

**TRIPARTITE MEMORANDUM OF UNDERSTANDING
 BETWEEN
 Centre for Development of Advanced Computing (C-DAC),
 Open Joint Stock Company "GLONASS"
 AND
 GLONASS Union**

On

**Cooperation for "Development of Technologies and Applications
 Based on Navigational Satellites"**

This Tripartite MoU for Cooperation (hereinafter - the "MoU") is entered and between **Centre for Development of Advanced Computing** a Scientific Society of the Department of Electronics and Information Technology (DeitY), Ministry of Communications and Information Technology, Government of the Republic of India, registered under the Societies' Registration Act 1860 and the Bombay Public Trust Act of 1950, and having its head office at University Campus, Pune 411 007, hereinafter referred to as "C-DAC" which expression shall include its successors and assignees (which expression shall mean and include its successors and assigns, **PARTY OF THE FIRST PART**).

And

Open Joint Stock Company "GLONASS", a Russian state-owned Company organized and exists under the Law of the Russian Federation with its registered address located in 1608, floor 16, Building 1, Krasnopresnenskaya emb, 12, Moscow, 123610, Russia, hereinafter referred to as OJSC "GLONASS" (which expression shall mean and include its successors and assigns, **PARTY OF THE SECOND PART**).

And

Non-Commercial Partnership for Development and Use of Navigation Technologies a non-commercial organization organized and exists under the Law of the Russian Federation with its registered address located in Room 9A. Suite 1D, floor 15,

Building 1, Krasnopresnenskaya emb, 12, Moscow, 123610, Russia, hereinafter referred to as "**GLONASS Union**" (which expression shall mean and include its successors and assigns, **PARTY OF THE THIRD PART**).

C-DAC, OJSC "GLONASS" and GLONASS Union (hereinafter referred to jointly as the "Parties" and individually as the "Party").

Whereas C-DAC was set up to emerge as a premier R&D institution for the design, development and deployment of electronic and ICT technologies and applications for socio economic advancement with the mission of expanding the frontiers of Information and Communication Technologies, evolving technology solutions, architectures, systems and standards for nationally important problems, achieving rapid and effective spread of knowledge by overcoming language barriers through application of technologies, sharing experience and know-how to help build advanced competence in the field of Information Technology, bringing benefits of Information Technology to society, and utilizing the Intellectual Property generated by converting it to business opportunities.

Whereas OJSC "GLONASS" was establish in order to commercialize the infrastructure of the "ERA-GLONASS" project. The company will become a navigation services provider and start provision of services based on GLONASS navigation technologies.

AND Whereas, GLONASS Union was established on 21 May 2012 with the goal of development and adoption of GLONASS technology-based products and services in Russia and abroad. GLONASS Union members are leading Russian companies in telecommunication, IT, and navigation markets. The main objectives of the Partnership are integration efforts of the state and navigation business for competitive development and scaling of the Russian navigation market and formation and implementation of a unified technical policy in the field of navigation, the Ministry of Transport of the Russian Federation signed an agreement on the implementation and maintenance of commercial operation of the "ERA-GLONASS" in 2015 with the GLONASS Union.

The key target of the GLONASS Union is the development of cutting edge solution based on the satellite navigation technologies. AND WHEREAS as a result of interactions at different levels and recognizing that integration of the Parties' synergistic efforts will contribute to successful cooperation in the areas specified herein below;

"Development of Technologies and Applications Based on Navigational Satellites"

Now therefore, it is agreed amongst the Parties as follows -

1. Purpose/Scope of the MoU

a) The purpose of the present MoU is to establish a framework of cooperation between the Parties based on mutual interests, equality, non-discrimination and for mutual benefit in the following identified areas of common interest:

- Technologies and Hardware for technologies based on navigational satellites
- Development of Technologies and solutions for Emergency Response Systems for public uses
- Development of GIS based Locational Services using GPS, GLONASS and IRNSS for Safe City Projects
- Applications of mutually developed technologies related Societal Importance
- Conducting mutually identified R&D projects in area of Geophysical Research

The broad scope of the MoU and identified areas is in Annexure-I.

b) This MoU only reflects a statement of intent by the parties to enhance cooperation in the above mentioned areas and does not constitute a legally binding instrument. Any specific activities under the purview of the agreed areas under this MoU will be conducted through mutually agreed projects and for such identified projects specific MoU/Agreement shall be signed between the parties defining the specific rights and responsibilities of parties,

commercials/financial obligation and other terms etc. Such MoUs/agreement will also be vetted by appropriate authorities in their respective country.

