Centre for Development of Telematics
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Collaborative Development of Low-Cost Handheld NavIC Messaging Receiver

1	Problem Statement	Development of Low-Cost Handheld NavIC Messaging Receiver
2	Technology Area	APPN
3	Project Introduction	NavIC is an independent regional navigation satellite system developed by ISRO. It is designed to provide accurate position information service to users in India as well as the region extending up to 1500 km from its boundary. Additionally, to the primary functionality of positioning information, this system allows broadcasting of short messages. These messages can be related to alerts, forecast and directives on the occurrence of natural disasters like Floods, Earthquake, Tsunami, Cyclones, Landslides etc. and dangers for the safety of life in areas with poor or no communication infrastructure. In order to receive the alert messages from NavIC satellite system, a suitable low-cost receiver terminal is required for the end users. Currently available receivers in the market receives the raw data/message from the satellite and then transmits the received raw data over Bluetooth connectivity. An application running on a smart device like mobile phone having Bluetooth connectivity can decode and display the messages to the user. Due to this, end user requires to carry two devices i.e., the NavIC receiver and a smartphone as well as to maintain the sufficient battery charging of these devices. This issue can be resolved by combining the NavIC receiver within a battery power handheld device with display. The NavIC messaging is a critical media for alert dissemination and is already integrated with C-DOT CAP Platform and has huge potential for countrywide deployment. Also, as the coverage of NavIC satellite system extends upto 1500 km beyond Indian territories, these receivers will have a good business opportunity in India as well as in Indian Subcontinent. The possible end users of this product will be the ships and fishermen in high sea, security forces in border areas, population living in remote areas with no terrestrial communication network connectivity. 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 prototype development of a low power portable/handheld NavIC messaging receiver unit. The potential participants should have demonstrable expertise in the product design, development and deployment including the supply of chipset/SoC compatible with NavIC message receiving, hardware & software development, supply chain management, PCB assembly, system testing, and field deployment experience along with related technical support.

		Through a process of rigorous technical evaluation, C-DOT shall select participant(s), 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 low cost, rugged, and field deployable solution, C-DOT would prefer to select multiple Partners based on expertise for the project, as deem appropriate.

4	Project Description	Project is aimed to design a prototype of commercially deployable low power handheld NavIC Messaging Receiver. The brief description of the major components to be used for receiver development as part of the project is as below: **i. NavIC Receiver Chipset/SoC** The Processor/SoC with suitable number of cores will perform operations like the signal acquisition, message decoding and output to interfaces. Additionally, the same SoC or separate a processor will do other board management function. Chipset, Processor, SoC, and other components available from Indian OEM and meeting the required specifications for the design will be preferred. **ii. Display** Suitable industry standard displays recommended for portable device like LCD, OLED, etc. may be used for display of the alert message. **iii. Battery Unit** An appropriate rated battery will be identified and used to power up the portable receiver. The capacity of the battery so chosen should last for 48 to 72 hours or more for operation. Battery consumption minimisation and system sleep mode function would be implemented for longer battery availability. **iv. Enclosure** It will be designed to protect the component placed inside and should be of rugged nature. **v. Software Program** All the software required (OS, Applications, drivers, etc.) for functioning of the NavIC receiver will be developed and ported.

5	Scope of work	The prototype design will include the PCB and enclosure design of the NavIC receiver. C-DOT will design and develop the PCB related CAD work (schematic, layout, routing and gerber generation).

The scope of work for this collaborative project is as follows:

- NavIC Processor Chipset and related design files supply by the partner, preferably of India make.
- Component procurement as per the finalised Component List (CL) and Part List (PL).
- 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.). C-DOT will supervise this activity.
- Hardware testing of the assembled PCBs (board bring up) and integration of software modules with assembled PCBs.
- 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.
- 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 handheld NavIC receiver. 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 Low-Cost Handheld NavIC Messaging Receiver 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 entire PCB design cycle till Gerber generations. 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**	CAD - Computer Aided Design CAP – Common Alerting Protocol C-DOT – Centre for Development of Telematics CCRP – C-DOT Collaborative Research Program IPR – Intellectual Property Rights ISRO – Indian Space Research Organisation LCD - Liquid Crystal Display NavIC - Navigation with Indian Constellation NDA – Non-Disclosure Agreement OLED - Organic Light Emitting Diode PCB – Printed Circuit Board PoC – Proof of Concept SoC – System on Chip

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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