. Direct Call transfer / conferencing facility will be facilitated to ALL States
8. ERSS being a unified platform for all services, the volume of data is very high. Studies indicate that the usage will increase as more and more services are integrated. Since all the data has to be securely retained for a long time, a redundant backup facility is envisaged. A DC-DR setup will be considered to ensure high availability.



9. Currently the MDTs deployed are with a warranty for three years. These will be replaced with smartphones. In NextGen ERSS dual SIM cards will be provisioned for smartphones / electronic tablets for addressing the loss of connectivity while in patrolling. GPS trackers and dashboard cameras will be provisioned for ERV.
10. Manpower will be deployed in PSAP of every state for Facility Management Services. The PMU team interacts with the FMS for collecting various details related to PSAP, and providing the support for maintenance activities. Currently they are depending on the PSAP resources availability for working at PSAP. A laptop for the FMS staff will be provided to facilitate faster and dependable communication with PMU and SPoCs.
11. Appropriate phasing of the project at different levels is needed for smooth transition as well as optimal scaling.
12. Key resources need to be mobilized for the project quickly. Accordingly, a technical team will be formed with consultants, knowledge experts, developers and trainers from various domains to provide a cost effective and expeditious implementation.
13. C-DAC intends to incorporate highly advanced features to ERSS solution in NextGen ERSS which requires deep research in these areas. In order to carry out the research in an effective manner, it is required to have an advanced research lab set up with a dedicated team to explore the core domain areas. C-DAC will also consider collaboration with other research/academic institutions for the research activity.

4 Technical Resources and Responsibilities

While enriching ERSS solution with advanced features and intelligence, it is also pertinent to maintain a strong and skilled team of professionals to develop / customize various software components as per the requirements of States on a regular basis. Setting up a Central Project Management Unit (CPMU) at Delhi along with the Single Point of Contacts (SPoCs) for the States / UTs would facilitate timely monitoring and adequate interactions with States/UTs on addressing the issues related to ERSS and hence improving the performance.

A team of 130 engineers will facilitate the software development and customization of the total ERSS solution and also involve in the research and development in advanced areas.

The Project Management Unit comprises a team of 7 members including Project Director, 3 Joint Directors and 2 Principal Engineers and 1 Engineer. We also suggest the need of 2 Senior Technical Associates who have prior experience to guide the entire team in the upcoming advanced areas.

A team of 2 Project Officers will be deputed exclusively for handling all the purchase and delivery and other related administrative tasks during the entire period. The Central Project Management Unit (CPMU) consists of 4 dedicated members who will be positioned at Delhi and will directly interact with the MHA, as representatives of the C-DAC PMU team. They will be responsible for communicating with States, providing periodic reports and other necessary support for MHA.

The team working on each of the domains will be constituted with a Team Leader, Knowledge Experts with deep technology background and a group of developers. Based on the role and experience the development team has:



- Full Stack developers: Work on the client side and the server side of the software.
- Front-end developers: Focus mainly on the view layer of the software and communicate with the business layer.
- Back-end developers: They concentrate mainly on the business logic and data.

Initial team allocation for the various domains/functional roles is as given below:

Table 3: Domain - Team Allocation

No	Technical Domain / Functional Role	Team Size
1.	VoIP and Emergency Signal Processing	10
2.	Web, Standalone, Reporting Applications	15
3.	Mobile Applications	8
4.	GIS Map Generation and Applications	9
5.	Database, Big Data, Server Apps, System Integration	12
6.	Hardware / Network / Security	11
7.	Wireless Communication	7
8.	Artificial Intelligence & Analytics	6
9.	Drones and IoT Devices	5
10.	Testing and Release	4
11.	Training & Content Generation	4
12.	Implementation & Operational Support	12
13.	SPoC and Remote support	12
14.	Project Management	1+6+4
15.	Others (Senior Consultant and Project Officers)	2+2
	Total	130



4.1 Responsibilities of Teams

The main responsibilities of the teams in each domain are listed in the following tables.

Table 4: VoIP and Emergency Signal Processing

VoIP and Emergency Signal Processing		Team Size : 10
1	Evaluation and integration of SIP Trunking	
2	RoIP- VoIP integration for seamless communication between VoIP and Radio network	
3	Web based calls and Adhoc control room concept development	
4	Development and integration of Video calling	
5	Development of Voice messaging feature	
6	Real-time call monitoring and logging	
7	Development of TSP portal for call statistical reporting for each TSP and each state	
8	Call data analytics and pattern prediction	

Table 5: Web, Standalone, Reporting Applications

Web, Standalone, Reporting Applications		Team Size : 15
1	Development of web applications using latest Web Framework with advanced features	
2	Incorporating advanced security features in web applications	
3	Using theming tools for UI Components – Providing theme selection option in standalone applications to make the UI more user friendly.	
4	Implementing Search Engine Optimization	
5	Deployment of Web chat feature in all states	
6	Using AI/Analytics for efficient search and filter – Intelligent search and filter option to load event details based on previous inputs.	
7	Development of web based solutions for standalone applications of ERSS – In place of the existing standalone application, a web based solution will be developed, so that the operations can be distributed.	
8	Incorporating Speech-To-Text technology	
9	Intelligent Dispatch assistance to Emergency Response Units for actionable cases	
10	Integration with National Subscriber Database	
11	Interstate ERSS integration – API integration to transfer data with other states (between CDAC states and also with non CDAC states)	



12	Offline mode implementation for standalone applications
13	Whisper - impart instructions to agents without alerting caller
14	Intelligent SMS filtering – content based/sender based etc.
15	Automated Chat bot – for registering signals
16	Intelligent vehicle dispatch based on traffic and road network
17	Call snooping (quietly listen to conversations) implementation for Supervisor
18	Automated notifications & escalation matrix
19	Browser based CTI Integration – By using web based Real Time Communication (Web RTC), voice communication can be made available to web based applications.

Table 6: Mobile Applications

Mobile Applications		Team Size : 8
1	Enhancing MDT with smart notification - Smart alerts including over speed, patrol route violation, shift change delay will be intimated	
2	Include web chat feature in 112 App - Integration of 112 India application to web chat module, this will help user to chat with the Available call takers in the PSAP	
3	Include additional services in 112 App - New services will be added to 112 India App like Disaster, WHL/CHL, Railway etc.	
4	Video Streaming in 112 India Application - If a user press SOS app itself take a 10 sec video and should be send to PSAP	

Table 7: GIS Map Generation and Applications

GIS Map Generation and Applications		Team Size : 9
1	Intelligent map-switching feature - The GIS Map has a layer switcher in which multiple base layers such as Google map, OSM Map, Here Map, State Map etc. are provided and user can swap between one base map to another and also between various overlays.	
2	View of location of ERVs of all services	
3	Geo-fencing based alerts and escalations	
4	Automated Buffer Analysis - The buffer tool helps to buffer or fence a place in map and the locations within that radius is popped up. The user can directly call that POI or else an emergency SMS to that locations in bulk whose phone nos. are available.	



