

# **Service description**

**Procurement of two flight model laser communication terminals for 16U small satellites in Low Earth Orbit (LEO)**

**Award No.: OV-106-26**

Client:

Technical University of Berlin, The President  
Straße des 17. Juni 135  
10623 Berlin

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## 1 BRIEF DESCRIPTION OF THE SERVICE

Technische Universität Berlin (TU Berlin, hereinafter referred to as Client – AG) intends to procure two (2) space flyable Laser Communication Terminals (LCT) as Flight Models (FM) for optical data transmission between two 16U small satellites in low-Earth orbit (LEO, approx. 500 km, sun-synchronous orbit – SSO) and between the satellites and an optical ground station in Neustrelitz (Germany). The laser communication terminals must support both direct-to-earth (DTE) connections and inter-satellite link (ISL) connections.

The service includes hardware, documentation, integration/acceptance support as well as defined Factory Acceptance Test (FAT) / System Integration Test (SIT) certificates.

## 2 SERVICE DESCRIPTION

In the following, the minimum criteria (MK) with the required components and parameters of the services to be procured are described and the task description to be fulfilled with the offer is discussed in detail.

**Unfulfilled requirements will lead to the exclusion of the respective offer.**

### 2.1 APPLICATION SCENARIO AND BOUNDARY CONDITIONS

- Orbit: LEO, approx. 500 km, SSO
- Satellite platform: 16U; Satellite peak power available: 50-100 W
- Ground segment: mainly Neustrelitz; Link windows are weather/visibility dependent  
→ priority on **robust acquisition, fast reacquisition, stable tracking operation**
- Terminal operation in modes: Standby / Acquire / Track / Data / Safe / Inhibit
- The client will provide satellite bus ICDs (power, data, mechanics) after the contract has been awarded.

### 2.2 MILESTONES

The mission envisages the following milestones:

- Q4 2026 CDR
- Q2 2027 Integration
- Q2/Q3 2027 AIVT
- Q4 2027 / Q1 2028 Rocket Launch / LEOP

### 2.3 PROJECT KICK-OFF MEETING

The Contractor (hereinafter referred to as the "Contractor") shall conduct an initial coordination meeting/project kick-off with the Client within a maximum of two (2) weeks after contract

award. The meeting shall be organized remotely by the Contractor. The purpose of the meeting is to briefly present the proposal and to define the further course of action. The meeting minutes shall serve as proof of service delivery.

Apart from the kick-off meeting, the Contractor shall provide regular technical support after contract award, primarily in a remote format, with a minimum effort of 0.5 hours per week until completion of the overall scope of work.

During the integration phase (expected around Q2 2027), an additional requirement for technical support shall be provided by the Contractor, primarily in a remote format, with a minimum effort of 1 additional hour per week (resulting in a total minimum support effort of 1.5 hours per week). The start of this additional technical support is dependent on the commissioning date of the satellite and shall continue until the successful commissioning of the LCT. The actual support effort may temporarily exceed this minimum level. For cost calculation purposes, bidders shall assume a minimum support effort equivalent to 1.5 hours per week over a period of six (6) months.

In particular, an increased level of support may be required during the commissioning phase of the LCT. Following successful commissioning, the support requirement is expected to decrease to irregular, event-driven support for the clarification of technical questions.

During the In-Orbit Operations phase, starting after the launch vehicle mission (currently expected in Q1 2028), the Contractor shall provide additional technical support, primarily in a remote format, with a minimum effort of 1 additional hour per week during the first six (6) months of operations (resulting in a total minimum support effort of 1.5 hours per week).

## **2.4 SCOPE OF DELIVERY**

The following are the minimum requirements for the scope of delivery for the Contractor:

### **2.4.1 Hardware**

- **2× LCT Flight Model (FM)**, each including all required subcomponents (optics, electronics, mechanics)
- Depending on FM: Mounting concept (baseplate/interface), cable-side connection according to ICD
- Each FM: **cable harness/connector** (space-compatible), incl. pinout plan
- For each FM: serial number, configuration status, CoC/QA documents
- The Contractor has to supply a Data Handling Unit (DHU) including mission software for ground tests. The scope of delivery includes the hardware, software licenses, technical documentation (ICD, User Manual).

