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Government of India
Ministry of Rural Development
Department of Land Resources

'G' Wing, NBO Building,
Nirman Bhavan, New Delhi - 110011
Dated 06th January, 2025

To,

ACS/Principal Secretary / Secretary Revenue and Urban development department of all States/UTs

Dear Sir / Madam,

Subject: Suggestive Specifications for Rover & Controllers for NAKSHA -Reg

I am directed to refer to the subject cited above and convey that DoLR has prepared the suggestive specifications of the Rovers and Controllers (**Annexure I**) in view of the various requests from different states/UTs for NAKSHA pilot programme. The same has been vetted by Survey Of India (SOI) with some suggestions vide their letter dtd. 30th December, 2024 .

2. The specifications for Rovers and Controllers have been categorized into Basic and Advance Models. The Basic Models deliver good accuracy for ground survey whereas Advanced models can significantly enhance accuracy; however, they come at a higher cost. In case the states opt to procure Advanced Models, the additional financial burden will need to be borne by the respective states, as the Department of Land Resources (DoLR) would support only the amount sanctioned under the NAKSHA pilot programme.

3. The suggestive lists of specifications of GNSS Rovers and Controllers are being forwarded for reference while carrying out the procurement of Rovers and Controllers.

4. CORS chapter (Technical Specifications of GNSS Rover) from SOI is also attached for your reference.

5. It may be ensured that the GNSS receivers to be procured should be compatible with the National CORS Network for consuming their services. This may be considered as a critical requirement.
6. If needed, state can approach SOI's Geospatial Directorate for availing assistance/facilitation in the technical evaluation/ testing of equipment.
7. This has the approval of the competent authority.

Yours Faithfully,



(Shyam Kumar)
Director, LR

Dept. of Land Resources, MoRD
Govt. of India
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Copy to:

1. Surveyor General of India, Survey of India, Dehradun
2. Managing Director, MPSEDC, Bhopal
3. **Copy for Information:** PPS to Secretary, LR/PS to AS(LR)/ PS to JS(LR)/
/Coordinator Geospatial (MR)/Project Manager (SG)

Annexure I

Suggestive Specifications for GNSS Rover and Controller

Sl. No	ITEM/NAME	SPECIFICATIONS for Basic Model	SPECIFICATIONS for Advanced Model
A.	GNSS Rover		GNSS Rover
1	SOLUTION TYPE	Pole mount Solution	Pole mount Solution
2	MEASURING MODE	RTK, Network RTK Corrections (bidders can quote for models having static feature)	RTK, Network RTK Corrections (bidders can quote for models having static feature)
3	HORIZONTAL ACCURACY	2cm+1ppm or better with Network RTK	2cm+1ppm or better with Network RTK
4	VERTICAL ACCURACY	4 cm+1ppm or better with Network RTK	4 cm+1ppm or better with Network RTK
5	IMU	IMU /Magnetic based tilt correction with the accuracy of +/- 5 mm +0.5mm/°	IMU /Magnetic based tilt correction with the accuracy of +/- 5 mm +0.5mm/°
6	GNSS RECEIVER FUNCTIONALITY	Antenna to track following GNSS Constellations Preferably: GPS: L1, L2, L5 GLONASS: L1, L2 Galileo: E1 QZSS : L1, L2 BeiDou: B1, B2 IRNSS: L5 SBAS: GAGAN (Additional features can be quoted by bidders)	Antenna to track following GNSS Constellations Preferably: GPS: L1, L2, L5, L2C GLONASS: L1, L2,L3 Galileo: E1, E5a, E5b, E5ab QZSS : L1, L2 BeiDou: B1, B2, B3 IRNSS: L5 SBAS: GAGAN (Additional features can be quoted by bidders)
7	NO OF CHANNELS	180+ Channels	500+ Channels
8	GNSS POSITIONING RATE	GNSS-Receiver must have support logging rates upto 20Hz or better	GNSS-Receiver must have support logging rates upto 20Hz or better
9	REAL-TIME PROTOCOLS	RTCM 3.0, RTCM 3.1, RTCM 2.3, RTCM 3.2, RTCM 3.3, RTCM MSM, NTRIP	RTCM 3.0, RTCM 3.1, RTCM 2.3, RTCM 3.2, RTCM 3.3, RTCM MSM, NTRIP
10		Must be capable of receiving the messages from base receiver through GSM/GPRS/UMTS/HSDPA/LTE (GSM/GPRS/UMTS/HSDPA/LTE with 4G cellular technology) or equivalent cellular technology or	Must be capable of receiving the messages from base receiver through GSM/GPRS/UMTS/HSDPA/LTE (GSM/GPRS/UMTS/HSDPA/LTE with 4G cellular technology) or equivalent cellular technology or

