

**REQUEST FOR COMMENTS OF STAKEHOLDERS/OEM/FIRMS**  
**ON QRS (QUALITY REQUIREMENT) & TDS (TRIAL DIRECTIVES)**  
**OF MINI UAV**

1. The proposed QRs/TDs of “Mini UAV” is attached as **Appendix ‘A & B’**. The OEMs/Vendors are requested to forward information of the product which they can offer and also forward correct specifications of their system against each parameter. Complied or not complied remarks will not be accepted.
  
2. The required information/details may please be forwarded at the following addresses on or before **03 September 2019**.

Directorate General CRPF

East Block-7, Sec-1, R.K. Puram, New Delhi-110066

Email: [comncell@crpf.gov.in](mailto:comncell@crpf.gov.in)

3. An early response is requested.

**REVISED QRs FOR MINI UNMANNED AERIAL VEHICLE**

<b>S.N.</b>	<b>Parameter</b>	<b>Specification</b>		
1	UAS (As a System)	a.	Aerial Vehicle	02
		b.	Ground Control System	01
		c.	Remote Video Terminal	01
		d.	Day & Night Camera	02 each
			or, Integrated both day and night camera in one payload case. (As per user requirement)	02
		e.	Data link Equipment/ Antenna	01
		f.	Battery / Battery set for each Aerial Vehicle	04
		g.	Water resistance (IP66) back packs to carry UAS	03
		h.	Rugged, compact and lightweight transportation box	<b>03</b>
2	Aerial vehicle (AV)	a	Air frame should be made of composite material rugged, durable, and robust.	
		b	The parts should be modular and easy to replace /maintain.	
		c	Fitment, removal and/or replacement of <b>sensors/payload</b> should be simple and easily executable in field conditions.	
		d	Suitable battery charger using normal commercial supply to charge the batteries.	
		e	The Aerial vehicle should have the capability to operate during day and night.	
3	Weight	a	Maximum Takeoff Weight - As per DGCA guidelines for Small category UAV	
		b	The complete weight of UAS should not be more than 35 Kg and system should be packable in three back packs.	
		c	Each back pack should not be more than 15 kgs including the weight of back packs.	
4	Launch and Recovery	Vertical Takeoff and Landing (VTOL) within the area of 25 X25 meter.		

S.N	Parameter	Specification	
5	Deployment time	Not more than 20 minutes.	
6	Aural signature	≤ 40 dB @ 300 meters AGL (Above Ground Level)	
7	Wind Speed	The AV should be able to Takeoff, Land and Fly upto the wind speed of 20 knots.	
8	Propulsion	The AV should be powered by battery.	
9	Operational Endurance	2 Hours with minimum loiter time of 60 minutes at target with max payload up to launch altitude of 1000 meter above mean sea level.	
10	Mission Range	Minimum 15 Km	
11	Altitude	a.	Minimum Operational Altitude: 1000 meter AGL (Above Ground Level)
		b.	Max Launch Altitude: 3000 meter AMSL (Above Mean Sea Level)
12	Temperature	Starting, Operating and Storage Temperature – From Minus 5°C to Plus 55°C	
13	Flight Modes	The AV should be able to operate in following modes –	
		a	Fully Autonomous Mode
		b	Semi Autonomous Mode
		c	Loiter Mode
		d	Target tracking Mode
e	Return to home mode		
14	Payload	a	The payload should have Gyro based stabilised cameras.
		b	Single <b>payload</b> assembly housing for day / night camera. or Integrated both day and night camera in one payload case. (As per user requirement)
		c	Payload should not damage during rough landings.
		d	Auto locking and tracking of the selected target in the video imagery.
		e	360° pan and 90° tilt control during flight for Day and Night payloads <b>independent of “YAW” movement of the UAV.</b>