#### 2.4.2 Documentation

- **Interface Control Document - ICD** (mechanical/electrical/thermal/protocol) incl. pinouts, timing, data rates, telemetry points
- **Concept Of Operations - CONOPS** (Acquisition/Tracking/AIF Logic, Abort/Retry Logic, Safe/Inhibit Behavior, KPI Logging)
- **Link budget** for LEO→Neustrelitz (assumptions transparent, sensitivity analysis)
- Proof/test documents: FAT procedures, FAT report, SIT test cases/protocols, environmental/quality certificates

#### 2.4.3 Support services

- **LCT-SUP01** The Contractor shall provide technical support services for the integration of the LCT into the spacecraft. The support serves to clarify and coordinate the mechanical, electrical and software interfaces between the terminal, spacecraft bus and ground segment. The main results of the technical coordination must be documented in an appropriate form.
- **LCT-AIT01** The Contractor shall provide technical assistance in defining the assembly, integration, and testing activities. This includes, in particular, the coordination of integration procedures, test requirements, test procedures and verification steps for the integration of the Laser Communication Terminal into the spacecraft.
- **LCT-OPS01** The Contractor shall provide technical support for the in-orbit operation of the Laser Communication Terminal for at least 6 months after launch. This includes, in particular, support in the command of the terminal as well as in the definition, coordination and documentation of suitable ground procedures for operation, testing, failure analysis and restoration of nominal operating states.

### 2.5 TECHNICAL REQUIREMENTS

**Note:** All requirements are feature/performance based. Tenders may offer **equivalent solutions**; Equivalence must be proven (compliance matrix + evidence).

#### 2.5.1 SWaP/Mechanical

**LCT-M01** Installation within a = **1U** envelope (incl. optical keep-out zone) per FM.

**LCT-M02** Mass per FM = **1.8 kg**.

**LCT-M03** Peak power per FM = **40 W**, power profiles (peak/avg, duty cycle) must be shown.

**LCT-M04** Thermal interface (baseplate/heat-flux) and temperature limits must be specified.

#### 2.5.2 Communication Performance / Data Rates

**LCT-C00** The LCT must comply with **the SDA OCT Standard v3.1.0 (or newer)** and be compatible. In particular, with the technical specifications of the optical ground stations (OGS) with separate wavelength architecture in the up/downlink with nominal wavelengths of 1536 nm and 1553 nm and a compatible modulation On-Off Keying (OOK).

**LCT-C01** The LCT must support optical inter-satellite links (OISL) **SDA OCT Standard v3.1.0 (or newer)** ). Proof by link budget and heritage with at least one identical (or  $\geq 90\%$  similar) model.

**LCT-C02** DTE downlink and OISL at a **slant range = 1000 km**, a bidirectional TX/RX payload rate of = **300 Mbaud/s** and the robustness of the acquisition via BER can be proven. (mission-relevant assumptions; Proof of link budget).

**LCT-C03** CONOPS, return channel/mechanism for acquisition/beacon and TM/TC transmission: concept/protocol to be disclosed.

**LCT-C04** The contractor describes at least one robust operational profile for weather-limited windows (reacquire strategy, KPI telemetry).

### 2.5.3 Acquisition / Tracking / Pointing

**LCT-P01** Terminal provides fine-pointing/fine-steering (or equivalent solution) to compensate for body-pointing residual errors.

**LCT-P02** Field-of-Regard/Fine-Pointing Range =  $\pm 0.5^\circ$  or equivalent evidence of robust acquisition/tracking capability (Test/Heritage/Analysis).

**LCT-P03** Terminal provides unique status and quality metrics: Beacon-Detect/PAT, Lock-State, Tracking-Quality, Termination Reasons.

### 2.5.4 Data/Control Interfaces & Disclosure

**LCT-I01** Primary payload interface: **Ethernet** (100/1000BASE-T) or functionally equivalent interface must be demonstrated.

**LCT-I02** TM/TC interface (Ethernet or serial) with full telemetry documentation and full access to housekeeping telemetry (= 1 Hz continuous) and diagnostic data (on-demand, =10 Hz).

**LCT-I03** framing/FEC/PHY profiles are **fully documented** (close to standard or equivalent openly documented) for optical ground station integration.

**LCT-I04** The codes and software components stored in the LCT (including, but not limited to, firmware, software, and configuration parameters) must be upgradable after launch in orbit (in-orbit) via the Telecommand Link (TC) without the need for physical access to the spacecraft.