		TCP/IP network.	TCP/IP network.
11	INTERFACE & COMMUNICATION	GNSS Rover (Receiver connected with controller) must have inbuilt GSM modem and must have support for 4G network work.	GNSS Rover (Receiver connected with controller) must have inbuilt GSM modem and must have support for 4G network work.
12		Supports real time kinematic positioning using industry standard formats. GNSS rover should be compatible to other makes of Base Receiver.	Supports real time kinematic positioning using industry standard formats. GNSS rover should be compatible to other makes of Base Receiver.
13		GNSS-Receiver must be able to connect to controller/laptop/computer for configuration/downloading through Bluetooth	GNSS-Receiver must be able to connect to controller/laptop/computer for configuration/downloading through Bluetooth
14		GNSS-Rover Device must support at least one Bluetooth connections.	GNSS-Rover Device must support at least one Bluetooth connections.
15		GNSS-Rover (Receiver connected with controller) should have provision for External memory like SD/Mini SD/ Micro SD/ SDHC, Memory stick,	GNSS-Rover (Receiver connected with controller) should have provision for External memory like SD/Mini SD/ Micro SD/ SDHC, Memory stick,
16		GNSS Rover should be capable of receiving Real Time data stream from the connected stations/Network to be received using TCP/IP communication. The support for all common Real time Formats i.e. CMR, CMR+, RTCM v2.x, RTCM v3.x, and NMEA. Proprietary message types will be considered in addition to (not in replace of) the before mentioned formats.	GNSS Rover should be capable of receiving Real Time data stream from the connected stations/Network to be received using TCP/IP communication. The support for all common Real time Formats i.e. CMR, CMR+, RTCM v2.x, RTCM v3.x, and NMEA. Proprietary message types will be considered in addition to (not in replace of) the before mentioned formats.
17		GNSS Rover should have NTRIP Client port and should be capable to receive RTCM data stream from NTRIP server.	GNSS Rover should have NTRIP Client port and should be capable to receive RTCM data stream from NTRIP server.
18		GNSS Rover should be capable to transmit NMEA message output to the Base Receiver /CORS control center.	GNSS Rover should be capable to transmit NMEA message output to the Base Receiver /CORS control center.

19		The GNSS -Rover shall be able to receive different type of corrections to allow different kind of services via TCP/IP over:	The GNSS -Rover shall be able to receive different type of corrections to allow different kind of services via TCP/IP over:
20		a. Single RTK corrections from specific stations	a. Single RTK corrections from specific stations
21		b. Single RTK corrections from nearest station. (Requires rover's position to be sent, rover should be able communicate his position to even for different make and model Base receiver).	b. Single RTK corrections from nearest station. (Requires rover's position to be sent, rover should be able communicate his position to even for different make and model Base receiver).
22		c. Network RTK corrections from VRS, FKP and MAC solution through NTRIP protocol. (Requires rover's position to be sent).	c. Network RTK corrections from VRS, FKP and MAC solution through NTRIP protocol. (Requires rover's position to be sent).
23	POWER	Provision for connection to external battery should also be available.	Provision for connection to external battery should also be available.
24		GNSS-Rover should be supplied with internal/external battery, capable of continuously operating for up to 12 hours in network RTK Mode. (Internal or external battery is acceptable. However, the battery should be sufficient enough to carryout upto 12 hrs operations. Additional rechargeable batteries and chargers shall be provided, if needed)	GNSS-Rover should be supplied with internal/external battery, capable of continuously operating for up to 12 hours in network RTK Mode. (Internal or external battery is acceptable. However, the battery should be sufficient enough to carryout upto 12 hrs operations. Additional rechargeable batteries and chargers shall be provided, if needed)
25	PHYSICAL SPECIFICATIONS AND ACCESSORIES	In case single battery could not support 12 hours continuous operation, additional internal/external batteries and battery chargers should be provided to ensure 12 hours operation in network RTK Mode. (Internal or external battery is acceptable. However, the battery should be sufficient enough to carryout upto 12 hrs operations. Additional rechargeable batteries and chargers shall be provided, if needed)	In case single battery could not support 12 hours continuous operation, additional internal/external batteries and battery chargers should be provided to ensure 12 hours operation in network RTK Mode. (Internal or external battery is acceptable. However, the battery should be sufficient enough to carryout upto 12 hrs operations. Additional rechargeable batteries and chargers shall be provided, if needed)