S.N	Parameter	Specification		
		f	UAV should transmit real time imagery to GCS <u>Day payload-</u> i. 0 to 15 km-1280 x 720p or better <u>Night Payload-</u> i. 0 to 15 km – 640 x <b>480</b> or better	
		g	Capabilities of payload	
		Parameter	Night Payload	Day payload
		Resolution (Minimum)	640 X <b>480</b> pixels or better	1280X720 pixels or better
		Digital Zoom	4X or more	4X or more
		Optical Zoom	-----	20X or more
		NFOV	-----	≤5°
		WFOV	-----	≥45°
15	Target Detection, Recognition, Identification (Minimum Slant range)	The system must be able to detect, acquire and designate targets up to maximum mission range of 15 Km in the following criteria:-		
		Payload	Vehicle size (6x3 meter)	Group of 3-4 People
		Day payload		
		Detection	2000 m	1000 m
		<b>Recognition &amp; Identification</b>	500 m	<b>500 m</b>
		Night payload		
		<b>Detection &amp; Recognition</b>	<b>1250 m</b>	500 m

S.N	Parameter	Specification	
16	Ground control station (GCS)	a	<p>The GCS should be portable, MIL-STD-810G or better.</p> <p><u>Option-I</u> Rugged IP65 laptop, minimum display size <b>13” or more</b> or Rugged IP65 tablet, minimum display size <b>10” or more</b></p> <p><u>Option-II</u> Semi-rugged IP51 laptop, minimum display size <b>13 or more”</b> or Semi-rugged IP52 tablet, minimum display size <b>10” or more</b> (As per user requirement)</p>
		b	Battery backup upto 3 Hrs.
		c	Suitable battery charger using normal commercial supply.
		d	It should be able to control all aspects like pre-flight checks, self tests, control of takeoff/landing and payloads.
		e	Digital Mass storage: 1 TB for laptop or 512 GB for Tablet
		f	<b>The laptop or tablet should have sunlight readable and touch screen.</b>
		g	It should facilitate recording and instantaneous playback of data.
		h	In flight, change of flight plan or waypoint.
		i	Suitable ports should be provided for taking the data.
		j	It should be capable of storing 100 or more flight routes with each route having capacity to configure minimum 70 waypoints.
		k	<p>The software should have following mission information:-</p> <ul style="list-style-type: none"> <li>i. Coordinates of target</li> <li>ii. AV position</li> <li>iii. Distance of AV from GCS</li> <li>iv. Air speed</li> <li>v. Mission Time</li> <li>vi. Payload looking angle</li> <li>vii. Communication link status</li> <li>viii. GPS status</li> <li>ix. Health status of AV battery</li> </ul>

S.N	Parameter	Specification	
17	Map Formats	a	Should have the capability to integrate geo-referenced raster maps provided in at least one of the commonly used digital map formats (GIF, TIFF, DTED and SRTM etc.)
18	Remote Video Terminal (RVT)	a	It should be minimum 10 inches tablet, must be MIL-STD-810G or more and IP65 or more, compact, light weight and portable with wrist/chest mountable holder. (As per user requirement)
		b	RVT should have ability to overlap the ground video data with geo-spatial data.
		c	Capable to record, instantaneous playback and freeze the imagery received from AV.
		d	<b>RVT should have sunlight readable and touch screen.</b>
19	Data link	a	Secure communication links between Air Vehicle and Ground Control Station with minimum 128 bits encryption.
		b	Should operate on S-band and / or C-band frequency for uplink and down link preferably on license free band i.e. 2.4GHz or 5.8 GHz.
20	Failsafe features	a	In case of communication loss during flight, the system should automatically change to recovery mode after 10 seconds, till such time UAV should remain on its flight path.
		b	Automatic Return to Home/Land on low battery.
		c	Multiple GPS on-board for GPS failure.
		d	There should be facility for on board light to facilitate visual signature for recovery, the operation of which should be GCS controlled
21	Miscellaneous	a	The comprehensive warranty of the UAS
		b	2 yrs
		c	Total technical life (TTL)
		d	5 yrs or 750 landings
		e	Life of AV battery
c	200 charging cycles or 2 yrs		
d	Product support after warranty		
e	up to 3 yrs		
e	Repair and maintenance including periodicity of midlife interventions/intent towards establishing maintenance hubs etc.		