### 2.5.5 Qualification / Safety

**LCT-Q01** The contractor must demonstrate the suitability of the proposed design for use in a LEO spacecraft. For this purpose, a flight heritage of the offered design or a verifiably equivalent predecessor design with at least one successfully completed flight mission must be proven.

In addition, suitable evidence of environmental qualification must be provided, in particular TVAC and vibration/shock. Evidence can be provided for the design offered or a verifiably equivalent predecessor design.

**LCT-Q02** The contractor must provide a warranty of at least 12 months on all components (except wear parts).

### **3 PAYMENT PLAN**

Payments are made as follows:

Power share:

- (1) 30% of the total amount after the initial coordination meeting/project kick-off has been completed
- (2) 40% of the total amount after service provision: delivery of ICD and technical documentation
- (3) 30% of the total amount after service provision: FM Delivery

All remuneration is to be understood as net remuneration plus the applicable statutory value added tax.

A benefit component is considered to have been completed if:

- The service provision has been carried out in full and accepted by the AG

### **4 PLACE OF PERFORMANCE**

All development work must take place on the Contractor's own premises. The AG does not provide any workstations.

All physical items included in the scope of delivery must be delivered to the following address:

Technical University of Berlin

12-14

10857 Berlin

Germany

The Integration Laboratory and Missions Control Center (MCC) is located at TU Berlin at Marchstraße 12-14, 10587 Berlin. Support must be available at least online or on-site.

### **5 DATES / EXECUTION TIMES**

Start of execution: Execution can take place from the day the contract is awarded (expected to be 20.08.2026).

End of execution: The flight hardware must be delivered by the end of April 2027 at the latest.

The DHU is to deliver as soon as possible, at least 4 months (expected December 31, 2026) before the FM models).

The technical documentation must be provided immediately after the order has been awarded, but within a maximum of 8 weeks.

***If bidders deviate from the above-mentioned binding deadlines, justified, deviating binding delivery times/deadlines must be deposited in the offer. In the course of the examination and evaluation, the AG reserves the right to decide whether the respective offer will be admitted for further evaluation.***

## **6 DOCUMENTS TO BE SUBMITTED**

In addition to the required self-declarations (see award documents), the following points must be presented in writing in the tender. If the following points are not presented in writing, the offer will be excluded.

- **TUB - Offer letter from the bidder:** Please submit this document completed with the offer.
- **TUB - Price sheet (ZK<sup>1</sup>):** Please submit this completed document with the offer.
- **TUB - Declarations to be submitted by the company EU (EC):<sup>2</sup>** Please submit this document completed with the offer.

**TUB – Compliance Matrix (EK):** The bidder provides a completed compliance matrix for all the above requirements

**TUB – Specification Documents (EK):** The bidder submits the following descriptions and evidence:

- technical description of the offered LCT,
- Link budget for LEO to optical ground station Neustrelitz,
- Description of DTE and ISL operating concepts,
- Proof of flight heritage and environmental qualification, at least 1 page

***Note: Individual information below will be evaluated as a quality award criterion as part of the evaluation and may not be requested by the Client afterwards.***

- **TUB – Schedule (EK):** The bidder draws up a chronological schedule showing that the individual services will be provided on time and in full under the specified deadlines.

***Note: Individual information below will be evaluated as a quality award criterion as part of the evaluation and may not be requested by the Client afterwards.***

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<sup>1</sup> CC = Award criterion

<sup>2</sup> EK = Suitability Criterion



- **TUB – Quality criterion (ZK):** The bidder indicates in a clear view whether and to what extent he/she fulfils the additional aspects. If necessary, the AG will check the information against it on the basis of the evidence submitted.

***Note: The fulfilment and indication of the additional criteria under point 7.2 is included in the evaluation and is not obligatory for the bidder. If no or insufficient information is provided, the bidder receives 0 points. Subsequent claims are not possible.***

## **7 AWARD CRITERIA AND WEIGHTING**

Taking into account all the circumstances, the contract will be awarded to the most economical tender. The evaluation is based on the submitted offer. Therefore, it is in the interest of the bidder to provide all requested information in as much detail and accuracy as possible.

The award criteria are weighted as follows:

- **Total offer net price:** 40%
- **Quality:** 60 %

### **7.1 TOTAL OFFER NET PRICE**

The lowest tender price is determined from the number of offers that can be evaluated, i.e. all offers that have not been excluded for formal reasons, not for reasons of lack of suitability for the business and not for reasons of an unreasonable price in relation to the service.