2. Instruments for cooperation

The Parties hereby agree to the implementation of this MoU by carrying out the following activities:

- a) For the purposes of operationalising the spirit of cooperation between the Parties in carrying out the purposes of the MoU, the Parties have agreed to constitute a working group consisting of two representatives from each Party. The Parties shall finalize the schedule of the working group meetings within 30 days from the date that the present MoU is concluded and signed. The working group will finalize concrete action plan leading to execution of specific projects in areas as agreed upon in this MoU.
- b) For successful carrying out of common projects the Parties may decide on exchange of joint information and other requisite materials on mutually agreed terms in writing between the Parties and as per legal and regulatory framework of the two countries.
- c) The Parties have agreed that the existence of the present MoU can be disclosed by either Party hereto within the scope of informational support of the Party's activities.

3. Responsibilities

- a) Responsibilities of C-DAC
 1. Identify specific areas and activities for joint collaborative works
 2. Contribute towards development based on its expertise
- b) Responsibilities of OJSC "GLONASS"
 1. Identify specific areas and activities for joint collaborative works
 2. Contribute towards market oriented applications.

c) Responsibilities of GLONASS UNION

1. Identify specific areas and activities for joint collaborative works
2. General management of the project
3. Attraction of key technology providers and partners
4. Formation of cooperation matrix
5. Attraction of Funds
6. Market research and supply chain management

d) Joint Responsibilities

1. Nominate Coordinators as nodal contacts to represent the parties and promote interface so as to plan, implement, monitor and review the various activities as agreed from time to time.
2. Draw the attention of the top management in case of any interface or operational problems.
3. Ensure the safety of the personnel and material whenever placed at either end by the other party
4. Each Party shall make its respective Contributions to the Project to the extent of availability of manpower/material/other resources.
5. Each Party confirms that it will act in good faith when complying with its respective obligations under this MoU

4. Financial Aspects

- a) No financial commitment from any party will be assumed unless a formal approval/ acceptance to that effect for the works or services has been accorded through signed documents by the parties.
- b) Unless otherwise agreed in writing through a separate agreement signed by the Parties, the Parties shall bear their own costs and expenses.

5. Confidentiality and Non-disclosure

- a) Neither Party shall disclose nor distribute any confidential information that is supplied from the other Party in the conduct of cooperative activities under this

Memorandum of Understanding to any third party, except as and to the extent authorized in writing to do so by the other Parties.

- b) The provisions of this Article shall continue to be binding upon the Parties notwithstanding the termination of this Memorandum of Understanding, unless otherwise agreed to in writing by the Parties.
- c) Specific confidentiality and non-disclosure agreement will be a part of specific MoUs agreed by the Parties for each project.

6. Intellectual Property Rights

- a) The Party, which provides information/materials to the other Party, according to the applicable national laws shall be the one having the ownership, intellectual property rights and all the related property rights of the materials, and the Parties confirm that the party receiving such information/materials shall respect and protect the above mentioned rights, from disclosure in any manner inconsistent with this MoU.
- b) The Parties understand that all the intellectual property rights concerning this MoU, developed and researched independently, by one party shall be in possession of that party and shall constitute property of that party, according to the applicable national laws.
- c) Parties further declare that according to the applicable national laws, intellectual property rights concerning this MoU, developed and researched through the efforts or using the common resources of the parties shall be the common property of the Parties.
- d) The parties shall ensure appropriate protection of intellectual property rights generated from such cooperation, consistent with respective domestic laws, rules and regulations in force and international agreements, to which both countries are signatories.