**REVISED TDs FOR MINI UNMANNED AERIAL VEHICLE**

Trial/Technical evaluation of UAV will be conducted by a Board of Officers (B.O.O.) to assess actual performance of the equipment.

2. All parameters/Specifications mentioned in QRs will be checked by the Board of Officers in the presence of representative of firm.

i) **Physically check:** In this category, specifications of the equipment will be checked physically as per QRs.

ii) **Practically check:** The representative of firm will show all the features/ configuration of the equipment to the board of officers during trial.

iii) **Submission of certificates:** Firm will provide certificate from Govt. Lab. or DRDO or NABL accredited or ILAC accredited laboratory which are mentioned in respective parameters.

S.N.	Parameter	Specification			Trial directives
1	UAS (As a System)	a.	Aerial Vehicle	02	Board will check physically.
		b.	Ground Control System	01	Board will check physically.
		c.	Remote Video Terminal	01	Board will check physically.
		d.	Day & Night Camera	02 each	Board will check physically.
			or, Integrated both day and night camera in one payload case. (As per user requirement)	02	Board will check physically.
		e.	Data link Equipment/ Antenna	01	Board will check physically.
		f.	Battery/Battery set for each Aerial Vehicle	04	Board will check physically. <b>For single battery :04 batteries or For battery set: 04 sets</b>
		g.	Water <b>resistance</b> (IP66) back packs to carry UAS	03	Firm will produce certificate of Govt. Lab. or NABL/ILAC accredited laboratory.
h.	Rugged, compact and lightweight transportation box	<b>03</b>	Board will check physically.		

S.N	Parameter	Specification	Trial directives	
2	Aerial vehicle (AV)	a.	Air frame should be made of composite material rugged, durable, and robust.	Board will check physically and firm will produce OEM certificate.
		b.	The parts should be modular and easy to replace /maintain.	
		c.	Fitment, removal and/or replacement of sensors/ <b>payload</b> should be simple and easily executable in field conditions.	
		d.	Suitable battery charger using normal commercial supply to charge the batteries.	
		e.	The Aerial vehicle should have the capability to operate during day and night.	
3	Weight	a.	Maximum Takeoff Weight - As per DGCA guidelines for Small category UAV.	Board will check practically.
		b.	The complete weight of UAS should not be more than 35 Kg and system should be packable in three back packs.	
		c.	Each back pack should not be more than 15 kgs including the weight of back packs.	
4	Launch and Recovery	Vertical Takeoff and Landing (VTOL) within the area of 25 X25 meter.	Board will check practically.	
5	Deployment time	Not more than 20 minutes.	Board will check practically.	
6	Aural signature	≤ 40 dB @ 300 meters AGL (Above Ground Level)	Firm will produce certificate of Govt. Lab. or DRDO or NABL/ ILAC accredited laboratory.	
7	Wind Speed	The AV should be able to Takeoff, Land and Fly upto the wind speed of 20 knots.	Firm will produce OEM certificate.	
8	Propulsion	The AV should be powered by battery.	Board will check practically.	

S.N	Parameter	Specification	Trial directives
9	Operational Endurance	2 Hours with minimum loiter time of 60 minutes at target with max payload up to launch altitude of 1000 meter above mean sea level.	Board will check practically and Firm will produce OEM certificate.  Acceptable for degradation in endurance 10% per 1000 meter beyond 1000 meter above mean sea level.
10	Mission Range	Minimum 15 Km	Board will check practically.
11	Altitude	a . Minimum Operational Altitude: 1000 meter AGL (Above Ground Level)	Board will check practically.
		b . Max Launch Altitude: 3000 meter AMSL (Above Mean Sea Level)	Firm will produce OEM certificate.
12	Temperature	Starting, Operating and Storage Temperature – From Minus 5°C to Plus 55°C	Firm will produce certificate of Govt. Lab. or NABL/ILAC accredited laboratory.
13	Flight Modes	The AV should be able to operate in following modes –	Board will check practically.
		a Fully Autonomous Mode	
		b Semi Autonomous Mode	
		c Loiter Mode	
		d Target tracking Mode	
		e Return to home mode	
14	Payload	a The <b>payload</b> should have Gyro based stabilised cameras.	Firm will produce OEM certificate.
		b Single payload assembly housing for day / night camera. or Integrated both day and night camera in one payload case. (As per user requirement)	Board will check physically.
		c Payload should not damage during rough landings.	Board will check practically.
		d Auto locking and tracking of the selected target in the video imagery.	Board will check practically.
		e 360° pan and 90° tilt control during flight for Day and Night payloads <b>independent of “YAW” movement of the UAV.</b>	Board will check practically.