The offer with the lowest total price (excl. VAT) will receive the maximum score of 40 points. For example, if the total price of an offer is 100% higher than the offer with the lowest total price, then this offer will receive 0 points. Zero points represent the lower limit, i.e. no negative points are awarded. The points in between are calculated interpolarily according to the following equation:

Formula:

$$Points_{price} = \left( 2 - \frac{Price}{Price_{min}} \right) * 40$$

## 7.2 QUALITY

The aspects described below represent improved performance. The fulfilment of these aspects is not obligatory for the bidder, but will be taken into account in the bid evaluation.

A maximum of 60 points are awarded for the fulfilment of the aspects; Partial points are not awarded. Any offer that fully meets the mentioned aspect will receive the number of points shown. If no or insufficient information is provided, the bidder receives 0 points.

The fulfilment of the additional aspect must be clearly indicated in the offer.

### Weighting of quality criteria

No.	Evaluation criterion	Weighting
1	Technical performance of the LCT	25 %
2	Integration capability in 16U platform and ground segment	25 %
3	Qualification, Heritage and Project Risk	5 %
4	Documentation, support, AIT and in-orbit support	5%
	<b>Total</b>	<b>60 %</b>

For the qualitative criteria 1-4, a point scale is used, which is broken down by the respective criteria. Only values that exceed the minimum requirement are positively evaluated.

The percentages achieved in the respective sub-criteria are multiplied by the respective weighting:

$$criterion_{Qua \quad Nr.1} = \left( \frac{awarded \ points}{100} \right) * 25$$

## 7.2.1 Technical performance of the LCT – sub-criterion 1

The performance of the LCT offered for DTE and ISL applications in LEO is evaluated.