7. Validity term, termination of the MoU

- a) The MoU enters into force upon its signing by the Parties and shall be valid for three years, unless the Parties decide on termination of the MoU.

- b) Nothing in this MoU shall be construed as a Party's obligation to deliver a payment/product/technology, to make expenses or to disclose certain confidential information to any other Party to this MoU.
- c) The MoU shall expire on the day it will complete period of three years from the date of signing unless is extended by mutual agreement in writing signed by the authorized signatories of the Parties.
- d) The present MoU can be terminated by the Parties, as per the provisions of the MoU.
- e) A Party may terminate the MoU by sending a termination notice to the other Party of the MoU sent through Air Mail. The MoU shall be deemed terminated upon expiration of 30 (thirty) days from receipt of the termination notice by the other Party.
- f) Unless otherwise agreed by the Parties, termination of the present MoU shall not affect the activities already jointly approved or being in progress under the terms of the MoU. The parties will also decide about continuance or otherwise of specific contracts entered amongst them while terminating this MoU.
- g) The MoU shall stand automatically terminated in the event of winding up/dissolution/merger/bankruptcy of any party.

8. Settlement of Disputes

Any dispute or difference arising out of interpretation, application or implementation of the Memorandum of Understanding shall be settled amicably through consultations or negotiations between the Parties.

9. Communication

Any communication or notice or intimation shall be addressed to the Nodal contacts of the respective parties and sent to the registered address of the parties concerned, and E-mail correspondence should be followed by signed hardcopy all important documents such as but not limited to financial and performance related documents.

Contact Person for C-DAC,

Mr. Biju C Oommen

Designation: Scientist F

E-mail ID: biju@cdac.in

Mobile No: +91 944 701 4760

Telephone No: +92-471-2724044

Office Address : Centre for Development of Advanced Computing (C-DAC)

Postal Address : Pune University Campus, Ganeshkhind, Pune: 411 007,

India Tel. +91-20-25704100 / Fax. +91-20-25691111

Contact Person for "GLONASS UNION" & OJSC "GLONASS"

Mr. Alexander Bondarenko,

Designation: Head, International Projects

E-mail ID ab@glonassunion.ru.

Mobile No +7 903 120 20 80

Telephone No +7 495 258 11 88 (149)


Office Address Room 9A. Suite 1D, floor 15, Building 1, Krasnopresnenskaya emb,
12, Moscow, 123610, Russia.

Parties' Identities and Signatures.

IN WITNESS WHERE OF, the undersigned being duly authorised thereto, by their
respective Parties, have signed this MoU.

Signed at Moscow on 24th December 2015 in three originals in the English language.

For and on behalf of C-DAC


Ambassador of India, Moscow
In presence of Witnesses

For and on behalf of C-DAC

.....

For and on behalf of OJSC "GLONASS"

Mr Andrey Nedosekov
CEO, OJSC "GLONASS"

In presence of Witnesses

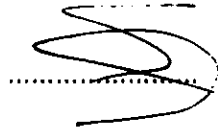
For and on behalf of OJSC "GLONASS"



For and on behalf of GLONASS Union

Mr Alexander Gurko
President, "GLONASS UNION"

In presence of Witnesses
For and on behalf of GLONASS Union

A handwritten signature in black ink, appearing to be a stylized 'S' or similar character, positioned below the text 'For and on behalf of GLONASS Union'.

Annexure-I

Combination of navigational satellites such as GPS, GLONASS, Galileo and IRNSS - based data collection systems shall provide accurate positional data. By connecting position information with other types of data, it is possible to analyze problems from a new perspective. Positional data collected through navigational satellites can be imported into Geographic Information System (GIS) software, allowing spatial aspects to be analyzed with other information to create a far more complete understanding of a particular situation than that might be possible through conventional means. This shall be leveraged by various technologies and applications. Some of the potential technology fall out and applications based on this collaboration is given below.

