Answer to Big Company

RFP for the Low-cost CubeSat Constellation for Global IoT Connectivity

Submitted to:
Big Company LLP
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VOLUME 2 – PROJECT MANAGMENT PROPOSAL

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Introduction

The present document details the management proposal for the procurement of an ioT CubeSat constellation to support Big Company's venture into IoT services and applications. This document aims to provide a comprehensive overview of the project's management and processes, and outlines AstroNot's approach to fulfilling the Statement of Work (SOW) requirements in detail. The following sections of this document provide detailed insights into our strategies and methodologies, demonstrating our commitment to delivering a state-of-the-art IoT network that meets and exceeds the stated requirements.

About Us

AstroNot brings extensive expertise in designing and managing satellite constellations. With three successful constellations already supporting 4G and 5G networks, AstroNot has a proven track record of delivering reliable and scalable solutions for global connectivity. Leveraging our advanced manufacturing, testing and operational capabilities, we are well-positioned to develop and manage an IoT satellite constellation, ensuring desired performance and long-term sustainability to meet the specific needs of Big Company's RFP.

1. Project Management Approach

a) Project Planning

An overview of the main phases of the project, activities and timings is presented below. After acceptance and signature, the project is planned to start on the **24th of March 2025**, for a full operational capacity of the constellation by the **1st of December 2031**.

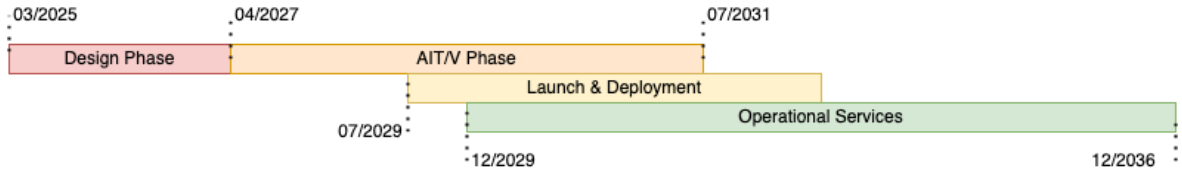


Figure 1: Project Timeline We define the major project phases as such:

Phase	Start Date	End Date	Duration	Details
A	24/03/2025	20/06/2025	2.9 months	Mission Analysis, high level System Design and Specification, ConOps
B	23/06/2025	24/03/2026	9 months	Subsystem definition and specification, preliminary system design
C	30/03/2026	16/04/2027	13.5 months	Detailed subsystem specification, component-level definition, modelling, analysis and design validation, final system design + architecture
D	20/04/2027	28/07/2031	51.3 months	Procurement, Prototyping, AIT/V
E	31/07/2029	01/12/2031	38 months *(12.5 effective)*	Preparation, shipping, launch preparation, launch, deployment, in-orbit testing & commissioning
F	14/12/2029	1/12/2036	7 years	Operations, maintenance, End-Of-Life

Planification of these phases has been made considering AstroNot's capacity, heritage and experience providing CubeSat constellations, as well as the heritage and trust we have with our subcontractors, launch operators and suppliers. Detailed planification is available in Annex A, and detailed work packages are available in Annex B.

b) Reporting and Communication Plan

To ensure effective communication, we propose delivering regular, detailed reports that provide clear insights into project progress, key metrics, and any potential challenges. These reports will be tailored to meet the specific needs and preferences of Big Company, ensuring they are always informed and engaged. We designate a dedicated Customer Liaison Officer (CLO) as a single point of contact. The CLO will be responsible for addressing inquiries, facilitating feedback, and ensuring seamless communication between Big Company and our team.

c) Configuration Management

Concerning documentation during project phases, the schedule includes 9 milestone reviews, from kickoff to project acceptance meeting, for which timing and deliverables are detailed in part 3.a. For each review, client signoff is required to kick off the next phase. Detail of all project documentation can be found in Annex B.

AstroNot commits to delivering 70 CubeSats able to provide a state-of-the-art ioT Network, and to operate the constellation for 5 years from the launch of the final batch of satellites (see part 5.a. for launch details). The user terminal will be provided by our subcontractor Apps4Space, and Cybersecurity services for by Group-IB.

d) Validation and Testing Plan

Our Validation and Testing Plan ensures the seamless integration and reliable performance of both the CubeSat design and IoT network through a structured testing process. This plan traces every mission requirement to specific testing criteria, ensuring alignment with technical specifications and mission-critical parameters. Validation is carried out through iterative testing at all stages of development, from ground-based assessments to in-orbit validation. Each stage of testing is meticulously documented, with results used to refine subsequent test protocols, guaranteeing continuous improvement throughout the project lifecycle.

The testing process is iterative, allowing for adjustments based on insights gained during each stage. Traceability is maintained through detailed documentation that links requirements to test criteria and outcomes. Any discrepancies or performance variations are analyzed and addressed to ensure alignment with mission objectives. Each satellite undergoes a full validation and testing campaign before inclusion in the constellation. Functional and environmental acceptance testing is carried out for every unit, and modifications to test protocols are implemented based on results from previous campaigns. A Certificate of Compliance (CoC) is issued upon successful completion of all tests, signed off by the design, manufacturing, and operations teams to confirm readiness for deployment.

The AIT/V phases are key parts of the ground testing process, covering thorough checks of the CubeSat design and IoT network. These stages ensure the satellite's structural strength and the IoT network's readiness for deployment and operation.