No .	Sub-criterion	Weighting														
A	<div><b>Data rate and link performance</b><table><tr><th>Points</th><th>Proof</th></tr><tr><td>0</td><td>Minimum requirement: Data rate and link performance for DTE and ISL, including proof of at least 300 Mbaud/s for Slanrange at least 1000 km</td></tr><tr><td>1</td><td>&gt;300 &lt; 500 Mbaud or &gt;1000 km &lt; 1500 km at 300 Mbaud with ≥3 dB margin</td></tr><tr><td>2</td><td>&gt;500 &lt; 1000 Mbaud or ≥1500 km &lt; 2000 km at 300 Mbaud with ≥3 dB margin</td></tr><tr><td>3</td><td>≥1000 Mbaud or ≥2000 km at 300 Mbaud with ≥3 dB margin</td></tr><tr><td>4</td><td>&gt;300 Mbaud and ≥1500 km with ≥3 dB margin</td></tr><tr><td>5</td><td>&gt;300 Mbaud and ≥2000 km with ≥6 dB margin</td></tr></table></div>	Points	Proof	0	Minimum requirement: Data rate and link performance for DTE and ISL, including proof of at least 300 Mbaud/s for Slanrange at least 1000 km	1	>300 < 500 Mbaud or >1000 km < 1500 km at 300 Mbaud with ≥3 dB margin	2	>500 < 1000 Mbaud or ≥1500 km < 2000 km at 300 Mbaud with ≥3 dB margin	3	≥1000 Mbaud or ≥2000 km at 300 Mbaud with ≥3 dB margin	4	>300 Mbaud and ≥1500 km with ≥3 dB margin	5	>300 Mbaud and ≥2000 km with ≥6 dB margin	30 %
Points	Proof															
0	Minimum requirement: Data rate and link performance for DTE and ISL, including proof of at least 300 Mbaud/s for Slanrange at least 1000 km															
1	>300 < 500 Mbaud or >1000 km < 1500 km at 300 Mbaud with ≥3 dB margin															
2	>500 < 1000 Mbaud or ≥1500 km < 2000 km at 300 Mbaud with ≥3 dB margin															
3	≥1000 Mbaud or ≥2000 km at 300 Mbaud with ≥3 dB margin															
4	>300 Mbaud and ≥1500 km with ≥3 dB margin															
5	>300 Mbaud and ≥2000 km with ≥6 dB margin															
B	<div><b>Robustness of acquisition via BER</b><table><tr><th>Points</th><th>BER Certificate</th></tr><tr><td>0</td><td>Minimum requirement: Proof of the robustness of the acquisition via BER is available.</td></tr><tr><td>1</td><td>Post-FEC BER ≤ 10<sup>-3</sup></td></tr><tr><td>2</td><td>Post-FEC BER ≤ 10<sup>-6</sup></td></tr><tr><td>3</td><td>Post-FEC BER ≤ 10<sup>-9</sup></td></tr><tr><td>4</td><td>Post-FEC BER ≤ 10<sup>-12</sup></td></tr><tr><td>5</td><td>Post-FEC BER &gt;10<sup>-12</sup></td></tr></table></div>	Points	BER Certificate	0	Minimum requirement: Proof of the robustness of the acquisition via BER is available.	1	Post-FEC BER ≤ 10 <sup>-3</sup>	2	Post-FEC BER ≤ 10 <sup>-6</sup>	3	Post-FEC BER ≤ 10 <sup>-9</sup>	4	Post-FEC BER ≤ 10 <sup>-12</sup>	5	Post-FEC BER >10 <sup>-12</sup>	30 %
Points	BER Certificate															
0	Minimum requirement: Proof of the robustness of the acquisition via BER is available.															
1	Post-FEC BER ≤ 10 <sup>-3</sup>															
2	Post-FEC BER ≤ 10 <sup>-6</sup>															
3	Post-FEC BER ≤ 10 <sup>-9</sup>															
4	Post-FEC BER ≤ 10 <sup>-12</sup>															
5	Post-FEC BER >10 <sup>-12</sup>															
C	<div><b>Fine-pointing/fine-steering capability, field-of-regard and compensation of residual errors of the satellite platform</b><table><tr><th>Points</th><th>Range</th></tr><tr><td>0</td><td>Minimum requirement: Fine-pointing/fine-steering capability to compensate for body-pointing residual defects; Proven field-of-regard/fine-pointing range of at least ±0.5° or equivalent proof of robust acquisition/tracking capability.</td></tr><tr><td>1</td><td>&gt;±0.5°; &lt; ±1.0</td></tr><tr><td>2</td><td>≥ ±1.0°; &lt; ±2.0</td></tr><tr><td>3</td><td>≥ ±2.0°</td></tr></table></div>	Points	Range	0	Minimum requirement: Fine-pointing/fine-steering capability to compensate for body-pointing residual defects; Proven field-of-regard/fine-pointing range of at least ±0.5° or equivalent proof of robust acquisition/tracking capability.	1	>±0.5°; < ±1.0	2	≥ ±1.0°; < ±2.0	3	≥ ±2.0°	40 %				
Points	Range															
0	Minimum requirement: Fine-pointing/fine-steering capability to compensate for body-pointing residual defects; Proven field-of-regard/fine-pointing range of at least ±0.5° or equivalent proof of robust acquisition/tracking capability.															
1	>±0.5°; < ±1.0															
2	≥ ±1.0°; < ±2.0															
3	≥ ±2.0°															
	SUM A - C	100%														

In particular, the following are rated positively:

- Proven bidirectional DTE and ISL capability,
- high link margins under realistic LEO boundary conditions,
- complete and comprehensible disclosure of the relevant communication parameters,
- low dependence on high-precision body pointing of the satellite.

**Calculation example:**

The points achieved are calculated with the respective weighting with the rule of three as follows:

$$subcriterium_A = \left( \frac{awarded\ points}{5} \right) * 30$$

Subsequently, the percentages for the sub-criteria A - C are added together as the entire evaluation criterion Technical Performance of the LCT No. 1.

## 7.2.2 Integration capability in 16U platform and ground segment – sub-criterion 2

It will assess how well the LCT offered can be integrated into the intended satellite platform and ground segment.