1. Technologies and Hardware

This collaboration shall enable development of chipsets based on GPS, GLONASS, IRNSS and possibly other satellites, leading towards hardware manufacturing. The same shall be leveraged by safety devices, vehicle tracking system, navigational applications, emergency response systems, safe city projects, disaster management and geophysical research etc.

2. Emergency Response System

A critical component of any successful emergency response system is the identification of precise location and timely response. The navigational satellites serves as a facilitating technology in providing precise location of landmarks, streets, buildings, emergency service resources, and disaster relief sites to disaster relief teams and public safety personnel. This shall also facilitate efficient management of emergency vehicles such as fire brigade, ambulance etc., in order to protect life and reduce property loss.

3. GIS based Locational Services using GPS, GLONASS and IRNSS for Safe City Projects

GIS based location sensing with navigational satellites can be effective in several applications. Some of the applications can be as follows.

Roads & Highways - The availability and accuracy of the navigational satellites offers increased efficiencies and safety for vehicles using highways, streets, and mass transit systems. This is essential for mass transit systems and road maintenance crews. Also, towards time-definite delivery, trucking companies can use navigational satellites for more precise tracking to guarantee delivery and pickup at the time promised, whether over short distances or across time zones.

Railways - Navigational satellites when combined with other sensors, computers, and communications systems shall improve rail safety, security, and operational effectiveness. The technology will help to reduce accidents, delays, and operating costs, while increasing track capacity, customer satisfaction, and cost effectiveness.

Aviation - Aviators throughout the world use the GPS to increase the safety and efficiency of flight. With its accurate, continuous, and global coverage, GPS along with other navigational satellites shall offer seamless satellite navigation services which will satisfy many of the requirements for aviation users. Space-based position and navigation enables three-dimensional position determination for all phases of flight from departure, en route, and arrival, to airport surface navigation.

Marine - Navigational satellites shall provide the fastest and most accurate method for mariners to navigate, measure speed, and determine location. This enables increased levels of safety and efficiency for mariners worldwide.

4. Applications of Societal Importance

Surveying & Mapping - Navigational satellite based data collection will be much faster than conventional surveying and mapping techniques, reducing the amount of equipment and labor required. A single surveyor can now accomplish in one day what once took entire team weeks to do. Navigational satellites will support more

accurate mapping and modelling of the physical world — from mountains and rivers to streets and buildings to utility lines and other resources. Features measured with Navigational satellites can be displayed using geographic information systems (GIS) that store, manipulate, and display geographically referenced data.

Agriculture - GPS based applications in agriculture are being used for farm planning, field mapping, soil sampling, tractor guidance, variable rate applications, and yield mapping. Combined data from various navigational satellites will allow farmers to work during low visibility field conditions with more accuracy. Moreover, precise application of pesticides, herbicides, fertilizers, and better control of the dispersion of chemicals are possible with the use of Navigational satellites enabled equipment, thus reducing expenses, producing a higher yield, and creating a more environmentally friendly farm.

Wild Life Conservation - Aerial studies of some of the world's forest are conducted with the aid of GPS technology to evaluate an area's wildlife, terrain, and human infrastructure. By tagging wildlife with Navigational satellites enabled units, it will be possible to get more accurate data to evaluate conservation efforts and assist in strategy planning.

5. Geophysical Research

The theory of plate tectonics explains that Earth's crust and upper mantle are split into a series of rigid plates. Like moving puzzle pieces, the plates move slowly and interact with one another at plate boundaries. A variety of geologic phenomena including earthquakes, volcanic eruptions, and mountain building occur at plate boundaries, all of which cause the Earth's surface, the crust, to deform (change). When deformation occurs at a point on Earth's surface, the point's position changes. This position change can be measured using high-precision Navigational satellites enabled instruments. Earth scientists use these data to record how much and how quickly Earth's crust is changing because of plate tectonics and to better understand the underlying processes of the deformation.