In the AIV phase, structural and thermal tests are carried out using structural and thermal models (SThM) to simulate conditions like vibration, shock, acoustic, and thermal environments. Subsystems are also tested to ensure that their performance, including microvibration and electromagnetic behavior, meets the required standards. The AIT phase moves on to full-system testing, with detailed performance evaluations done before and after environmental tests. This includes deployment checks, EMC compliance tests (both conducted and radiated), and functional health tests to confirm the CubeSat is fully operational.

The Flight Model (FM) qualification takes testing further by exposing the satellite to harsher-than-expected conditions, adding a safety margin to ensure durability and reliability. These tests cover mechanical, thermal, and EMC qualifications, as well as performance checks both before and after testing, to confirm that all systems meet mission requirements. This testing plan ensures that the satellite and IoT network are fully ready to perform in space.

The IoT network is validated through integration and functional tests, ensuring its compatibility with user applications. Communication protocols, data rates, and simultaneous connection capacities are rigorously evaluated to confirm the network's ability to meet operational demands.

A dedicated Avionics Test Bench (ATB) validates avionics systems and onboard software (OBSW) using physical and electrical models. Harness mock-ups further ensure the electromagnetic compatibility of all cabling. Cleanroom facilities adhering to ISO 14644 standards are utilized to maintain an optimal testing environment, minimizing contamination risks and ensuring precise results.

Following deployment, in-orbit testing verifies end-to-end system functionality under operational conditions. This stage focuses on validating communication with ground stations, assessing the IoT network's performance, and confirming the system's ability to support user applications. Key metrics such as data rate, simultaneous connections, signal strength, protocol efficiency, and frequency hopping performance are carefully monitored. While these parameters are initially validated during ground testing, in-orbit testing provides the final confirmation of the system's capabilities. Data collected during this phase is used to update performance models and refine the constellation's operations.

Our testing processes leverage advanced infrastructure and extensive expertise built through years of experience. State-of-the-art test benches and cleanroom facilities enable precise validation of complex satellite systems, and our configuration allows for staggered, parallel building and testing of multiple CubeSats at any time.

2. Mission Assurance and Quality Management

a) Mission Assurance

AstroNot S.A. is a certified company by Bureau Veritas certification body for the following:

- ISO 9001: 2015 Quality management for consistency.
- ISO 14001:2015 Environmental management.
- ISO 45001:2023 Health and safety.
- ISO 26000:2010 Guidance on social responsibility

AstroNot has nominated a Quality Assurance Specialist with specific responsibilities, which includes the maintenance and further development as well as the surveillance of the implementation of company's Quality Assurance and Environmental Procedures, tuning up all the executives and personnel involved in operations related to Quality, as described in the Company's Procedures, Work Instructions, Policies and Job Descriptions.

In addition, AstroNot's clean rooms have been accredited with the ISO 14644 certification for clean rooms standards and with the ISO 17025:2017 certification for testing and calibration accuracy of the equipment used to test and validate the CubeSats performance. Finally, AstroNot have been accredited with ISO 9100 (AS9100) qualification for quality management in the aerospace sector.

Our approach ensures that all deliverables meet the highest quality standards and performance expectations through rigorous, end-to-end testing and validation. This includes a defined prototyping phase to verify design and functionality before advancing to production. Each CubeSat undergoes comprehensive testing procedures (see part 1.d. for details) to simulate mission scenarios. Once deployed, in-orbit validation procedures monitor performance to confirm adherence to mission requirements. These phased checks ensure early detection of issues and guarantee mission success.

All components integrated into our CubeSats have a minimum lifespan of 5 years, are flight proven and guaranteed TRL-9. At AstroNot we take great pride and care in selecting trustworthy suppliers and subcontractors to ensure product lifespan in harsh space conditions. Previous flight experience with our currently deployed CubeSats and constellations allow us to deliver an 8-year warranty on all our CubeSats and operate our constellations in LEO for an extended 40% longer than the average expected lifespan. This feature allows us to stagger deployment and offer partially operational services before the full deployment of the constellation. For more details, see part 5.a.

b) Quality Assurance (QA) Process

AstroNot undertakes the responsibility to execute this project by applying the relevant Big Company standards and best practices. AstroNot undertakes the responsibility to perform regular audits:

- **Internal Audits:** Regular internal audits are conducted throughout the project to review QA compliance, assess risks, and ensure that processes are followed as documented. Any deviations are corrected with preventive measures.
- **Supplier Audits**: Audits of suppliers and subcontractors are performed to verify their quality systems align with our QA standards. This ensures the integrity of the components and services they provide.
- **Client Audits:** Clients are invited to perform or witness audits, providing them transparency and confidence in our QA practices.

AstroNot will inform Big Company in writing of any non-compliance of quality closes and/or of any significant change in the organization of the applicable quality system. If a non-compliance is observed, a non-compliance sheet will be issued and submitted for validation. A structured process is followed to implement corrective and preventive actions based on non-compliance findings. This includes updating QA plans, modifying design specifications, or adjusting processes as needed. General approach to quality management, that will be employed in the project will be based on requirements and bast practices coming from ISO/EN 9100 standards.
Subcontractors Apps4Space and Group-IB also comply with necessary quality certifications.

3. Project Schedule and Work Breakdown Structure

a) Detailed Project Schedule

Detailed project schedule can be found in the detailed Gantt timetable in Annex A.