No .	Sub-criterion	Weighting														
D	<div>Falling below the SWaP boundary condition: at least 1U</div> <table><tr><th>Points</th><th>Falling below the SWaP boundary condition: at least 1U</th></tr><tr><td>0</td><td>Minimum requirement: At least 1U</td></tr><tr><td>1</td><td>&lt;1U and <math>\geq 0.95</math>U</td></tr><tr><td>2</td><td>&lt;0.95 and <math>\geq 0.90</math> U</td></tr><tr><td>3</td><td>&lt;0.90 U and <math>\geq 0.85</math> U</td></tr><tr><td>4</td><td>&lt;0.85 and <math>\geq 0.80</math> U</td></tr><tr><td>5</td><td>&lt; 0.80 U</td></tr></table>	Points	Falling below the SWaP boundary condition: at least 1U	0	Minimum requirement: At least 1U	1	<1U and $\geq 0.95$ U	2	<0.95 and $\geq 0.90$ U	3	<0.90 U and $\geq 0.85$ U	4	<0.85 and $\geq 0.80$ U	5	< 0.80 U	25 %
Points	Falling below the SWaP boundary condition: at least 1U															
0	Minimum requirement: At least 1U															
1	<1U and $\geq 0.95$ U															
2	<0.95 and $\geq 0.90$ U															
3	<0.90 U and $\geq 0.85$ U															
4	<0.85 and $\geq 0.80$ U															
5	< 0.80 U															
E	<div>Falling below the SWaP boundary condition: maximum 1.8 kg</div> <table><tr><th>Points</th><th>Falling below the SWaP boundary condition: maximum 1.8 kg</th></tr><tr><td>0</td><td>Minimum requirement: maximum 1.8 kg</td></tr><tr><td>1</td><td><math>\geq 1.71</math> kg and &lt; 1.8 kg</td></tr></table>	Points	Falling below the SWaP boundary condition: maximum 1.8 kg	0	Minimum requirement: maximum 1.8 kg	1	$\geq 1.71$ kg and < 1.8 kg	25%								
Points	Falling below the SWaP boundary condition: maximum 1.8 kg															
0	Minimum requirement: maximum 1.8 kg															
1	$\geq 1.71$ kg and < 1.8 kg															

	<table><tr><td>2</td><td><math>\geq 1.62</math> kg and <math>&lt; 1.71</math> kg</td></tr><tr><td>3</td><td><math>\geq 1.53</math> kg and <math>&lt; 1.62</math> kg</td></tr><tr><td>4</td><td><math>\geq 1.44</math> kg and <math>&lt; 1.53</math> kg</td></tr><tr><td>5</td><td><math>&lt; 1.44</math> kg</td></tr></table>	2	$\geq 1.62$ kg and $< 1.71$ kg	3	$\geq 1.53$ kg and $< 1.62$ kg	4	$\geq 1.44$ kg and $< 1.53$ kg	5	$< 1.44$ kg							
2	$\geq 1.62$ kg and $< 1.71$ kg															
3	$\geq 1.53$ kg and $< 1.62$ kg															
4	$\geq 1.44$ kg and $< 1.53$ kg															
5	$< 1.44$ kg															
F	<p>Falling below the SWaP boundary condition: low power consumption</p> <table><tr><th>Points</th><th>Peak Power</th></tr><tr><td>0</td><td>Minimum Requirement: Peak Power</td></tr><tr><td>1</td><td><math>&gt; 35</math> W</td></tr><tr><td>2</td><td><math>&lt; 35</math> W and <math>\geq 30</math> W</td></tr><tr><td>3</td><td><math>&lt; 30</math> W and <math>\geq 25</math></td></tr><tr><td>4</td><td><math>&lt; 25</math> W and <math>\geq 20</math></td></tr><tr><td>5</td><td><math>&lt; 20</math> W</td></tr></table>	Points	Peak Power	0	Minimum Requirement: Peak Power	1	$> 35$ W	2	$< 35$ W and $\geq 30$ W	3	$< 30$ W and $\geq 25$	4	$< 25$ W and $\geq 20$	5	$< 20$ W	35 %
Points	Peak Power															
0	Minimum Requirement: Peak Power															
1	$> 35$ W															
2	$< 35$ W and $\geq 30$ W															
3	$< 30$ W and $\geq 25$															
4	$< 25$ W and $\geq 20$															
5	$< 20$ W															
G	<p>Data and control interfaces: Ethernet payload interface and TM/TC access</p> <table><tr><th>Points</th><th>Range</th></tr><tr><td>0</td><td>TM/TC interface (Ethernet or serial) with full telemetry documentation and full access to housekeeping telemetry (= 1 Hz continuous) and diagnostic data (on-demand, =10 Hz).</td></tr><tr><td>1</td><td>StdTM <math>\geq 1</math> Hz or DebugTM <math>\geq 10</math> Hz (one value exceeds minimum requirement)</td></tr><tr><td>2</td><td>StdTM <math>&gt; 1</math> Hz and DebugTM <math>&gt; 10</math> Hz (both values exceed minimum requirement)</td></tr><tr><td>3</td><td>StdTM <math>\gg 1</math> Hz and DebugTM <math>\gg 10</math> Hz (both values exceed minimum requirement many times 10+)</td></tr></table>	Points	Range	0	TM/TC interface (Ethernet or serial) with full telemetry documentation and full access to housekeeping telemetry (= 1 Hz continuous) and diagnostic data (on-demand, =10 Hz).	1	StdTM $\geq 1$ Hz or DebugTM $\geq 10$ Hz (one value exceeds minimum requirement)	2	StdTM $> 1$ Hz and DebugTM $> 10$ Hz (both values exceed minimum requirement)	3	StdTM $\gg 1$ Hz and DebugTM $\gg 10$ Hz (both values exceed minimum requirement many times 10+)	15 %				
Points	Range															
0	TM/TC interface (Ethernet or serial) with full telemetry documentation and full access to housekeeping telemetry (= 1 Hz continuous) and diagnostic data (on-demand, =10 Hz).															
1	StdTM $\geq 1$ Hz or DebugTM $\geq 10$ Hz (one value exceeds minimum requirement)															
2	StdTM $> 1$ Hz and DebugTM $> 10$ Hz (both values exceed minimum requirement)															
3	StdTM $\gg 1$ Hz and DebugTM $\gg 10$ Hz (both values exceed minimum requirement many times 10+)															
	SUM D - G	100 %														