26		Operating temperature: -20°C + 60°C or better, Humidity: 90% or better,	Operating temperature: -20°C + 60°C or better, Humidity: 90% or better,
27		Vibration: MIL STD 810G/ MIL STD 810F/ISO 9022	Vibration: MIL STD 810G/ MIL STD 810F/ISO 9022
28		Shock: 1m drop to hard surface.	Shock: 1m drop to hard surface.
29		GNSS-Rover as well as controller must meet IP 67 or better compliance for dust and water ingress.	GNSS-Rover as well as controller must meet IP 67 or better compliance for dust and water ingress.
30		GNSS-Rover must have a robust adjustable (telescopic) range pole (2.0 to 3.0m long) with quick release operation, Pole mounted Levelling bubble should be provided with Rover.	GNSS-Rover must have a robust adjustable (telescopic) range pole (2.0 to 3.0m long) with quick release operation, Pole mounted Levelling bubble should be provided with Rover.
31		Pole mount clamp for Controller devices, is to be provided along with the GNSS	Pole mount clamp for Controller devices, is to be provided along with the GNSS
32		Robust bipod/tripod is to be provided along with the GNSS Rover.	Robust bipod/tripod is to be provided along with the GNSS Rover.
33		GNSS-Rover must be provided with a heavy duty protective case for Receiver unit and the other standard OEM accessories.	GNSS-Rover must be provided with a heavy duty protective case for Receiver unit and the other standard OEM accessories.
34		GNSS-Rover must be provided with a Carrying bag with Shoulder Carrying Strap and Allen Key for Range pole and bipod/tripod.	GNSS-Rover must be provided with a Carrying bag with Shoulder Carrying Strap and Allen Key for Range pole and bipod/tripod.
B.		GNSS FIELD SOFTWARE	GNSS FIELD SOFTWARE
35	GNSS Receiver Field Software	GNSS-Rover must be able to connect to a windows/android based mobile/Tablet/Laptop devices. Necessary software to be provided for configuration of receiver and establishing data uplink/downlink with Mobile/Tablet/Laptop. Said software license should be perpetual and to	GNSS-Rover must be able to connect to a windows/android based mobile/Tablet/Laptop devices. Necessary software to be provided for configuration of receiver and establishing data uplink/downlink with Mobile/Tablet/Laptop. Said software license should be perpetual and to

		be provided with free updates upto Warranty period inclusive in the scope of supply.	be provided with free updates upto Warranty period inclusive in the scope of supply.
36		a. Full GNSS receiver Configuration, setup, status monitoring and management.	a. Full GNSS receiver Configuration, setup, status monitoring and management.
37		b. Should provide full control over selection and configuration of RTK correction sources, type of correction and type of data stream, projection and datum coordinate system.	b. Should provide full control over selection and configuration of RTK correction sources, type of correction and type of data stream, projection and datum coordinate system.
38		c. Downloading of data containing corrected co- ordinates, uncorrected co- ordinates, raw file and Survey report with accuracy parameters along with other satellite metadata like no of satellite, type/status of differential correction, receiver make, Model, time, SNR of satellite signals, source / reference station data in case of RTK / NTRK etc. Should Provide standard COM components to easily integrate into third party applications	c. Downloading of data containing corrected co- ordinates, uncorrected co- ordinates, raw file and Survey report with accuracy parameters along with other satellite metadata like no of satellite, type/status of differential correction, receiver make, Model, time, SNR of satellite signals, source / reference station data in case of RTK / NTRK etc. Should Provide standard COM components to easily integrate into third party applications
39		d. Correction sources type of correction and type of data stream projection and datum coordinate system.	d. Correction sources type of correction and type of data stream projection and datum coordinate system.
40		e. Collection and storage of point, line and area features on basis of rover's position feature coding, labelling and basic symbolization. It should also have capability to log the data in Kinematic mode for Post processing purpose.	e. Collection and storage of point, line and area features on basis of rover's position feature coding, labelling and basic symbolization. It should also have capability to log the data in Kinematic mode for Post processing purpose.
41		f. Graphical staking of points, lines, and polygon.	f. Graphical staking of points, lines, and polygon.
42		g. Must have support for external Distance meter or rangefinder for calculating coordinate points from surveyed bearings distances, angles and vice	g. Must have support for external Distance meter or rangefinder for calculating coordinate points from surveyed bearings distances, angles and vice
43		h. Provide standard components to integrate	h. Provide standard components to integrate