S.N	Parameter	Specification	Trial directives																		
		<p>f UAV should transmit real time imagery to GCS  <u>Day payload-</u>                      i. 0 to 15 km-1280 x 720p or better  <u>Night Payload-</u>                      i. 0 to 15 km - 640 x <b>480</b> or better</p> <p>g Capabilities of payload</p> <table border="1" data-bbox="597 562 1159 1031"> <thead> <tr> <th data-bbox="597 562 824 636">Parameter</th> <th data-bbox="824 562 1013 636">Night Payload</th> <th data-bbox="1013 562 1159 636">Day payload</th> </tr> </thead> <tbody> <tr> <td data-bbox="597 636 824 814">Resolution (Minimum)</td> <td data-bbox="824 636 1013 814">640X <b>480</b> pixels or better</td> <td data-bbox="1013 636 1159 814">1280X720 pixels or better</td> </tr> <tr> <td data-bbox="597 814 824 888">Digital Zoom</td> <td data-bbox="824 814 1013 888">4X or more</td> <td data-bbox="1013 814 1159 888">4X or more</td> </tr> <tr> <td data-bbox="597 888 824 961">Optical Zoom</td> <td data-bbox="824 888 1013 961">-----</td> <td data-bbox="1013 888 1159 961">20X or more</td> </tr> <tr> <td data-bbox="597 961 824 993">NFOV</td> <td data-bbox="824 961 1013 993">-----</td> <td data-bbox="1013 961 1159 993">≤5°</td> </tr> <tr> <td data-bbox="597 993 824 1031">WFOV</td> <td data-bbox="824 993 1013 1031">-----</td> <td data-bbox="1013 993 1159 1031">≥45°</td> </tr> </tbody> </table>	Parameter	Night Payload	Day payload	Resolution (Minimum)	640X <b>480</b> pixels or better	1280X720 pixels or better	Digital Zoom	4X or more	4X or more	Optical Zoom	-----	20X or more	NFOV	-----	≤5°	WFOV	-----	≥45°	<p>Board will check practically real time imagery and firm will produce OEM certificate.</p> <p>Firm will produce OEM certificate for day &amp; night payload resolution.</p>
Parameter	Night Payload	Day payload																			
Resolution (Minimum)	640X <b>480</b> pixels or better	1280X720 pixels or better																			
Digital Zoom	4X or more	4X or more																			
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Payload	Vehicle size (6x3 meter)	Group of 3-4 People																			
Day payload	2000 m	1000 m																			
<b>Recognition &amp; Identification</b>	500 m	<b>500m</b>																			

S.N	Parameter	Specification		Trial directives
				During Recognition and Identification, UAV should be able to descend upto the height of minimum <b>500</b> mtr AGL.
		Night payload		Board will check practically.
		Detection & Recognition	<b>1250 m</b> 500 m	Detection- Ability to distinguish an object.  Recognition- Ability to classify the object class (Animal, Human, Vehicle, Boat etc)  <b>During Detection &amp; Recognition,</b> UAV should be able to descend upto the height of minimum <b>500</b> mtr AGL.
16	Ground control station (GCS)	a	<p>The GCS should be portable, MIL-STD-810G or better.</p> <p><u>Option-1</u> Rugged IP65 laptop, minimum display size <b>13” or more</b> or Rugged IP65 tablet, minimum display size <b>10” or more</b></p> <p><u>Option-II</u> Semi-rugged IP51 laptop, minimum display size <b>13” or more</b> or Semi-rugged IP52 tablet, minimum display size <b>10” or more</b> (As per user requirement)</p>	<p>Firm will produce certificate of Govt. Lab. or NABL/ILAC accredited laboratory for MIL-STD-810G and IP. Board will check display size practically</p> <p>Firm will produce certificate of Govt. Lab. or NABL/ILAC accredited laboratory for MIL-STD-810G and IP. Board will check display size practically.</p>
		b	Battery backup upto 3 Hrs.	Board will check practically.
		c	Suitable battery charger using normal commercial supply.	Firm will produce OEM certificate.
		d	It should be able to control all aspects like pre-flight checks, self tests, control of takeoff/landing and payloads.	Board will check practically.