In order to mark milestone events such as finalization of the design, production and qualification of the CubeSat batches or launch of the batches, AstroNot commits to 9 key milestone reviews with the customer. Timeline and description of each meeting is detailed below:

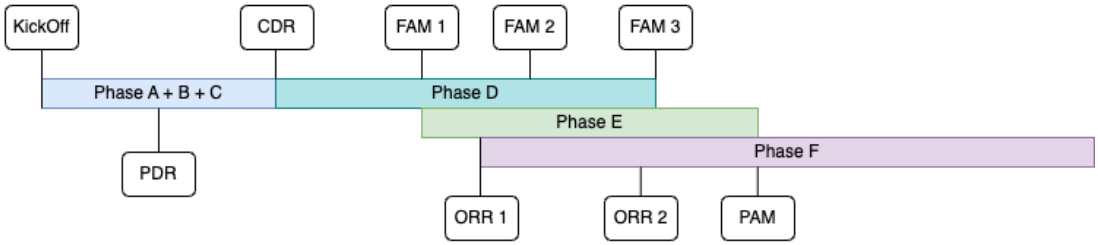


Figure 2: Project Timeline with Milestone Meetings

- **Project Kickoff (PK) -** 24/03/2025

The initial meeting marks the project's kickoff, bringing together key stakeholders—project managers, technical leads, and client representatives. Its purpose is to establish communication channels, align on project scope and deliverables, agree on milestones, and address the timeline, expectations, and any immediate concerns.

- **Preliminary Design Review (PDR) -** 24/03/2026

The PDR reviews initial design concepts and plans, focusing on system architecture, components, and alignment with client requirements. Stakeholders provide feedback, identify risks, and ensure the project is on track before advancing to detailed design and development.

- **Critical Design Review (CDR) -** 16/04/2027

The CDR thoroughly examines the final detailed design to ensure it is robust, reliable, and production ready. System components, software, and hardware specifications are reviewed, addressing any remaining issues or risks to ensure a smooth transition to production.

- **Factory Acceptance Meetings (FAM) 1, 2 & 3 -** 30/07/2029, 29/07/2030, 28/07/2031

The FAM is held at AstroNot's manufacturing and testing facility in Greece after each batch of CubeSats passes the AIT/V process. AstroNot and client representatives verify and formally approve that the CubeSats and platform meet specifications before delivery and deployment.

- **Operational Readiness Reviews (ORR) 1 & 2 -** 14/12/2029, 4/12/2030

The ORR, held at AstroNot's operational site in Japan, verifies and accepts the delivered system's performance in its intended environment. It ensures each CubeSat batch and the User Terminal meet performance standards through calibration, operational testing, and client validation, leading to partial project acceptance.

- **Project Acceptance Meeting (PAM) -** 1/12/2031

The PAM, held after the final launch, validates the fully operational constellation with the client, ensuring it meets performance standards. This review includes End-To-End testing and client validation, leading to full project acceptance and handover into routine operations until the constellation's end of life, as managed by AstroNot.

b) Work Breakdown Structure (WBS)

The work breakdown structure of this project including work packages, inputs and ouputs can be found in Annex B. A synthesized version is given below:

