Centre for Development of Telematics
C-DOT Campus, Mehrauli,
New Delhi -110030

<u>Collaborative Development of Public Warning Alert Siren System</u>

1	**Problem Statement**	Development of Public Warning Alert Siren System
2	**Technology Area**	APPN

3	**Project Introduction**	The alert siren system is an effective media to disseminate alerts in the form of tone(s), pre-recorded messages, and live public announcement in the event of disasters like flood, cyclones, tsunami, etc. This system is capable of alerting the large number of vulnerable populations in a very short span of time during disaster events. This enables administration to effectively manage the rescue and rehabilitation operations more effectively.
		
		 The siren system is installed in coastal areas, landslide prone hilly or mountain areas, industrial zones, dams, riverbanks, etc. The installation in such vulnerable locations helps reduce the loss of life and property.
		
		 The Public Warning Siren System comprises of following major components:
		
		 1. Central Control Unit (CCU): Located centrally for triggering of the remote sirens.
		 2. Remote Siren Unit (RSU): Installed at the multiple remote locations. The CCU located at a central location has geo-mapping of all the remotely deployed Siren Units. Based on the dissemination message, alert tone, pre-recorded message, or live public announcement are send towards the selected siren unit(s).
		 This siren unit consist of following sub-units packed in a single cabinet,
		      a) Remote Terminal Unit (RTU),
		      b) Audio Amplifier Unit (AAU),
		      c) Power Supply Unit (PSU)
		 The RTU process the received alert message (audio file) and is amplified by AAU and feed to the High Power Speaker Array/Industrial Sirens. Based on the audio output power, single siren unit could cover an area of 2-3kms radius.
		
		 The CCU and remote siren units are connected through multiple network connectivity such as Fibre, Cellular, VHF, and Satellite. Fibre is the primary connection medium, and others alternative connectivity act as a fall back secondary medium. The network connectivity between CCU and RSU is mainly IP based.
		
		 The Alert Siren System is a critical media for integration with C-DOT CAP Platform and has huge potential for countrywide deployment. Also, as foreign countries are so interested in deployment of CDOT CAP based alert system in their countries, Siren system will have a good business opportunity in India as well as abroad.

C-DOT invites participation from the suitable Indian entities capable of partnering with C-DOT in collaborative development of project led by C-DOT for rugged disaster Remote Siren Unit (RSU) including Remote Terminal Unit (RTU), Audio Amplifier Unit (AAU), and Power Supply Unit (PSU).

The potential participants should have demonstrable expertise in the early warning system development and deployment including hardware & software development, supply chain management, PCB assembly, system testing, and field deployment experience along with support related to alert sirens.

Through a process of rigorous technical evaluation, C-DOT shall select participants, holding the most promising track record for delivering commercial grade products, as its collaborative development partners ("Partner") in the project. In order to achieve a rugged, field deployable solution, C-DOT would prefer to select multiple Partners for the same work item, as deem appropriate.

4	Project Description	Project is aimed to design a prototype of rugged and commercially deployable Remote Siren Unit (RSU) along with the housing cabinet/enclosure.

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The brief description of subunits to be developed as part of the project is as below:

Sno.	Parameter	Description
1	Remote Terminal Unit (RTU)	This unit is connected over network with the Central Controller (e.g., C-DOT CAP Platform) and process the alert messages (audio file or text to speech conversion) received from the Central Controller. It has network connectivity interfaces (such as fibre, cellular, satellite) for data receive/transmit along with control and management interfaces. This unit will have IP based network connectivity interfaces.
2	Audio Amplifier Unit (AAU)	The alert messages audio file from RTU is feed to this unit, which then suitably amplified and feed it to high power speaker array for alert dissemination to general public.
3	Power Supply Unit (PSU)	This unit is responsible to supply stable power to all the components of the RSU. It has surge and lighting protections. This unit manages power supplies directly from AC mains, Solar Powered batteries, or any other available sources.
4	Cabinet/Enclosure	It houses RTU, AAU, PSU, and all other accessories related to Alert Siren. It is designed to protect the elements placed inside it from harsh weather conditions, dust, rain, rodent, insects, etc. It can be a standard 19" telecom rack with appropriate height (in U) as per the system requirements.

5	Scope of work	The RSU prototype design will include the PCB design of RTU, AAU, PSU, and housing cabinet/enclosure. The scope of work for this collaborative project is as follows: • PCB design (schematic, layout, routing, etc.) of RTU, AAU, PSU and Gerbers generation. • PCB design should follow best practices of EMI/EMC considerations and hardware design guidelines. • Component procurement as per the finalised Component List (CL) and Part List (PL). Chipset, Processor, SoC, and other components available from Indian OEM and meeting the required specifications for the design will be preferred. • The collaborator should directly interact with all the chipset and components suppliers for getting the required technical support/clarifications. Any NDA required with the suppliers to be done by the collaborator directly. • PCB fabrication based upon the generated Gerbers. • PCB assembly and inspection. • Arranging/procuring hardware and software/firmware tools required for development environment and programming of image on the target system (including emulators). • Software development for the product features as per the system requirements (like porting of the OS and required platform software, drivers, APIs/library, etc.). • Hardware testing of the assembled PCBs (board bring up) and integration of software modules with assembled PCBs. • Development of Control Plane, Data Plane and Management Plane Software. • End to end integration testing with C-DOT CAP Platform. • The collaborator is required to build 10 proto systems. • Ruggedised Cabinet/Enclosure unit design and manufacturing as per the system requirements, environmental conditions and with required thermal cooling provisions.