**In particular, the following are rated positively:**

- Falling below the target value for volumes of no more than 1 U Falling below the target value for volumes of no more than 1.8 kg Higher sampling rates of housekeeping and diagnostic telemetry,
- Falling below the target value for power consumption

**Calculation example:**

The points achieved are calculated with the respective weighting with the rule of three as follows:

$$subcriterium_D = \left( \frac{\text{awarded points}}{5} \right) * 25$$

Subsequently, the percentages for the sub-criteria D - G are added together as the overall evaluation criterion of integration capability in 16U platform and ground segment no. 2.

**7.2.3 Qualification, Heritage and Project Risk – Sub-Criterion 3**

The technical maturity of the offered design and the risk for deployment, integration and operation are assessed.

No	Sub-criterion	Weighting										
H	Flight heritage of the offered design or a demonstrably equivalent predecessor design (maturity/TRL of the design) <table><tr><th>Points</th><th>Range</th></tr><tr><td>0</td><td>Minimum requirement: Flight Heritage flown 1x</td></tr><tr><td>1</td><td>Up to 5 missions</td></tr><tr><td>2</td><td>6-10 missions</td></tr><tr><td>3</td><td>Over 10 missions</td></tr></table>	Points	Range	0	Minimum requirement: Flight Heritage flown 1x	1	Up to 5 missions	2	6-10 missions	3	Over 10 missions	100 %
Points	Range											
0	Minimum requirement: Flight Heritage flown 1x											
1	Up to 5 missions											
2	6-10 missions											
3	Over 10 missions											
	SUM H	100%										

**In particular, the following are rated positively:**

- terminals already operated in orbit (more = positive), comparable terminals,

**Calculation example:**

The points achieved are calculated with the respective weighting with the rule of three as follows:

$$subcriterium_H = \left( \frac{\text{awarded points}}{3} \right) * 100$$

The further weighting is carried out in the evaluation criterion Qualification, Heritage and Project Risk No. 3.

## 7.2.4 Documentation, Support, AIT and In-Orbit Support – Sub-Criterion 4

The quality of the supplied technical support and the documentation base is evaluated.