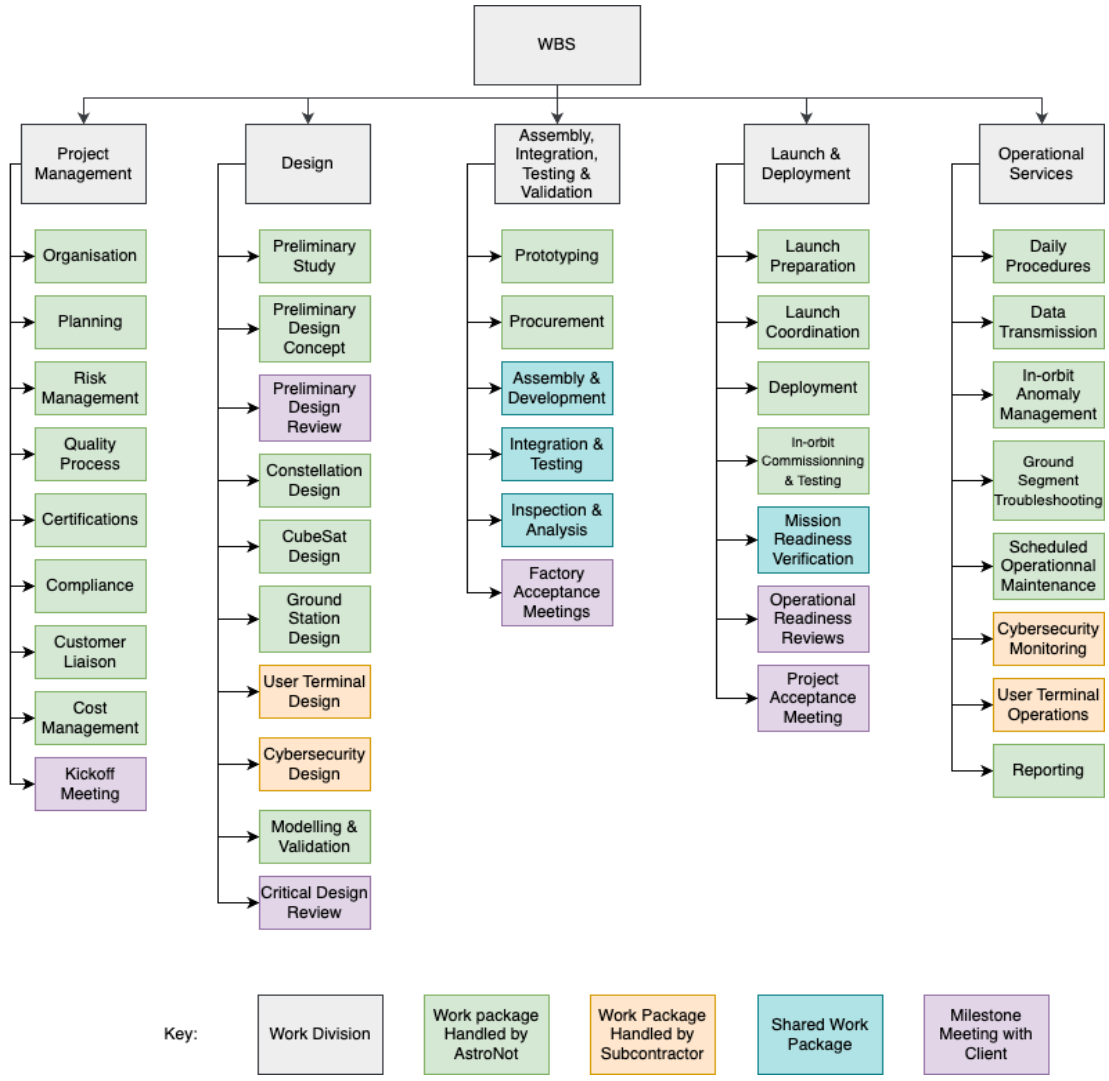


Figure 3: WBS

c) Organizational Breakdown Structure (OBS)

The OBS of the project is given below. Allocation of work packages and team composition is available upon request.

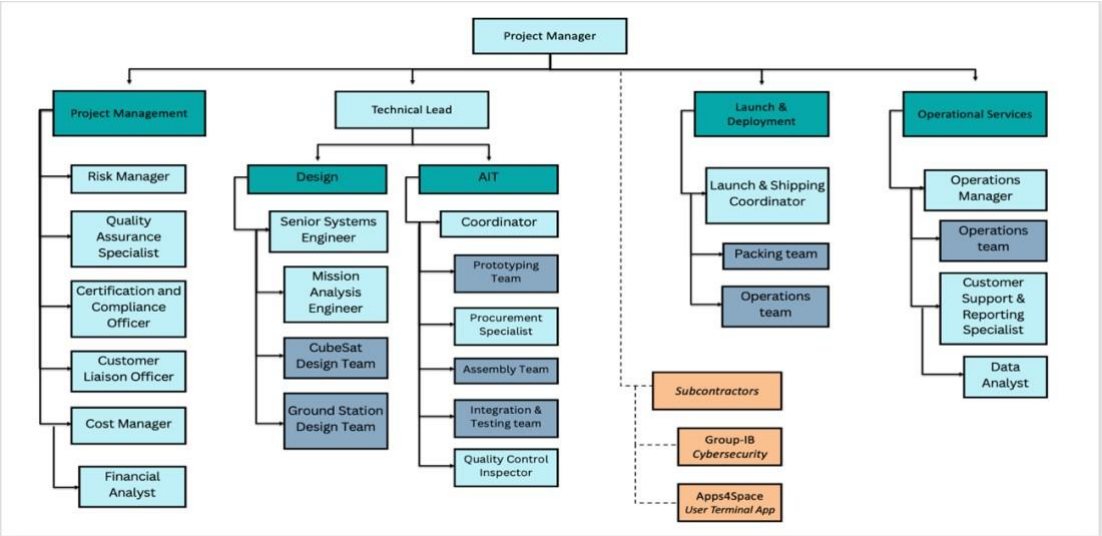


Figure 4: OBS

4. Risk Management and Mitigation Strategy

Our approach combines continuous monitoring with a structured reporting schedule to provide proactive, transparent risk management for the CubeSat constellation. Risks indicators are tracked in real time and a reporting schedule is provided monthly with immediate escalation for critical issues. Responsibilities for risk management are clearly assigned to ensure a quick response when needed, and the customer will be kept informed throughout the process. The following table contains identified risks, their assessed likelihood, severity and risk index:

		Severity				
		Negligible 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	5 Almost certain					
	4 Likely					
	3 Possible		Component failure	Geopolitical factors		
	2 Unlikely			Delivery delay	Communication system failure	
				Collision with debris	Power failure	
					Telecommand and Telemetry links failure	
	1 Rare					Launch vehicle failure
						Orbital insertion failure
						Deployment failure
						Hardware failure
						Cybersecurity

An overview of the risk and their corresponding mitigations strategies is given below:

Manufacturing & Deployment Risks:

Number	Name	Description	Mitigation Strategy
1.1	Component failure	Risk of receiving and integrating failed components	A short lead time was a key requirement for selecting our components, with alternative options planned for cases of significant delays.
1.2	Delivery delay	Delays in the delivery of components	
1.3	Geopolitical factors	Adverse political conditions, weather, or natural disasters could delay timelines	Remote working infrastructure and agreements with several transport providers to maintain deliveries
1.4	Launch vehicle failure	Risk of failure in the launch vehicle, preventing the CubeSat from reaching orbit	Additional CubeSats are manufactured and ready to be launched if the coverage and revisit time are no longer guaranteed
1.5	Orbital insertion failure	Issues with deploying the CubeSat into correct orbit	
1.6	Deployment failure	A satellite fails to deploy correctly	

Operational Risks:

Number	Name	Description	Mitigation Strategy
2.1	Collision with debris	Risk of collision with space debris	Additional CubeSats are ready to be launched if the coverage and revisit time are no longer guaranteed
2.2	Actuator/sensor failure	Failure of one of the actuators or sensors	
2.3	Communication system failure	Risk of communication loss after deployment	Software-based corrective actions if unsuccessful and if the coverage and revisit time are no longer guaranteed, replacement of the defunct CubeSat is made from the additional reserve CubeSats
2.4	Power failure	Loss of one or multiple power systems in operation	
2.5	Telecommand and Telemetry links failure	Impossible to receive or transmit data between ground center and CubeSats	

5. Deployment and Operational Support

a) Deployment Plan

Based on manufacturing and testing capabilities, AstroNot proposes to stagger constellation deployment in 3 batches of CubeSats, enabling to start deployment of the first batch as the second batch is going through its AIT/V phase and so on so forth. This will allow a smooth transition from assembly to launch, reducing overall time to deployment and costs. The batches will be split 30/20/20 CubeSats each, allowing for a partial operational capacity of **52.2%** of the constellation at the first launch.