5	Scenario Reproduction solution - Vehicle trace is possible in GIS map using date and time. From that vehicle playback we can identify vehicle locations on different time period.
6	AI & Analytics based utility for identification of crime patterns, prediction and effective deployment of resources in delivery of emergency services - GIS map will generate heatmap and hotspots based on different filter criteria such as district, event type, data and time etc. Heatmap is a graphical representation of data that shows magnitude of the events in a particular area represented by different colors. Hotspot will shows the density of events based on filter criteria.
7	Offline Map services with purchased Map Data
8	GIS-based tactical and strategic analysis
9	Algorithm development for Routing, Search and Address Decoding
10	Search and other services based on speech to text conversion - System will generate some keywords for landmark search and vehicle search from voice.
11	Vehicle tracking reports from GIS Map
12	Display of verified Rescuer(s) location on GIS Map
13	Display of ERSS Network components and status on map
14	Show missing patrol locations – based on vehicle tracking history

Table 8: Database, Big Data, Server side Applications, System Integration

Database, Big Data, Server side Applications, System Integration		Team Size : 12
1	Design database solutions using Big Data	
2	Installing and Configuring Systems	
3	Ensuring security of all information and data	
4	Monitor system performance by performing regular tests and troubleshooting	
5	Recommend solutions to improve existing databases	
6	Database Documentation	
7	Work with front-end developers to integrate modules	
8	Control access permissions and privileges	
9	Develop, manage and test back-up and recovery process	
10	Enhance query processing by improving speed, performance and accuracy	
11	Tuning SQL commands to enhance performance	



Table 9: Hardware / Network / Security

Hardware / Network / Security		Team Size : 11
1	Setting up DC-DR deployments for all ERSS implementations across all states/UTs to ensure high availability of servers and storage devices between sites.	
2	Software Customization for enabling automatic mechanisms for: <ul style="list-style-type: none"> Real time fail over and fall back from DC to DR with near zero down time Implementing real time failover and data recovery with zero data loss 	
3	Software development for supporting automatic redirection of PSAP operations from DC to DR during DC failure.	
4	Cloud-based solutions for data backup of DC-DR	

Table 10: Wireless Communication

Wireless Communication		Team Size : 7
1	Deployment of Critical Communication Networks such as TETRA /DMR for ensuring high availability of network to public safety personnel / ERV during ERSS operations.	
2	Development of Inter System Interface (ISI) protocol for TETRA/DMR for seamless integration of PMR systems (TETRA/DMR Network) from different vendors.	
3	Development and deployment of Adhoc Network for providing emergency communication during disaster.	

Table 11: Artificial Intelligence and Analytics

Artificial Intelligence and Analytics		Team Size : 6
1	Data Mining and tagging of similar events	
2	AI based shortest route prediction and auto alerts for reducing the travel time for emergency response vehicles and ambulances.	
3	Social media crawling analytics	
4	AI Chat Bot for automated information gathering during disaster events	
5	AI based solution for alerting suspicious search of details in ERSS	
6	Fake news identification and fake image identification	
7	Green Corridor, messages to officers for clearing road	
8	Predictive analytics for past event analysis to identify and extract patterns, population vulnerable to disaster	
9	AI based solution for face recognition from images and real time videos.	



Table 12: Drone and IoT Devices

Drones & IoT Devices		Team Size : 5
1	Design and development of IoT based intelligent solutions for ERSS which will include <ul style="list-style-type: none"> • AI based analysis of signals from IoT devices • Public Warning Systems • Early Warning Systems • Accident Detection Systems 	
2	Design and Development of common protocol for facilitating seamless integration of different IoT devices	
3	Design and development of Drone based solutions for ERSS <ul style="list-style-type: none"> • Setting up of Drone control stations • Setting up of Drone Docking/ Charging stations • Drone Software customization • Remote Drone deployment 	
4	Development of algorithms for safe landing of the Drone at docking station/nearest police station in case of low battery/emergency situations	
5	Development of software algorithms for supporting dynamic GPS co-ordinate update.	

Table 13: Testing and Release

Testing and Release		Team Size : 4
1	Performance Testing of all applications.	
2	Regression/UAT/Automation Testing of all applications.	
3	Prepare test plan and procedures based on new requirements.	
4	Assure that design and functionality meets requirements.	
5	Quality assurance for the product.	

Table 14: Training & Content Generation

Training & Content Generation		Team Size : 4
1	Prepare relevant documents like Product Specification, User Manuals etc.	
2	Prepare course materials and schedule training in all states.	
3	Conducting training and hands-on for all States/UTs.	

Table 15: Implementation & Operational Support

Implementation & Operational Support		Team Size : 12
1	Visit & inspect site readiness.	



2	Installation of hardware, deployment of new software based on Technology upgrade, as per implementation guidelines.
3	Ensure system is up and running.
4	Provide support during training.
5	Provide on-site support for smooth operation of the system.

Table 16 : SPoC & Remote Support

SPoC & Remote Support		Team Size : 12
1	Constant attention and monitoring of the various activities of SERC pertaining to ERSS	
2	Responding quickly to the problems, if any , by discussing with technical team	
3	Follow up of payments and initiate sending of invoices in time	
4	Be in charge of day-to-day communications and operations management	
5	Provide rapid response to service requests and claims	
6	Communicating with CPMU team and updating the status	
7	Regular health check of ERSS Backend system at SERC	



5 Project Implementation Strategy

NextGen ERSS will be implemented across the country in a phased manner and will be completed in FIVE years starting from the signing of contract with MHA. The implementation of NextGen ERSS includes major activities such as upgrading/replacing of hardware, security appliances, network components value addition in software and services. Being an emergency response system, it cannot be shut down, so the transition from the old system to the new system will be carried out with minimum interruption of emergency support service.

After successful implementation, the modernized ERSS will have:

- Hardware infrastructure with more computing power, storage facility and failover mechanism.
- Off-site DR capability for PSAP by providing DR in the Cloud platform as a Service
- Software with intelligent features and enhanced functionalities.
- Upgraded terminal resources for efficient call handling and dispatching.
- Redundant connectivity to ensure high availability.

5.1 State Categorization

The states are categorized as Small, Medium and Large on the basis of the total area, number of districts and the daily volume of distress signals currently handled by ERSS Phase I. Accordingly, the provisioning of hardware, software and connectivity for NextGen ERSS is worked out for each category.