		into third party applications.	into third party applications.
44		i. Add Raster layer in the background of working space.	i. Add Raster layer in the background of working space.
45		j. Digitize points, lines and area feature over attached raster.	j. Digitize points, lines and area feature over attached raster.
46		k. Manipulate point, line and area features.	k. Manipulate point, line and area features.
47		l. Stake-out Capability.	l. Stake-out Capability.
48		m. Must have support for OGC standards GeoServer - WMS, WFS, aWFS-T	m. Must have support for OGC standards GeoServer - WMS, WFS, aWFS-T
49		n. Must have on board import and export support for ASCII, Shape, KML(optional), DXF and DWG and should be possible to share the data via cloud services like one drive, Google drive, whatsapp etc	n. Must have on board import and export support for ASCII, Shape, KML(optional), DXF and DWG and should be possible to share the data via cloud services like one drive, Google drive, whatsapp etc
50		o. It shall have capability to support NTRIP Client operation for rover receiver. It shall support GNSS Rover to receive RTCM data stream and apply necessary correction to rover's position.	o. It shall have capability to support NTRIP Client operation for rover receiver. It shall support GNSS Rover to receive RTCM data stream and apply necessary correction to rover's position.
C.		TABLET / CONTROLLER	TABLET / CONTROLLER
51	OPERATING SOFTWARE	Android 12/13 or latest version OR Supported by Google	Android 12/13 or latest version OR Supported by Google
52	CPU	OCTACORE (8 core), QUALCOMM/ ARM/INTEL	OCTACORE (8 core), QUALCOMM/ ARM/INTEL
53	STORAGE & MEMORY	8 GB RAM or above, 128 GB or more SSD/EMMC (or equivalent)	8 GB RAM or above, 128 GB or more SSD/EMMC (or equivalent)
54	DISPLAY	Minimum 7 inch or higher display with rugged and protection film, screen, antiglare, sunlight readable, capacitive multi touch, water resistant, daylight readable screen, automatic screen rotation with required certificate and ergonomically hand strap.	Minimum 7 inch or higher display with rugged and protection film, screen, antiglare, sunlight readable, capacitive multi touch, water resistant, daylight readable screen, automatic screen rotation with required certificate and ergonomically hand strap.

55	AUDIO	Internal Speaker / mic for Webcam.	Internal Speaker / mic for Webcam.
56	KEYBOARD & INPUT	Multi touch +Digitizer Screen/ Digital Screen/ Touch Screen. Tablet buttons for display enable/disable & volume control, on screen QWERTY keyboard.	Multi touch +Digitizer Screen/ Digital Screen/ Touch Screen. Tablet buttons for display enable/disable & volume control, on screen QWERTY keyboard.
57	CAMERAS	Rear - 8MP or above camera with auto focus and LED light.	Rear - 8MP or above camera with auto focus and LED light.
58	INTERFACE	Headphone/speaker-mini jack stereo, standard size USB 2.0 / 3.0 port /Type C.	Headphone/speaker-mini jack stereo, standard size USB 2.0 / 3.0 port /Type C.
59	WIRELESS AND SENSORS	Inbuilt GPS, 4G LTE multicarrier mobile, Bluetooth version 4.1 or better, WiFi enabled.	Inbuilt GPS, 4G LTE multicarrier mobile, Bluetooth version 4.1 or better, WiFi enabled.
60	POWER SUPPLY	Li-Ion battery with 10 hours or more back up for normal field operation, battery charging time less than or equal to SIX hours. Battery, adapter and its spares should have three years warranty, battery should not heat up severely due to continuous working.	Li-Ion battery with 10 hours or more back up for normal field operation, battery charging time less than or equal to SIX hours. Battery, adapter and its spares should have three years warranty, battery should not heat up severely due to continuous working.
61	WEIGHT	Not more than 1.2 kgs	Not more than 1.2 kgs
62	DURABILITY	Dust and Water Resistant IP 65 or better	Dust and Water Resistant IP 65 or better
63	ACCESSORIES	Device should be supplied with AC adopter. AC adopter should have minimum 1.2 m input / output cable, Low/High input voltage disconnect, output short circuit, over current protection and internal over temperature protection.	Device should be supplied with AC adopter. AC adopter should have minimum 1.2 m input / output cable, Low/High input voltage disconnect, output short circuit, over current protection and internal over temperature protection.
64	CARRYCASE	Rugged Shockproof Case with Hand / Shoulder Strap, S Pen Holder. Device should be supplied with 1 digitizer pen / Stylus, Carry bag,	Rugged Shockproof Case with Hand / Shoulder Strap, S Pen Holder. Device should be supplied with 1 digitizer pen / Stylus, Carry bag,
65	WARRANTY	3 years	3 years

66	AMC	After warranty period is over	After warranty period is over
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Miscellaneous Conditions:

1. Bidders can supply GNSS Rovers and Controllers of different OEMs. However, in such cases, the OEM of Network Rovers shall be responsible for complete integration of the equipment. The bids for single scheduled item of different OEMs may be treated as non-responsive offer. Further, the bidder should be responsible for submission of manufacturer authorization form for both GNSS Receivers and Controllers.
2. On site training to 10 technical staff at each place of consignment will be provided by principal/Indian agents (if they have the requisite know-how) for operation and maintenance of the equipment to the satisfaction of the user department.
3. **ISO 9001:** The Bidder or OEM of the offered product must have ISO 9001 certification.
4. **Warranty:** Three years comprehensive (including spares and labour). All software updates should be provided free of cost during Warranty period.