Launch and release of the CubeSats will be operated by SpaceX's launcher Falcon-IX on rideshare launches. AstroNot has deployed all 3 of its operational constellations with Space X's rideshare service with no delays or launch anomalies. With SpaceX's stellar record and flexible launch availability and capacity, we fully trust our partner to safely deliver the CubeSat batches in orbit as quickly as possible and release them into their designated orbits within maximum 24 hours once launched. While we understand the customer's desire for two launch operators, the flexibility, quality assurance and cost optimality of launching only with Space X far supersedes using another launcher. Given AstroNot's history with the operator and Space X's heritage, the proposal only operates launch with Space X.

Should Big Company still desire a launch with another operator, an optional proposal is made to use the PSLV Rideshare Program offered by the Indian Space Research Organisation (ISRO), which is also capable of delivering cubesats into multiple orbital planes, at a higher rate and with less flexibility. Cost breakdown of this option is available in the cost report.

Batches of satellites are expected to be delivered by plane to Space X facilities 60-90 days before launch in order to go through launch readiness testing and integration. Considering AIT/V timeline, shipping time and launch readiness preparation, the timeline for delivery and full operational capacity is given below. Exact dates for each phase can be found in the detailed Gantt in Annex A.

Launch dates are currently held with Space X for 14/12/2029, 04/12/2030 and 1/12/2031.

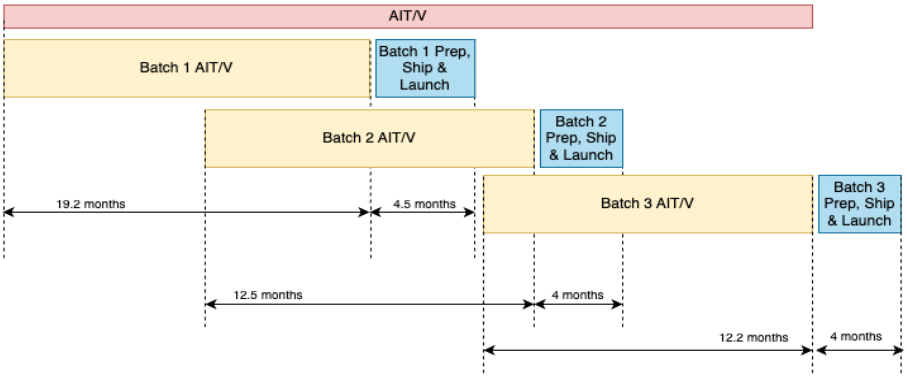


Figure 5: Production/Deployment Timeline Overview

The release will be done over the 7 orbital planes at each launch to ensure as much coverage as possible at each release. As the CubeSats have no on-board propulsion, they will be released one by one using orbital drift in order to ensure proper spacing along the orbit.

Batch	N° of sats	Plane A	Plane B	Plane C	Plane D	Plane E	Plane F	Plane G
1	30	5	5	4	4	4	4	4
2	20	8	7	7	7	7	7	7
3	20	10	10	10	10	10	10	10

This deployment allows for an earlier partial availability of the constellation rather than waiting for the full production of the constellation to launch. It also allows to mitigate eventual issues that may arise with the first batch and reduces the probability of in-orbit issues with the full constellation. Operational capacity for each batch at each launch is given below:

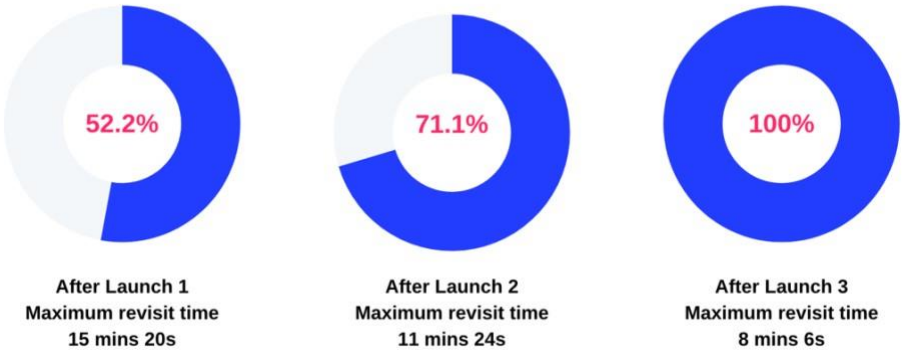


Figure 6: Constellation Operational Capacity

In terms of ioT applications, our client can expect:

- After launch 1: Limited coverage, some communication gaps, only low-frequency IoT applications, no real-time.

- After launch 2: Improved coverage, less frequent communication gaps, suitable for medium-demand applications.
- After launch 3: Full global coverage, high reliability, supports all types of IoT applications, including those requiring real-time data and high-frequency communication

Until the IoT constellation reaches full operability, we suggest Big Company prioritize low-bandwidth and lowfrequency applications to ensure the IoT network delivers value and communicate clearly with client and stakeholders about the expected service limitations and future capacities.

b) Operational Services

AstroNot proposes to handle the comprehensive operation of the constellation, ensuring seamless functionality from the initial in-orbit commissioning of each satellite batch through to end-of-life (EOL) management, extending five years beyond the final launch. Our Mission Control Center (MCC) is fully equipped with the infrastructure, expertise, and capacity to integrate and manage additional constellations without compromising performance or service quality. With proven expertise in handling complex satellite constellations, AstroNot ensures operational excellence across every phase of the mission. Our MCC operates on a 24/7 basis, staffed by a team of highly skilled professionals trained to manage high-demand, multi-orbit, and diverse payload constellations.