- Development of the chassis management and fault management software.

- The collaborator should prepare the required system (hardware, software and testing) documentation for the boards and system, as required for production of the system.

- The collaborator should submit a project plan for implementing the scope of work and will be required to submit fort-nightly status updates on the progress of the planned work.

- Field deployment at prospective customer site(s) and testing for Proof of Concept (PoC) of the designed system.

- Providing field support to the customer.

- Transferring of production knowhow to the C-DOT approved partner(s).

The final outcome of the collaborative development project will be a rugged and commercially deployable Remote Siren Unit (RSU). The project outcomes can be further licensed back to collaborative partner(s) or to any other interested participants or third parties, capable of its mass production, marketing, and deployments for end users, directly or in association with system integrators.

6	**Project Deliverables**	Design and development of rugged and commercially deployable Remote Siren Unit (RSU) along with all the subsystems and standard enclosure as described in section 4 of this document. The partner(s) will develop minimum of 10 prototype systems initially as part of this project which may be increased as per the project requirement.

7	**Roles & Responsibilities of C-DOT**	C-DOT shall lead the project and actively involve with collaborator in creating respective unit level block diagram/ system architecture, component finalisation and review the entire PCB design cycle till Gerber generations of the RTU, AAU, and PSU. It will facilitate and extend support for validation and testing of the final solution. It will provide technical direction and financial support to the Partners selected through a process of evaluation and due diligence conducted by a committee of subject experts. Wherever deemed feasible, C-DOT may arrange equipment resources, testing infrastructure, assistance with respect to the mandatory clearances, statutory permissions, technical consultancy, know-how of existing design and provide funding to the Partners in realizing their respective target deliverables. C-DOT will license the final solution for mass production and deployment. Royalty proceeds received from licensing shall be shared with the developing Partner/s in ratio of the assessed value of each partner's respective contribution determined through mutual discussions while finalizing the product architecture. C-DOT shall engage with Partner/s on a non-exclusive basis and shall retain its right to develop similar products / through other developmental programs.
8	**Roles & Responsibilities of Participants**	Role of the collaborative partner(s) is broadly outlined in Section 3 (Scope of Work) of this document. The partner(s) may build the required module with pre-existing background facilities available with them. All concerned partners shall own the foreground technologies developed by them individually or collectively as the case may be. The partners may utilize the available test and infrastructure facilities offered by C-DOT with no financial implication for its usage. Participation in the project shall be on nonexclusive basis. All partners shall be required to demonstrate commitment to the project by entering into a formal agreement with C-DOT as per the CCRP policy.
9	**Ownership of Background & Foreground IP**	New foreground technologies created during the project shall be owned by the respective development partners, individually or collectively as the case may be. Any agreement required for collective ownership shall be settled directly by the concerned partners. C-DOT will own the IPR of the developed solution and the related foreground technologies created during the project. Decision for collective ownership of the solution with the collaborative partner(s) will solely at the discretion of C-DOT.

10	**Format of response**	Companies / organizations / institutions / individuals from India who is/who are developing the enabling technologies / modules / components / subsystems / products in this area are required to respond to this document in the format provided at the bottom of the webpage with below mentioned URL: **https://www.cdot.in/cdotweb/web/ccrpProposals.php**
11	**Submission Procedure**	A separate response shall be emailed to connect-ccrp@cdot.in, not later than three weeks from the date of release of this document.
12	**Acronyms and Abbreviations**	API – Application Programming Interface AAU - Audio Amplifier Unit CAD - Computer Aided Design CCRP CAP – Common Alerting Protocol C-DOT – Centre for Development of Telematics CCRP - Collaborative Research Program EMI – Electromagnetic Interference EMC – Electromagnetic Compatibility PCB – Printed Circuit Board POC – Proof of Concept PSU - Power Supply Unit RTU - Remote Terminal Unit VHF – Very High Frequency

Technology Areas (XXXX)

APPN	Advanced Telecom Applications
PQC	Post-Quantum Cryptography
QKDC	Quantum Communication
TSPT	Transport Technologies (Routers, Switches, Aggregators)
TVLA	Test Vector Leakage Assessment
CPA	Correlation Power Analysis
DPA	Differential Power Analysis
EMA	Electromagnetic Emission Analysis
SCA	Side Channel Analysis
OTHR	Other

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