5.2 Guidelines for Implementation

The proposed work is a mission critical project, to be implemented in nationwide at locations with geographical challenges. The delay in governmental procedures related to the approval and transfer of funds affects the complete lifecycle of the project which may cause unmanageable cost overruns and dissatisfaction for the stakeholders. Considering these facts, following guidelines will be followed for the seamless execution of the implementation activities.

- The proposal and provisions to the state will be as per approved Project Implementation Plan (PIP). Since C-DAC is the TSP for the implementation, no separate proposal will be prepared for the States/UTs.
- All fund allocation to the State/UTs shall be done referring to this document.
- All the requirements for the States/UTs shall be provisioned based on the requirements provided as per the PIP. State/UT can request for additional work with the help of C-DAC, provided the additional cost has to be taken by the State/UT.
- C-DAC as the TSP will procure all the required items with the approval from the competent authority of the State / UTs. C-DAC(T) will handle the procurement process for States / UTs for the benefits of bulk purchase.
- The procurement of hardware, connectivity, COTS software and Installations are some of the main challenging activities tightly coupled with the approvals and fund allocations. To facilitate the timely purchase of the equipment and connectivity and get the cost benefits of bulk purchase, the state shall place work order to C-DAC and MHA has to transfer funds as per the payment's terms covered under section **Payment Plan for MHA**.



- The implementation will be done in phased manner. Selection of States/UTs will be done based on the requirements and readiness of the State, to ensure the execution as per the timelines of the project.
- The implementation and maintenance of the NextGen ERSS will be monitored and supervised by the competing authorities of the State/UT. The State must ensure that the committee takes responsibility of timely allocation and transfer of the required funds.
- Along with C-DAC the TSP, State has to provide all the required support and approvals as required for execution of the project activities.
- Other activities of C-DAC as TSP covers the training, maintenance, attending the high level meetings as well as state level meetings, scheduling travels and discussions for planning and execution of the project, providing timely technical support by assigning dedicated Single Point of Contact (SPoC) to each State/UTs, travel, control room visits, sensitizing the senior officials during functional changes, generating required reports and updating MHA with the current status, updating and maintenance of centralized portal, maintenance and support for '112 India App', addition of new features and integration of new services in all States/UTs.

5.3 Provisioning for States/UTs with unified ERSS Solution

The provisions for each state are aligned exactly with the recommendations of MHA shared in 2016. Based on the information collected during our interaction with states and from the analysis of monthly call statistics from states for the past 3 years, slight variations have been incorporated.

The existing hardware including servers, IP Phone, PCs are in continuous use for more than 3 years and are to be replaced with new and advanced hardware, on need basis, in phased manner

The existing MDTs currently being used in Emergency Response Vehicles (ERVs) will be replaced with smart phones.

5.4 Provisioning for States/UTs with third party ERSS Solution

C-DAC has interacted with the eight states (States with third-party solution: Chhattisgarh, Gujarat, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh) to identify their requirements of hardware for the upcoming modernization phase. All these states except Tamil Nadu have conveyed that their current systems are commissioned with all necessary infrastructures in place. On the basis of this assessment, funds for hardware have been allotted to the States / UTs. Since Tamil Nadu has expressed interest in C-DAC system, hardware is provisioned for Tamil Nadu.

However, for the remaining seven states, funds are provisioned for integration of other external systems, for integration of '112 India App', software customization etc.

5.5 Project Deployment Plan

The implementation strategy defined around phasing concept will provide the benefit of smooth and trouble-free upgradation, through efficient utilization of existing resources, improved logistic arrangements and provide appropriate customized solutions based on feedback during deployment.

5.5.1 Considerations

The deployment plan will be based on the following considerations:



- I. **Gap analysis:** Gap analysis will be carried out for each state, in terms of required physical infrastructure, required redundant connectivity and last mile connectivity, IT hardware for call takers & dispatchers, IP phones along with headsets, ACD, CTI, servers etc.
- II. **Service / Capacity expansion:** This activity will be primarily concerned with expanding the capacity at the State level to accommodate the anticipated traffic. Further, it will involve procurement and commissioning of hardware, software and manpower that would be required for expansion of capacity across the country.
- III. **Geographical expansion:** Ensure successful implementation in every district of each State/UT.
- IV. **Feature expansion:** New and additional state of the art features will be deployed in the overall system based on results from the implementation at the pilot level and additional requirements as submitted by States/UTs.

The deployment of modernized ERSS in each State/UT will consist of the following activities:

- Gap Analysis
- Upgradation of Civil Infrastructure, as required
- Upgradation and configuration of Hardware Infrastructure and DC
- Upgradation of Connectivity Infrastructure
- Set up and configure Disaster Recovery (DR) in the cloud platform
- Provide redundant connectivity for PSAP, DCC and DR
- Dual SIM provisioning for Smartphones, provisioning of dashboard cameras and GPS trackers for ERVs
- Upgradation and configuration of the Core Software
- Switching over and commissioning of NextGen ERSS
- User Acceptance Test (UAT)
- Operation and Maintenance (O&M) for FIVE Years.

5.5.2 Handing Over

The final phase of the implementation in a State / UT will be handover and sign-off. This phase will commence on completion of UAT. The key focus of this phase is to ensure that the modernized ERSS operates seamlessly as an integrated and comprehensive solution. This phase will consist of the following activities:

- i. Public awareness campaigns and media coverage
- ii. Internal communication and awareness with in government agencies
- iii. Training on the advanced features to all stakeholders.
- iv. Integration with other systems
- v. Submission of completion report
- vi. Operation & maintenance for FIVE years from the project start date.

5.5.3 Pan-India Roll out

Independent teams for implementation will be deployed for parallel deployment across the country and the hardware infrastructure be augmented / replaced will be completed within 24 months from the start of the project (T0). This includes tendering and procurement period of hardware and



COTS software. Implementation in states will start from T0+6 months, subject to agreements with the states/UTs. The phase wise implementation plan is listed in Table 17.

Table 17: Pan-India Roll out of NextGen ERSS

Implementation Plan for NextGen ERSS		
Group	Start Date (Months)	Name of States/UTs *
I	T0+6 months	Group I States Andaman & Nicobar Islands, Andhra Pradesh, Dadra Nagar Haveli & Daman Diu, Himachal Pradesh, Jammu & Kashmir, Kerala, Lakshadweep, Nagaland, Punjab, Uttarakhand, Tamil Nadu, Chandigarh
II	T0+12 months	Group II States Assam, Meghalaya, Manipur, Madhya Pradesh, Arunachal Pradesh, Chhattisgarh, Goa, Gujarat, Karnataka, Mizoram, Puducherry, Tripura
III	T0+18 months	Group III States Bihar, Jharkhand, Ladakh, Maharashtra, West Bengal, Rajasthan, Delhi, Sikkim, Haryana, Odisha, Telangana, Uttar Pradesh

* Order of implementation may change subject to the readiness of States/UTs.