S.N	Parameter	Specification	Trial directives
		<p>e Digital Mass storage: 1 TB for laptop or 512 GB for Tablet</p> <p>f <b>The laptop or tablet should have sunlight readable and touch screen.</b></p> <p>g It should facilitate recording and instantaneous playback of data.</p> <p>h In flight, change of flight plan or waypoint.</p> <p>i Suitable ports should be provided for taking the data.</p> <p>j It should be capable of storing 100 or more flight routes with each route having capacity to configure minimum 70 waypoints.</p> <p>k The software should have following mission information:-            i. Coordinates of target            ii. AV position            iii. Distance of AV from GCS            iv. Air speed            v. Mission Time            vi. Payload looking angle            vii. Communication link status            viii. GPS status            ix. Health status of AV battery</p>	<p>Board will check practically.</p> <p>Board will check practically.</p> <p>Board will check practically.</p> <p>Board will check practically</p> <p>Board will check practically</p> <p>Board will check practically.</p> <p>Board will check practically.</p>
17	Map Formats	a Should have the capability to integrate geo-referenced raster maps provided in at least one of the commonly used digital map formats (GIF, TIFF, DTED and SRTM etc.)	Board will check practically.
18	Remote Video Terminal (RVT)	a It should be minimum 10 inches tablet, must be MIL-STD-810G or more and IP65 or more, compact, light weight and portable with wrist/chest mountable holder. (As per user requirement)	Board will check practically and firm will produce certificate of Govt. Lab. or NABL/ILAC accredited laboratory for MIL-STD-810G or more and IP65 or more.

S.N	Parameter	Specification		Trial directives	
		b	RVT should have ability to overlap the ground video data with geo-spatial data.	Board will check practically.	
		c	Capable to record, instantaneous playback and freeze the imagery received from AV.	Board will check practically.	
		d	<b>RVT should have sunlight readable and touch screen.</b>	Board will check practically.	
19	Data link	a	Secure communication links between Air Vehicle and Ground Control Station with minimum 128 bits encryption.	Firm will produce OEM certificate for AES encryption.	
		b	Should operate on S-band and / or C-band frequency for uplink and down link preferably on license free band i.e. 2.4GHz or 5.8 GHz.	Firm will produce OEM certificate.	
20	Failsafe features	a	In case of communication loss during flight, the system should automatically change to recovery mode after 10 seconds, till such time UAV should remain on its flight path.	Board will check practically.	
		b	Automatic Return to Home/Land on low battery.	Board will check practically.	
		c	Multiple GPS on-board for GPS failure.	Firm will produce OEM certificate.	
		d	There should be facility for on board light to facilitate visual signature for recovery, the operation of which should be GCS controlled	Board will check practically.	
21	Miscellaneous	a	The comprehensive warranty of the UAS	2 yrs	Firm will produce OEM certificate.
		b	Total technical life (TTL)	5 yrs or 750 landings	Firm will produce OEM certificate.

<b>S.N</b>	<b>Parameter</b>	<b>Specification</b>		<b>Trial directives</b>	
		c	Life of AV battery	200 charging cycles or 2 yrs	Firm will produce OEM certificate.
		d	Product support after warranty	up to 3 yrs	Firm will produce OEM certificate.
		e	Repair and maintenance including periodicity of midlife interventions/intent towards establishing maintenance hubs etc.		Firm will produce undertaking.