Throughout the mission lifecycle, AstroNot delivers continuous monitoring and control services, leveraging predictive analytics to identify and mitigate risks. A proactive maintenance plan is devised, allowing for fast MTTR in case of in-orbit anomalies, in order to ensure continuous service of the ioT network. Regular reporting is handled by an assigned specialist in order to keep Big Company informed of constellation health and performance.During the operational phase, cybersecurity and maintenance of the user terminal application is handled by each respective subcontractor.

At the conclusion of the mission lifecycle, our operations team manages EOL protocols, including deorbiting strategies and compliance with international guidelines for debris mitigation. By adhering to the EOL plan, we ensure that each CubeSat is responsibly retired, minimizing impact on space environment and reducing risks to other space assets.

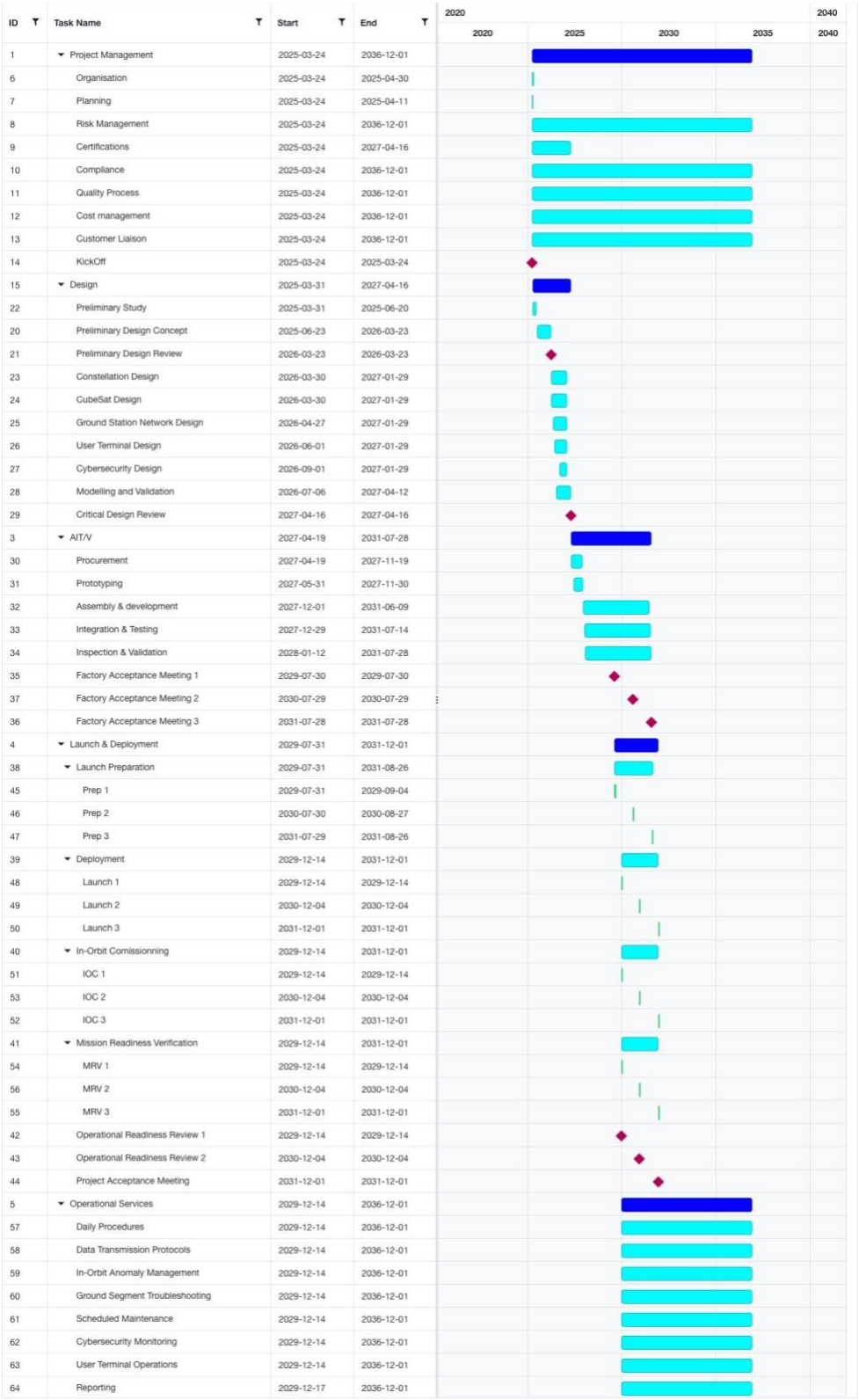
c) Customer Service and Warranty

Each CubeSat's warranty is fixed to 8 years according to the component's lifetime in similar flight conditions. In the case that a defect appears in the satellite within the warranty time, AstroNot commits to replace the satellite. An additional 10% of the total fleet of satellites will be manufactured to facilitate replacement in the case of such event. The launch of the replacement satellites will be scheduled for the first available opportunity since the defect appeared. If a satellite is to be launched within 6 months from the manufacturing date, the satellite will be shipped instantly without additional ground tests. Otherwise, the satellite will go through ground tests to validate its nominal operation before shipping. In both cases the replacement satellite will undergo In Orbit Testing as it is deployed. Thanks to rideshare capacities and high flexibility of our launch operator, the whole process until launch will have a maximum duration of 2.5 months. The cost of manufacturing and launch of the replacement satellites is covered by the manufacturer, AstroNot, for the first 5 years of the fully operational constellation. After this time frame the cost of manufacturing and launch of the replacement satellites is covered by the client, Big Company. However, in the event of an operational error, the costs are to be covered by the operator, AstroNot.