The major activities to be undertaken during the implementation period are shown in Table 18.

Table 18: List of major activities

Period-1 : First SIX months
<ul style="list-style-type: none"> Study of new requirements and gap analysis Project execution planning Procurement of Hardware and COTS software Design and development of new features and customization of software Replacement of smartphones (in ALL states) Replacement of PCs and other hardware Project management activities Attending various High level meetings at offices of ministries Travel to States / UTs Procurement and extension of connectivity services Placement / extension of Facility Management Staff



Period-2 : Second SIX months
<ul style="list-style-type: none"> • Delivery of hardware to States / UTs • Design and development of new features and customization of software • Replacement of PCs and other hardware • Replacement of Server Infrastructure • Project management activities • Attending High level meetings at offices of ministries • Travel to States • Establishment of DR as IaaS
Period-3 : Third SIX months
<ul style="list-style-type: none"> • Delivery of hardware to States / UTs • Replacement of PCs and other hardware • Replacement of Server Infrastructure • Setting up and configuration of DR • Deployment of Software with enhanced features • Project management activities • Attending High level meetings at offices of ministries • Travel to States / UTs for meetings / deployment / support • Establishment of DR as a Platform as a Service (PaaS)
Period-4 : Fourth SIX months
<ul style="list-style-type: none"> • Delivery of hardware to States / UTs • Replacement of Server Infrastructure • Setting up and configuration of DR • Deployment of Software with enhanced features • Project management activities • Attending High level meetings at offices of ministries • Travel to States / UTs for meetings / deployment / support • Establishment of DR as PaaS

5.5.4 Deliverables

Major deliverables of NextGen ERSS are given below:

Table 19 Deliverables of NextGen ERSS

<ul style="list-style-type: none"> • Upgraded DC-DR Infrastructure and ERUs <ul style="list-style-type: none"> ○ Upgraded server infrastructure at DC ○ Desktop PCs, IP Phones at DC and DCCs ○ Smartphones, Dashboard cameras, GPS trackers for ERUs ○ DR as IaaS in two zones each handling 18 States/UT ○ Scalable and demand based DR allocation ○ Enhanced security for DC using Security monitoring services with Web SIEM and firewall



<ul style="list-style-type: none"> Enhanced Connectivity Services <ul style="list-style-type: none"> Redundant connectivity ensuring continuous service (MPLS, ILL and SIM) Supporting multiple PRI connectivity Increased bandwidth for seamless exchange of data and voice
<ul style="list-style-type: none"> ERSS Software solution enhanced with state-of-the-art technology <ul style="list-style-type: none"> Intelligent operations using AI/ML/Analytics Enhanced NSS portal with advanced dashboard and statistics 112 India App with smart features
<ul style="list-style-type: none"> 100 % geographic coverage and outreach of ERSS Training through online, offline mode M2M integrations with all major helplines and services

5.5.5 Operation and Maintenance

Operation and maintenance will be for FIVE years from the date of delivery. C-DAC will take the responsibility for the maintenance of the total system for FIVE years which starts from the date of acceptance. However, it is the responsibility of the state to carry out periodic maintenance of all physical infrastructure at PSAP and DCC. Operations and maintenance charges will be applicable beyond the total project period of FIVE years and the state can enter into an AMC with TSP.

5.5.5.1 Capacity Building

As a TSP, C-DAC will provide all the necessary training and technical support during the O & M period. The total system (hardware and installed application software) will be handed over to the State/UT on acceptance of the system, and the maintenance and support will start from the date of acceptance, extended for a period of FIVE years. By this time, the state is expected to be equipped to continue using the system and carry out Operation and maintenance. The software will remain with C-DAC and if the state desires any further enhancements or customization the same must be reported to MHA which will be carried out on mutual agreement between state and TSP.

6 Roles and Responsibilities

Clear and effective delineation of roles and responsibilities between various stakeholders is key to the successful implementation of the project. The roles and responsibilities of each stakeholder are defined below:

6.1 Responsibilities of Total Service Provider

- Undertake system study with officials of various emergency services (Police, Health, Fire, Disaster Management)
- Design and architect the modernized ERSS
- Procure / Upgrade all the hardware equipment required to setup the modernized ERSS system
- Upgrade/Replacement of existing faulty hardware required at PSAP and DCC
- Undertake Software customization on mutually agreed terms and conditions



- Procure / Upgrade COTS software for the PSAP as required
- Purchase and coordination of connectivity Services for PSAP, DCC and DR
- Deployment of DR for availability and failover on physical / cloud servers
- Installation and commissioning of modernized ERSS for all states
- Trial-run of the fully integrated system
- Provide hands-on training on modernized ERSS applications to users and administrators at a central location in each state. A digital platform will also be provided for training.
- Deploy Facility Management Staff at PSAP
- Integration of other services and helplines
- Enhancement of the national portal for modernized ERSS
- Upgrade the '112 India App' with smart features
- Provide operational support & preventive maintenance for FIVE years till Mar 2023

6.2 Responsibilities of MHA

- Provide overall guidance to the States/UTs for the implementation of the ERSS Modernization.
- Project Monitoring: NextGen ERSS would be closely monitored at both the Centre and the State/UT levels. At the Centre, MHA would interact extensively with other concerned Ministries in the Government of India, C-DAC, and the State/UT governments for timely and successful implementation of NextGen ERSS. MHA would also establish a reporting mechanism to monitor and document the progress of the project.
- MHA would receive the assessment details from the State/UT for the modernized ERSS State Contact Centre. It would include an assessment of existing IT infrastructure, applications, network, other details and a requirement study of infrastructure required.
- Ensure timely release of funds to C-DAC as per the specified milestones
- Facilitate publicity and awareness of the modernized ERSS

6.3 Responsibilities of States / UTs

- Provide physical infrastructure for State Contact Centre such as physical space, furniture, amenities, including electricity, space rental, alternate power supply, LAN cabling etc. All calls/data messages would mature at the State/UT Contact Centre.
- Provide sufficient manpower like call takers, dispatchers, center-in-charge etc. to operationalize the system.
- Ensure prompt payments of connectivity charges to telecom service providers to avoid disruption in service.
- Deploying and maintenance of vehicles in the field.
- Ensure IT training support and soft skills training to the appointed manpower.
- Maintenance of applications developed/deployed by States/UTs.
- Any solution enhancement or customization required in the deployed solution may be proposed by the State/UT and can be forwarded to MHA for further action.
- Provide support to C-DAC and other designated agencies for the implementation of ERSS- II.