No.	Sub-criterion	Weighting														
I	Quality and scope of integration, AIT and in-orbit operations support	50 %														
	<table><tr><th>Points</th><th>Range</th></tr><tr><td>0</td><td>Minimum requirement:<ul style="list-style-type: none"><li>- Regular professional support: 0.5 hours per week</li><li>- Integration phase: additional 1 hour per week</li><li>- In-orbit operations (first 6 months): additional 1 hour per week</li></ul></td></tr><tr><td>1</td><td><ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 1.5 hours per week</li><li>- In-orbit operations (first 6 months): additional 1.5 hours per week</li></ul></td></tr><tr><td>2</td><td><ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 2 hours per week</li><li>- In-orbit operations (first 6 months): additional 2 hours per week</li></ul></td></tr><tr><td>3</td><td><ul style="list-style-type: none"><li>- Regular professional support: at least 1 hour per week</li><li>- Integration phase: additional more than 2.5 hours per week</li><li>- In-orbit operations (first 6 months): additional more than 2.5 hours per week</li></ul></td></tr></table>		Points	Range	0	Minimum requirement: <ul style="list-style-type: none"><li>- Regular professional support: 0.5 hours per week</li><li>- Integration phase: additional 1 hour per week</li><li>- In-orbit operations (first 6 months): additional 1 hour per week</li></ul>	1	<ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 1.5 hours per week</li><li>- In-orbit operations (first 6 months): additional 1.5 hours per week</li></ul>	2	<ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 2 hours per week</li><li>- In-orbit operations (first 6 months): additional 2 hours per week</li></ul>	3	<ul style="list-style-type: none"><li>- Regular professional support: at least 1 hour per week</li><li>- Integration phase: additional more than 2.5 hours per week</li><li>- In-orbit operations (first 6 months): additional more than 2.5 hours per week</li></ul>				
	Points		Range													
	0		Minimum requirement: <ul style="list-style-type: none"><li>- Regular professional support: 0.5 hours per week</li><li>- Integration phase: additional 1 hour per week</li><li>- In-orbit operations (first 6 months): additional 1 hour per week</li></ul>													
	1		<ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 1.5 hours per week</li><li>- In-orbit operations (first 6 months): additional 1.5 hours per week</li></ul>													
	2		<ul style="list-style-type: none"><li>- Regular professional support: 1 hour per week</li><li>- Integration phase: additional 2 hours per week</li><li>- In-orbit operations (first 6 months): additional 2 hours per week</li></ul>													
3	<ul style="list-style-type: none"><li>- Regular professional support: at least 1 hour per week</li><li>- Integration phase: additional more than 2.5 hours per week</li><li>- In-orbit operations (first 6 months): additional more than 2.5 hours per week</li></ul>															
J	Provision/delivery of the DHU in weeks	25 %														
	<table><tr><th>Points</th><th>Falling short of DHU [in full weeks]</th></tr><tr><td>0</td><td>Minimum requirement: no later than 31.12.2026</td></tr><tr><td>1</td><td>1–2 weeks</td></tr><tr><td>2</td><td>3–4 weeks</td></tr><tr><td>3</td><td>5–6 weeks</td></tr><tr><td>4</td><td>7–8 weeks</td></tr><tr><td>5</td><td>more than 8 weeks</td></tr></table>		Points	Falling short of DHU [in full weeks]	0	Minimum requirement: no later than 31.12.2026	1	1–2 weeks	2	3–4 weeks	3	5–6 weeks	4	7–8 weeks	5	more than 8 weeks
	Points		Falling short of DHU [in full weeks]													
	0		Minimum requirement: no later than 31.12.2026													
	1		1–2 weeks													
	2		3–4 weeks													
	3		5–6 weeks													
	4		7–8 weeks													
	5		more than 8 weeks													
K	Functionality DHU including mission software for ground tests	25 %														
	<table><tr><th>Points</th><th>Proven functionality</th></tr><tr><td>0</td><td>Minimum requirement: Simple ground test unit or simulator with basic functions but limited mission software and limited test coverage.</td></tr></table>		Points	Proven functionality	0	Minimum requirement: Simple ground test unit or simulator with basic functions but limited mission software and limited test coverage.										
	Points		Proven functionality													
0	Minimum requirement: Simple ground test unit or simulator with basic functions but limited mission software and limited test coverage.															

	1	Usable test unit with relevant electrical/logical interfaces and mission-related software for basic integration and functional testing.	
	2	Fully integrated, mission-oriented test environment including Data Handling Unit/EGSE functionality, applicable mission software, configuration options, interface emulation, test scripts/procedures, logging2 Comprehensive ground test solution with mission-specific software, documented interfaces, telecommand/telemetry functionality, error/status outputs.	
SUM I - K			100 %

**In particular, the following are rated positively:**

- Scope of Support
- good usability of the DHU for early integration and soil tests.

**Calculation example:**

The points achieved are calculated with the respective weighting with the rule of three as follows:

$$subcriterium_j = \left( \frac{awarded\ points}{2} \right) * 25$$

Subsequently, the percentages for the sub-criteria I - K are added together as the entire evaluation criterion Documentation, Support, AIT and In-Orbit Support No. 4.

In the event of a tie in the overall evaluation of price and quality, the bid with the higher number of points in the award criterion quality will be awarded the contract. If there is also a tie in this respect, the decision shall be made by lot.