Collaborative development of Text to Speech conversion for Indian English and Indian vernacular languages

1	**Problem Statement**	Development of Text to Speech (TTS) conversion for Indian English and Indian vernacular languages
2	**Technology Area**	APPN
3	**Project Introduction**	In disaster management domain effective Text to Speech (TTS) solution has an important role in disseminating disaster early warning. Particularly audio message alerts in Indian accent and Indian vernacular language will help common people understand disaster alerts take necessary actions based on them to protect precious lives and properties. The Text to Speech solution will be used to generate audio message for dissemination over different media like Radio, TV, Mobile App, Website etc. C-DOT invites participation from the Indian start-ups/ organizations/ research and academic Institutions in a collaborative solution led by C-DOT for Text to Speech solution in Indian accent for Indian English and Indian vernacular languages. The potential participants should have domain expertise in Speech Synthesis, Text to Speech related technologies. The support of Indian Accent and Indian vernacular languages are mandatory requirements. The final outcome of the collaborative development project shall be a working solution that can be integrated in software application programmatically. Through a process of rigorous technical evaluation, C-DOT shall select participants holding the most promise of delivering commercial grade outcomes as its development partners ("Partner") in the project. In order to achieve an efficient, accurate and production ready solution, C-DOT would prefer to select multiple Partners for the same work item wherever feasible.
4	**Description**	The TTS solution must produce accurate speeches in Indian Accent and in Indian vernacular languages so that it can be easily understandable by common citizens. The solution must follow the bellow mentioned specifications:

S.No.	Parameter	Description
1	Language Support	Indian English, and 22 scheduled Indian Languages
2	Supports Text Normalization in speaking	**i. Address**- Processes Indian addresses, including district, city, village, block, etc. places names **ii. Abbreviations**- Handle abbreviations list of provided values **iii. Date and Time-** Process date and time statements such as: 14:00:00 hrs; from 15:30 hours IST of today the 17/06/2022; at 0230 IST of 11.05.22; from 15:15 Hrs IST of date 20.04.2022; etc. **iv. Ordinal Numbers-** Process ordinal numbers: 1st as first, 2nd as second, etc.

			v. Numbers- Handle numbers (year, telephone numbers, digits) **vi. URL, E-mail, File name-** Handle URL address, e-mail, file name extensions in the text message **vii. Currency-** Processes currency amounts specified either with monetary symbol such as ₹, or as associated abbreviation like INR. **viii. Units of measurements-** Should handle terms for measurement of distance, speed, time, etc. like km, kmph, s, etc. **ix. Special Characters-** Handling of characters like -, /, &, etc. e.g., '30-40 kmph' should be read as 'thirty to forty kilometer per hour'.
	3	Voice Qualities	**i. Type of Voice-** Female and male **ii. Accent-** Indian **iii. Sampling rate-** Configurable **iv. Audio type-** Stereo and mono **v. Pitch-** Configurable **vi. Speed-** Configurable
	4	Custom dictionary support	Provides feature to add custom dictionary in Text to Speech Engine, allow text rule to speak out particular word in desired form
	5	Scripting Language Support	SSML (optional)
	6	Character length Support	Min. 500 characters in single request
	7	Processing Time	Not more than 1 second per request
	8	Concurrent Request Handling	Support up to 100 concurrent requests
	9	Models at Edge	Develop and provide smaller models further to run on edge devices
	10	Code-switched text to speech	Handle mix of two or more languages
	11	Model Optimization (adaptation)	Optimizing model performance after development of base model
5	**Roles & Responsibilities of C-DOT**		C-DOT shall lead the integration of the final solution. It will provide technical development assistance, infrastructure and financial support to the project partners selected through a process of evaluation and due diligence conducted by a committee of subject experts. Where ever deemed necessary, C-DOT may arrange resources, testing infrastructure, mandatory clearances, statutory permissions, technical consultancy and provide gap funding to the partners in realizing their

		respective target deliverables. Development costs of the module, whether developed from scratch or derived from existing background technology of partners shall be borne by C-DOT. C-DOT shall use the final solution for integration with production grade software and the services will be offered to public and other stakeholders. C-DOT shall engage with Partners on a non-exclusive basis and shall retain its right to develop similar products / through other developmental programs.
6	**Roles & Responsibilities of Participants**	Roles of the partner(s) are broadly outlined in **Section 4**. The Partner(s) may build the required module afresh or by modifying pre-existing background technologies available with them. The Partner(s) 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 non-exclusive basis. All partner(s) shall be required to demonstrate commitment to the project by entering into a formal agreement with C-DOT as per the CCRP policy.
7	**Expected Deliverables**	Text to Speech (TTS) conversion solution for Indian English and Indian vernacular languages with features as described in Section 2 of this document.
8	**Ownership of Background & Foreground IP**	Background technologies used in the project shall continue to remain with their respective owners. 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. The ownership of the final solution shall rest collectively with C-DOT and all its Partners.

Technology Areas (XXXX)

5G6G	5G/6G Technologies
IOTM	IoT and M2M Solutions
AIML	Artificial Intelligence, and Cognitive Sciences
TSEC	Telecom Network and Cyber Security
SRAN	Radio,Wi-Fi, Satellite and Broadcast
OPTL	Optical Access & Transport technologies
NMGT	Network Management System and Framework
APPN	Advanced Telecom Applications
MSOC	SOC/Micro-system level Design
QKDC	Quantum Communication
TSPT	Transport Technologies(Routers, Switches, Aggregators)
OTHR	Other