- Ensure timely release of payments to C-DAC, if any, as per the specified milestones
- Carryout UAT and accept the system.
- Operations and Maintenance
 - Identification of nodal officers and the second level officers for coordinating and supporting the activities at the State level.
 - Periodic maintenance of all physical infrastructure provided by the state/UT
 - Provide support to the C-DAC during the operation and maintenance phase
 - Timely submission of MIS reports, raising the concerns and monitoring overall activities of C-DAC at State/UT level.
 - Provide suggestions and support to integrate with other departments/ ministries.
- State/UT Awareness Campaign
 - Support the MHA in building awareness about NextGen ERSS at the State/UT level
 - Take up awareness campaign at the State/UT level aligned with the national campaign
 - Responsible for taking up awareness campaigns within the State/UT.

6.4 Roles and Responsibilities of Other Agencies

Following agencies are engaged for handling the different aspects of the ERSS project:

1. Telecom Service Providers

The State in consultation with DoT shall ensure the roles and responsibilities of Telecom service provider.

- Routing voice calls and SMS to 112 of respective PSAPs,
- Provide access to online subscriber's database,
- Extend access to Gateway Mobile Location Centre(GMLC) for location identification

2. Cloud Service Provider

C-DAC will provide the cloud service for DR systems either through C-DAC's own solution or utilizing third party solutions.

- Provide the specified server infrastructure for hosting the application
- Provide 24 X 7 support as per SLA
- Provide necessary support for Telecom Service Providers for establishing connectivity with DR on cloud
- Provide adequate training required for using the cloud services

7 Project Timelines

7.1 Timelines

- Modernization phase begins with a gap analysis to find the areas of improvement.
- Procurement process of all hardware equipment will be completed in the first six months, though delivery to sites will be based on assessment of requirements for the States / UTs. Hardware will be delivered on-demand basis.
- The software design and development activities will be completed in 12 months.



- Replacement of server hardware will commence six months after start of the project. The older and faulty items will be replaced on priority.
- Replacement of other hardware like IP phones and PCs will be completed in a span of 18 months after procurement. This will also be prioritized based in the order of the expiry of warranty.
- After the replacement of existing servers, the augmentation of the DC and setting up of DR will be carried out. Server replacement including DC-DR setup in all sites will be completed in 2 years from the date of approval of NextGen ERSS.
- Installation of the modernized system will commence from the tenth month, replacing old IT equipment with the new enhanced ones.
- Replacement of smartphones will be completed in 6 months after procurement.
- All replacements will be completed within 24 months followed by installation. Replacement of PCs, IP Phones etc. will be done in third and fourth year on demand basis, if necessary.
- Stabilization of the system and minimal improvisation will be undertaken after the operationalization of the system.

The modernized system will have a minimum lifespan of 10 years. The connectivity and FMS services will be made available for the entire period of the project for the smooth operation of the system.



7.2 Gantt Chart

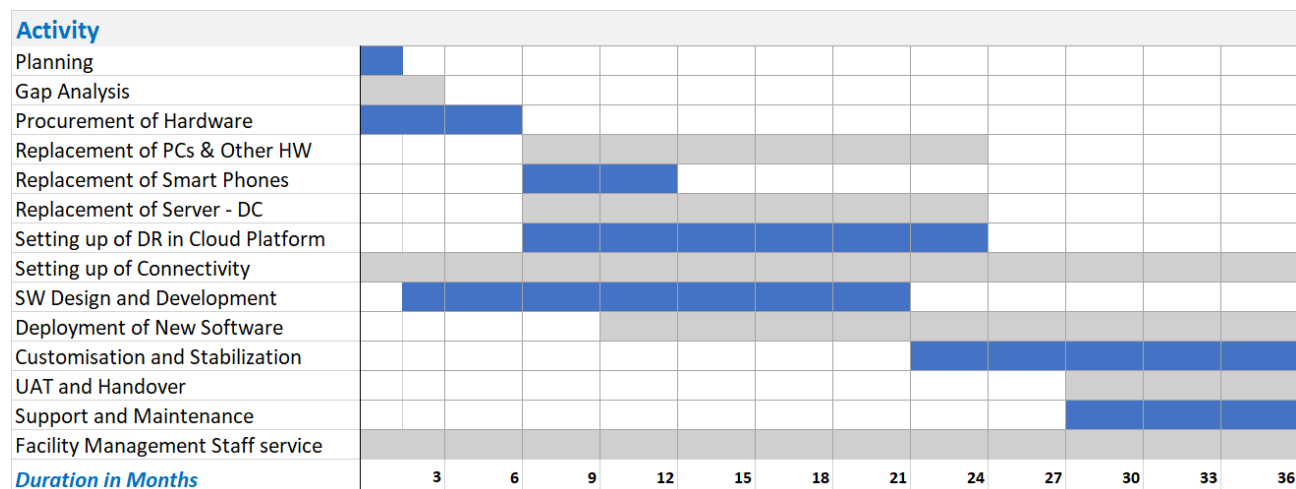


Figure 4: NextGen ERSS Gantt chart

7.3 Memorandum of Understanding (MoU)

When MHA, GoI engaged C-DAC as the solution provider of Computer Aided Dispatching (CAD) solution of Emergency Response Support System (ERSS), an MoU (Contract) was signed between C-DAC and MHA, defining the responsibilities of both parties, during the year 2015. Subsequently, when MHA engaged C-DAC as the Total Service Provider (TSP) for ERSS-112 and an MoU was signed in that regard. The role of C-DAC as TSP was further extended till 31st Dec 2022 vide another MoU (Contract) signed in 2019. Accordingly, the ERSS-112 solution is developed in-house as per MHA's guidelines and deployed in all States and UTs. ERSS-112 is stabilized by now, running successfully across the country.

Now, as the ERSS-112 is getting modernized through another phase of research and innovation C-DAC is entrusted with the role of Central Nodal Agency (CNA) and Total Service Provider (TSP), it is required to sign a fresh MoU between C-DAC and MHA, GoI for engagement of C-DAC till March 2026 for implementation of ERSS Phase-II project. Once the MoU is assigned and PIP approved by the competent authority in MHA, after vetting by the Integrated Finance Division (IFD). Funds will be returned to the CNA (C-DAC-T) as TSP / Vendor under the delegated power of the Program Division Head.



8 Cost Estimation

Cost estimation has been done based on the scope, effort and schedule of the project. The total Project Cost is estimated to be **Rs. 5,31,24,00,000/- (Rupees Five Hundred and Thirty One Crores, Twenty Four Lakhs Only)** inclusive of the actual expenditure incurred for ERSS implementation during the financial year 2021-22 as per the approved Department of Expenditure , Public Finance Central - II. The details are described in the following sections.