Individual satellite reliability is 98% considering downtime for software and security updates. Considering the constellation overlap is 41% and with a constellation of 70 satellites, the system uptime is 100%.

6. Appendices

A. Detailed Gantt Chart



ID	Task Name	Start	End
1	Project Management	2025-03-24	2036-12-01
6	Organisation	2025-03-24	2025-04-30
7	Planning	2025-03-24	2025-04-11
8	Risk Management	2025-03-24	2036-12-01
9	Certifications	2025-03-24	2027-04-16
10	Compliance	2025-03-24	2036-12-01
11	Quality Process	2025-03-24	2036-12-01
12	Cost management	2025-03-24	2036-12-01
13	Customer Liaison	2025-03-24	2036-12-01
14	KickOff	2025-03-24	2025-03-24
15	Design	2025-03-31	2027-04-16
22	Preliminary Study	2025-03-31	2025-06-20
20	Preliminary Design Concept	2025-06-23	2026-03-23
21	Preliminary Design Review	2026-03-23	2026-03-23
23	Constellation Design	2026-03-30	2027-01-29
24	CubeSat Design	2026-03-30	2027-01-29
25	Ground Station Network Design	2026-04-27	2027-01-29
26	User Terminal Design	2026-06-01	2027-01-29
27	Cybersecurity Design	2026-09-01	2027-01-29
28	Modelling and Validation	2026-07-06	2027-04-12
29	Critical Design Review	2027-04-16	2027-04-16
3	AIT/V	2027-04-19	2031-07-28
30	Procurement	2027-04-19	2027-11-19
31	Prototyping	2027-05-31	2027-11-30
32	Assembly & development	2027-12-01	2031-06-09
33	Integration & Testing	2027-12-29	2031-07-14
34	Inspection & Validation	2028-01-12	2031-07-28
35	Factory Acceptance Meeting 1	2029-07-30	2029-07-30
37	Factory Acceptance Meeting 2	2030-07-29	2030-07-29
36	Factory Acceptance Meeting 3	2031-07-28	2031-07-28
4	Launch & Deployment	2029-07-31	2031-12-01
38	Launch Preparation	2029-07-31	2031-08-26
45	Prep 1	2029-07-31	2029-09-04
46	Prep 2	2030-07-30	2030-08-27
47	Prep 3	2031-07-29	2031-08-26
39	Deployment	2029-12-14	2031-12-01
48	Launch 1	2029-12-14	2029-12-14
49	Launch 2	2030-12-04	2030-12-04
50	Launch 3	2031-12-01	2031-12-01
40	In-Orbit Comissionning	2029-12-14	2031-12-01
51	IOC 1	2029-12-14	2029-12-14
53	IOC 2	2030-12-04	2030-12-04
52	IOC 3	2031-12-01	2031-12-01
41	Mission Readiness Verification	2029-12-14	2031-12-01
54	MRV 1	2029-12-14	2029-12-14
56	MRV 2	2030-12-04	2030-12-04
55	MRV 3	2031-12-01	2031-12-01
42	Operational Readiness Review 1	2029-12-14	2029-12-14
43	Operational Readiness Review 2	2030-12-04	2030-12-04
44	Project Acceptance Meeting	2031-12-01	2031-12-01
5	Operational Services	2029-12-14	2036-12-01
57	Daily Procedures	2029-12-14	2036-12-01
58	Data Transmission Protocols	2029-12-14	2036-12-01
59	In-Orbit Anomaly Management	2029-12-14	2036-12-01
60	Ground Segment Troubleshooting	2029-12-14	2036-12-01
61	Scheduled Maintenance	2029-12-14	2036-12-01
62	Cybersecurity Monitoring	2029-12-14	2036-12-01
63	User Terminal Operations	2029-12-14	2036-12-01
64	Reporting	2029-12-17	2036-12-01