8.1 Project Cost

The summary of the project cost for NextGen ERSS is given in Table 20 below. The total project cost covers the cost for hardware, software, connectivity, technical resources, C-DAC services and project management, cloud services etc. During the entire phase of the project, C-DAC will provide sufficient technical manpower which includes knowledge experts, team leads, developers, testers, trainers etc. Manpower charges for the C-DAC technical resources, for **FIVE** years included in the project cost.

Table 20: Project Cost for NextGen ERSS

Summary of Project Cost			
No	Item	Provision to	Total (with GST)
1	Hardware Infrastructure	State	₹ 1,93,08,32,000
2	Connectivity	State	₹ 90,24,63,000
3	COTS Software	State	₹ 40,34,40,000
4	Facility Management Services (FMS)	State	₹ 27,65,45,000
5	Cost for Technical resources	TSP	₹ 90,23,34,000
6	C-DAC Services and Project Management	TSP	₹ 48,18,18,000
7	Cloud services for DR (all States/UTs)	TSP	₹ 22,67,77,000
8	Provision for Contingency	Overall	₹ 18,81,91,000
Total Project Cost			₹ 5,31,24,00,000

* Contingency shall include Central Administrative expenses including IEC activities and shall be expanded with specific approval of MHA.

The provision shown in Table 20 is intra-adjustable depending upon the functional needs. The program division will exercise the power for any change within the heads. Except for item 2, for all the other items the funds will be fully provisioned to TSP. There are two components in item2 as shown in Table 22. Out of these, One Time Charges for connectivity will be provisioned to TSP and the connectivity charges for **FIVE** years will be provisioned to State/UT.

The fund for hardware, one-time charges for connectivity and COTS software allocated for states/UTs (Refer Annexure 1), are provisioned to TSP and the procurement will be done by C-DAC as the TSP, for all



states accepting the solution provided by C-DAC. Any expenditure beyond what is allocated will be funded by the corresponding State/UT. States/UTs can go for additional work with the help of C-DAC or on their own. All these will be done with the approval of state level committee. Details of costing/specification for each item are in following sections.

8.1.1 Hardware Infrastructure

Cost of hardware infrastructure includes cost of server, external storage, PC, IP phone, Smart phones, GPS Tracker and Dashboard Camera. Specifications of each item that is used for the cost estimation is given in below.

Table 21: Details of Hardware Infrastructure

Hardware Infrastructure	
1	<p>Server Hardware for Data Centre</p> <p>A Hyper-Converged Infrastructure (HCI) model of servers are currently installed in the PSAP Data centre of 27 States / UTs with 2 or 3 nodes and a storage server carrying 3-year warranty. The Server infrastructure will be placed on-site and the server hardware sizing will be done based on the State/UT category, population and distress signal receiving history etc. Augmentations of the servers are done with additional nodes to enhance computing and storage power for the next 4 years. Hardware augmentation and maintenance will be done for the DC implemented using physical infrastructure.</p>
2	<p>Next Generation Firewall (NGFW) for DC and DR</p> <p>NGFW provides security by monitoring the network traffic and block potentially dangerous traffic. The HCI servers for DC require powerful NGFW to ensure security of information and access, mainly to facilitate application-level inspection, intrusion prevention and bringing intelligence from outside the firewall.</p> <p>Since DR utilises the cloud infrastructure, leverage the cloud firewall or firewall-as-a-service for providing the required network security.</p>
3	<p>Work Stations, IP Phones, Headsets</p> <p>The Desktop computers with IP Phones and Headsets function as the workstation for Call-Taking and Dispatching. They carry a 3-year warranty currently. It would be essential to upgrade or replace them for efficiency.</p>
4	<p>Network Switches, Routers</p> <p>Need to provide these managed devices with PoE to ensure proper internal and external connectivity of ERSS network with the best throughput.</p>
5	<p>Smart Phone with MDM license</p> <p>To provision the Emergency Response Vehicles (ERVs) with 6.2" smartphones to function as the communication device between the PSAP and ERV. This will replace the current 8" electronic tablets mounted on the vehicle.</p>



6	GPS Tracker A device mounted on ERVs and depicted to transmit GPS location of the vehicle on a regular interval to the PSAP.
7	Dashboard Camera, storage / transmission A portable camera placed on the dashboard of the vehicle for recording the ambience and incidents while an ERV is on a mission to assist distress events reported.
8	Unified Voice Gateway Hardware acting as an interface between ERSS network and Telecom exchanges to facilitate reception and transmission of voice calls. Gateways currently deployed carry a 3-year warranty. They need to be maintained or replaced during the subsequent phase of operations.
9	Laptops for Facility Management Staff A Laptop per PSAP for the FMS staff in duty to generate reports and send to SPoCs / CPMU. FMS shall login and maintain sessions for interactions with C-DAC PMU and CPMU.
10	External Storage The Storage Array with the following capacities : For large states, 25 TB usable in RAID-10 using SSD Drives. (12G SAS) 475 TB usable in RAID-5 using 8TB 12G LFF SAS Drives. For medium states, 15TB usable in RAID-10 using SSD Drives. (12G SAS) 285TB usable in RAID-5 using 8TB 12G LFF SAS Drives. For small states, 10TB usable in RAID-10 using SSD Drives. (12G SAS) 190 TB usable in RAID-5 using 8TB 12G LFF SAS Drives.

8.1.2 Connectivity Services

Break-up of connectivity cost is shown in Table 22. It includes OPEX which is the cost of dual connectivity between DC – DR, PSAP – DCC, internet connectivity and SIM connectivity charges for a period of FIVE years for all states/UTs and One Time Charges (CAPEX) for last mile connectivity.

Table 22 : Connectivity Costs

Connectivity (MPLS, ILL, SIM) Cost			
No	Item	Provision to	Total (with GST)
1	One Time Charges for connectivity at PSAP & DCC	State	₹ 17,65,28,000
2	Connectivity charges for 5 years (OPEX)	State	₹ 72,59,35,811
	Total Connectivity Cost		₹ 90,24,63,811



Table 23: Details of connectivity services

Connectivity	
1	MPLS (Primary + Secondary) Currently, a single dedicated network connectivity is provided between PSAP and associated District Coordination Centres (DCCs) for exchange of data, voice and other multimedia between them. An additional connectivity from a different Telecom Service Provider would be essential to avoid any chances of single point failures.
2	Internet Leased Line – ILL (Primary + Secondary) Currently, the internet facility connecting PSAP DC with external systems or devices is provided as a single internet leased line. There should be redundant connectivity to supplement and balance the load of communications from external units. The redundant ILL shall be taken from a different TSP than the primary one
3	SIM Charges SIM cards for the MDTs were provisioned for three years. The NextGen ERSS would require new SIM cards for smartphones, GPS trackers and dashboard cameras.

8.1.3 COTS Software

COTS software cost includes cost of various Commercial software and tools that will be procured for each state as part of ERSS. Provision has to be made for purchase of these software. Details of the COTS software is given below.

Table 24: Details of COTS software

COTS Software	
1	Operating System for Servers Linux-based operating system licenses required for the 10 Virtual Machines (VMs) created on the HCI hardware. Enterprise class licenses with unlimited VM option would be required with 5-year warranty
2	Enterprise Database Server Enterprise class Postgres Plus Advanced Server with PostGIS extension with 1-year warranty is required for DC and DR units. The entire operational data with other static datasets will be stored in this SQL-based data store.
3	Enterprise Application Software The container of all user-created server applications that provide resource management and dynamic database connectivity is required with 1-year warranty



4

Security Operations Centre(SOC)with WebSIEM

A Security Operations Centre with Web Security Information and Event Management will be used for continuous monitoring of the network and raising alerts on identifying cyber threats.

8.1.4 Facility Management Services (FMS)

Facility Management Staff will be deployed in all states who will be responsible for managing the total system on a 24X7 basis. They will be well trained on the system and will be involved in all activities right from the installation to the maintenance of the system till March 2026. They will assist the users in the ERC and interact with the PMU team. They will do periodic monitoring and report to MHA if any concerns are raised by the users.

Cost for FMS Indicates the salary required for FMS team to support for the duration of the project. Four FMS staffs were provisioned by MHA to each state for Phase I. As per the states' requirements, the number of FMS staffs allotted for States/UTs were reduced for some States/UTs. For NextGen ERSS, FMS staffs are provisioned for States/UTs based on the state PSAP functional requirements. At least 3 FMS will be required in Small and Medium states and 4 FMS will be required in large states. Same number of FMS staff would be required for the subsequent years also for onsite support.

8.1.5 Techno-Managerial Resources

Cost for Techno-Managerial Resources gives the details of the manpower provisioned for the technical team involved in development, implementation and support. As part of the modernization of NextGen ERSS, around hundreds of new advanced features will be incorporated to the ERSS solution. This modernization process requires a lot of technical activities such as the design, architect, implementation, system integration, testing and deployment of the developed solution.

The cost for Techno-Managerial Resources is based on their percentage of involvement in the project. **Appendix 3** provides the details of cost estimation for technical resources.

8.1.6 C-DAC Services and Project Management

Cost estimation for C-DAC Services and Project Management is given in Table 25 below. The various services and project management activities for NextGen ERSS are listed in Table 26 below. A small amount is provisioned for contingency to meet any unforeseen expenses that may incur during the course of the project.



Table 25: Cost for C-DAC Services and Project Management

C-DAC Services & Project Management		
No	Item	Total (with GST)
1	Travel Cost	₹ 9,94,03,000
2	Training Cost	₹ 5,26,28,000
3	Project Management	₹ 16,45,87,000
4	Research Facility	₹ 5,90,00,000
5	Integration of services and helplines	₹ 10,62,00,000
	Total Cost	₹ 48,18,18,200

Payment for C-DAC Services and Project Management will be based on actuals.

Table 26: Details of Project management and C-DAC Services

C-DAC Services and Project Management	
1. Project Management	Working in collaboration with MHA, Resources Management, Planning, Execution and monitoring.
2. Interaction with states and other agencies	<p>C-DAC PMU team will interact with</p> <ul style="list-style-type: none"> MHA officials for the overall project management State officials for the successful implementation of NextGen ERSS. State departments for project coordination activities Other agencies like Telecom Service providers for establishing connectivity.
3. Integration of other services and helplines	While Police, Medical and Fire services are integrated with ERSS, other services like NDMA, Railways and Women helplines are in the process of integration. NextGen ERSS will provide integration with other services/helplines such as CCTNS, Coastal Services etc. and with any other services as required by the state.
4. Travel&Logistics	Travel and logistics includes travel and stay across the country for management, attending high level meetings, other supporting technical discussions with States and UTs. Right from the commencement of the project, the team will have to travel throughout the country. The travel and logistics during the entire phase of implementation includes:



<ul style="list-style-type: none"> • Travel to MHA for CPMU meetings • Travel to States /UTs for high level meetings • Travel to States/UTs for study and discussion • Travel and logistics for installation and implementation in all districts of states • Travel to non-C-DAC states for integration of services • Travel and logistics to states for awareness and training • Travel to states/UTs for post installation support
<p>5. Training</p> <p>C-DAC will provide hands-on training on modernized ERSS applications to users and administrators at a central location in each state. A digital platform will also be provided for training.</p>
<p>6. Other activities</p> <p>The PMU team will also involve in</p> <ul style="list-style-type: none"> • Coordination activities • Resource management
<p>7. Engaging third party agencies</p> <p>C-DAC may engage third party agencies if required to expedite installation and completion of work within time. Technical expertise of other C-DAC centre's may be used during the development and deployment phase. Guidance/support may also be sought from premier academic institutions of the country for the research/development activities.</p>
<p>8. Map data, Subscriber Data updation</p> <p>C-DAC will facilitate the periodic update of information like subscriber data and digital map data on a regular basis.</p>
<p>9. Provision for R&D setup to enhance ERSS</p> <p>Research is an integral component of any development activity. In order to carry out the research in an effective manner, it is required to have an advanced research lab set up with a dedicated team to explore the core domain areas. C-DAC intends to setup an advanced research lab for continuous research on areas such as IoT, Drones, AI and Analytics, Big data and voice/multimedia solutions. C-DAC may collaborate with other research/academic institutions for this activity.</p>
<p>10. Provisions for contingency</p> <p>For covering any unforeseen expenses pertaining to purchases, connectivity services, publicity, organizing promotional events etc. during the implementation of the project.</p>



8.1.7 Cloud Services for Disaster Recovery

The DR Infrastructure is proposed as an additional set up required for all the States/UTs. A DR infrastructure is the facility required for recovering and restoring the system and its operations when the primary Data Centre becomes unavailable. In order to reduce the expenditure for setting up the physical infrastructure, the DR will be implemented as IaaS leveraging the cloud platform. The capital cost will be reduced and the service will be availed as pay and use.

8.2 Year-wise Breakup

Table 27: Year-wise Cost breakup

Description	Year-3 (2023-24)	Year-4 (2024-25)	Year-5 (2025-26)
Hardware Infrastructure	91,22,60,640	70,46,48,063	23,16,99,840
Connectivity	25,62,78,631	30,91,21,554	30,08,21,017
COTS Software	22,18,92,000	14,12,04,000	4,03,44,000
FMS	12,36,42,774	6,91,36,250	6,91,36,250
C-DAC Manpower (Technical Resources)	40,43,36,530	26,31,42,027	15,64,40,417
C-DAC Services & Overall Project Management	15,07,09,920	12,04,54,500	9,63,63,600
Cloud Services for DR	11,33,88,500	5,66,94,250	5,66,94,250
Total	₹ 2,18,25,08,995	₹ 1,66,44,00,644	₹ 95,14,99,374

* This includes an amount of ₹ 11,94,51,452/- to be claimed by C-DAC as arrear in 2023-24 for the manpower expenditure of 2022-23.

Note:

- An amount of ₹ 14,01,69,050/- was received by C-DAC for the actual expenditure incurred for ERSS implementation during the financial year 2021-22.
- An amount of ₹ 18,56,01,695/- was released by MHA to CNA account of C-DAC during the financial year 2022-23 for the expenditure incurred for ERSS implementation during the financial year 2022-23.

8.3 Funds allocated for States/UTs

The funds allocated for States/UTs under Capital Expenses (CAPEX) and Operational Expenses (OPEX) are as below.

CAPEX cost includes cost for:

- Hardware at PSAP and DCC
- COTS software



- c) Other items like smart phones, dashboard camera and GPS tracker

OPEX cost includes:

- a) Annual Connectivity charges (MPLS, ILL, SMS, SIM cards, DR) for 5 years
b) One Time Charges for last mile connectivity
c) Facility Management Staff (FMS)

Estimation of quantities for each state has been done on the basis of traffic volume expected and state categorization. The costing related to FMS manpower, workstations may vary as per the final requirements from the states.

Non-C-DAC states may require funds for modernization of the existing systems and also for integration with other systems. Allocations are made considering these factors and are included as OPEX cost.

The summary allocation of funds for the States/UTs is given in **Appendix-1** for reference. The state-wise summary of various components allocated for States/UTs in NextGen ERSS is given in **Appendix-2**.



9 Payment Plan

Payment plan is prepared based on the experience during the implementation of Phase I and foreseeing the risk factors in the execution of the proposed project activities nationwide. The detailed payment plan is given in Table 28.

9.1 Payment Plan for MHA

In order to avoid schedule slippages in the implementation phase, timely release of the required funds to CNA by MHA is necessary. This will also facilitate timely procurement of equipment, connectivity etc. and also to avail the financial benefit of bulk purchase. MHA will release payment to CNA as per the plan given in the tables below:

Table 28: Payment Plan

Payment Plan for NextGen ERSS		
No	Milestone	Payment
1	Signing of MoU with MHA	40 % of hardware 25 % Cloud Services 25 % Connectivity One-time charges 10 % COTS Software 25 % FMS charges 20 % Project Management
2	Completion of 6 states	15 % of hardware 25 % Cloud Services 25 % Connectivity One-time charges 20 % COTS Software 25 % FMS charges
3	Completion of next 6 states	15 % of hardware 20 % COTS Software 20 % Project Management
4	Completion of next 6 states	15 % of hardware 25 % Cloud Services 25 % Connectivity One-time charges 20 % COTS Software 25 % FMS charges 15 % Project Management
5	Completion of next 6 states	15 % of hardware 20 % COTS Software 15 % Project Management
6	Completion of the DR setup for all states	25 % Cloud Services 25 % Connectivity One time charges 10 % COTS Software 25 % FMS charges 15 % Project Management
*Includes travel expenses which will be claimed at actuals after every quarter		
Technical Resources – Payment Plan		
1	End of every quarter	100% of manpower cost as per claim



9.2 Registration Details

1	GSTIN	32AAATC0934H2Z8
2	PAN	AAATC0934H
3	Legal Name	CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING
4	Trade Name	C-DAC TECHNOLOGU PROMOTION CENTRE
5	Registration Details under Existing Law	
ACT		Registration Number
(a)	TIN under Value Added Tax	32010655522
(b)	Central Sales Tax Registration Number	32010655522C
(c)	Central Excise Registration Number	AAATC0934HXM003
(d)	Service Tax Registration Number	AAATC0934HST011
Electronic Payment Details		
	Beneficiary	C-DAC, Thiruvananthapuram
	Name of the Bank	Canara Bank, (Erstwhile Syndicate Bank), C-DAC Campus, Vellayambalam, Thiruvananthapuram-695033, Kerala
1	Account Type	Central Nodal Account
	Account Number	110077159161
	IFSC/RTGS Code	CNRB0014019
	MICR Code	695015908
2	Account Type	Zero Subsidiary Account
	Account Number	110077347847
	IFSC/RTGS Code	CNRB0014019
	MICR Code	695015908

9.3 Contact Details

Technology Promotion Centre
 Centre for Development of Advanced Computing (C-DAC)
 Vellayambalam, Thiruvananthapuram 695 033
 Phone: +91-471- 2311704; Fax: +91-471-2311703
 Email: tpc@cdac.in; www.cdac.in



10 Glossary

Table 29: List of Abbreviations

List of Abbreviations	
ACD	Automated Call Distribution
AI	Artificial Intelligence
CCTNS	Crime & Criminal Tracking Network and Systems
C-DAC	Centre for Development of Advanced Computing
CNA	Central Nodal Agency
COTS	Commercial Off-The-Shelf
CPMU	Central Project Management Unit
CTI	Computer Telephony Integration
DC	Data Center
DCC	District Coordination Centre
DR	Disaster Recovery
ERSS	Emergency Response Support System
ERV/ERU	Emergency Response Vehicle / Unit
FMS	Facility Management Services
GFR	General Financial Rules
GIS	Geographical Information System
GMLC	Gateway Mobile Location Centre
GPS	Global Positioning System
HCI	Hyper Converged Infrastructure
ILL	Internet Leased Line
IoT	Internet of Things
IP	Internet Protocol
LBS	Location Based Services
LEA	Law Enforcement Agency
MDM	Mobile Data Manager
MDT	Mobile Data Terminal
MHA	Ministry of Home Affairs
MIS	Management Information System
MPLS	Multiprotocol Label Switching
NCRB	National Crime Records Bureau
NDMA	National Disaster Management Authority
NGFW	Next Generation Firewall
NSS	National Support Service



PMU	Project Management Unit
PoE	Power Over Ethernet
PSAP	Public Safety Answering Point
SERC	State Emergency Response Centre
SIEM	Security Information and Event Management
SIM	Subscriber Identity Module
SLA	Service Level Agreement
SMS	Short Messaging Service
SOC	Security Operations Center
SOP	Standard Operating Procedure
SOS	Save Our Souls
TSP	Total Service Provider
UT	Union Territory
VM	Virtual Machine