B. Detailed WBS

Ref	Name	Description	Input	Ouput

PM	Project Management			
PM_01	Organisation	Define project team structure, roles, responsibilities, communication channels, and document management systems.	Project charter, scope definition, organizational structure guidelines, team requirements.	Project team structure, roles and responsibilities matrix, communication plan, document management system
PM_02	Planning	Develop project schedule, set milestones, and create a resource allocation plan.	Project scope, budget, schedule requirements, resource availability	Project schedule, milestone list, resource allocation plan, timeline
PM_03	Risk management	Identify risks, perform risk assessment, develop mitigation strategies, and maintain a risk register.	Risk assessment framework, initial project plan, industry risk data.	Risk analysis, risk mitigation plan, contingency plans
PM_04	Quality process	Establish quality standards, ensure QA checks, and implement corrective actions	Project requirements, quality standards, QA procedures.	Quality assurance plan, quality checklists, corrective action logs
PM_05	Certifications	Identify certifications, liaise with bodies, and ensure compliance	Certification requirements, regulatory guidelines, product specifications.	Certification plan, certification documents, compliance records
PM_06	Compliance	Ensure adherence to customer, regulatory, and legal standards; manage compliance audits.	Regulatory and customer requirements, compliance guidelines	Compliance matrix & report, audit records, corrective action documentation
PM_07	Customer Liaison	Maintain customer engagement, report progress, and handle inquiries.	Customer requirements, project progress reports	Customer communication logs, regular progress reports, issue resolution records
PM_08	Cost Management	Plan, monitor, and control project costs, ensuring efficient allocation of resources	Project budget, cost estimation data, expenditure records	Budget reports, cost optimization recommendations, financial updates
PM_09	Kickoff Meeting	Initial meeting to align all stakeholders on project scope, deliverables, milestones, and communication channels.	Project charter, initial scope definition, stakeholder list.	Agreed milestones, project timeline, stakeholder alignment.
DE	Design			
DE_01	Preliminary Study	Conduct mission analysis, develop architecture, and assess feasibility	Mission objectives, customer requirements, preliminary data.	Mission analysis report, preliminary architecture, feasibility assessment
DE_02	Preliminary Design Concept	Create CubeSat, constellation, and user terminal concepts; outline payload, communication, and terminal requirements.	Mission requirements, CubeSat and user terminal requirements.	Initial design concepts, payload and communication requirements outline
DE_03	Preliminary Design Review (PDR)	Present initial design concepts and ensure alignment with client requirements.	Initial design concepts, customer requirements, mission analysis.	Design review feedback, feasibility assessment, updated design requirements
DE_04	Constellation Design.	Develop constellation design, run simulations, and optimize satellite layout	Constellation objectives, communication requirements, preliminary designs.	Constellation layout, coverage, tradeoff analysis
DE_05	CubeSat Design	Design CubeSat subsystems, software, and payload; optimize for IoT and integration with terminals.	CubeSat functional requirements, IoT requirements, tradeoff analysis.	CubeSat subsystem designs, software architecture, and final functional architecture
DE_06	Ground Station Design	Develop ground station network, integrate systems, and conduct link budgeting.	Ground station requirements, communication network requirements	Ground station network design, link budget analysis, control and monitoring system specifications

DE_07	User Terminal Design	Design user terminal hardware and software;	User terminal requirements, system architecture.	User terminal design documents, integration and testing requirements
DE_08	Cybersecurity Design	Define cybersecurity framework, develop protocols for CubeSats, ground station, and user terminals.	Cybersecurity requirements, regulatory standards, system architecture.	Cybersecurity plan, risk assessment, security protocols
DE_09	Modelling & Validation	Develop and validate models for orbit, link budget, thermal and structural integrity.	Constellation design, CubeSat and ground station designs, simulation requirements.	Orbit and link budget models, coverage simulations, structural and thermal validation results
DE_10	Critical Design Review (CDR)	Review final detailed designs, ensuring readiness for production and integration.	Finalized designs, simulation and validation results, cybersecurity and user terminal design.	Approved final designs, validation report, readiness confirmation
AIT	Assembly, Integration, Testing and Validation			
AIT_01	Prototyping	Develop prototypes of CubeSat components, software, and user terminals; test functionality.	Approved CubeSat component designs, onboard software design, prototyping materials.	Functional prototypes, prototype testing results
AIT_02	Procurement	Procure parts and materials for CubeSat and user terminal manufacturing and assembly, manage logistics.	Bill of materials, supply chain plan, component specifications.	Procured parts and materials, inventory records, logistics plan
AIT_02	Assembly & development	Assemble subsytems and CubeSats, develop software and user terminal	Procured parts, system specifications and architecture, assembly plan	Assembled and developed outputs for integration
AIT_03	Integration & Testing	Perform CubeSat integration and testing plan, perform unit and functional software and user terminal testing	Assembly outputs, components, onboard software, test specifications	Test results & Reports, integrated CubeSats and software
AIT_04	Inspection & Analysis	Inspect manufactured components, perform performance analysis, and evaluate test results. Mitigate failures to meet requirements	Component specifications, CubeSats, testing data & reports	Inspection report, performance analysis, failure mitigation actions
AIT_05	Factory Accptance Meetings (FAMs)	Present CubeSat batches for customer approval, validate all operational systems, and confirm readiness for deployment	Assembled and tested systems, inspection results, client requirements.	Client approval, final assembly acceptance, deployment readiness confirmation
LD	Launch & Deployment			
LD_01	Launch Preparation	Coordinate with launch provider, prepare CubeSats for launch (packaging, documentation)	CubeSat units, packaging specifications, launch provider requirements	Prepared CubeSats, launch documentation, logistics plan for transportation
LD_02	Coordination with providers	Liaise with launch service abd shipping providers, finalize schedules, ensure compliance with launch requirements.	Launch schedule, providers' requirements, CubeSat launch specifications	Coordinated launch schedule, compliance documentation, final confirmation with providers
LD_03	Deployment	Procedures for CubeSat deployment and orbit insertion, in coordination with provider	Launch provider requirements, CubeSat deployment specifications	Deployment procedure documentation, coordinated deployment plan, deployed CubeSats
LD_04	In-Orbit Comissionning & Testing	Perform system checks postdeployment, establish initial communications.	Deployed CubeSats, in-orbit testing plan, initial communication setup	System check reports, initial communication confirmation

LD_05	Mission Readiness Verification	Verify operational readiness of CubeSats and ground systems, review mission objectives.	System check reports, operational objectives	Readiness verification report, mission objectives review
LD_06	Operational Readiness Reviews	Verify operational readiness for initial CubeSat batches and user terminals, perform end-to-end testing, validate performance under operating conditions	Deployment systems, operational data	ORR reports, partial client acceptance
LD_07	Project Acceptance Meeting	Validate full system functionality with client postfinal launch; hand over project into operational services.	ORR reports, constellation data, end-to-end test results.	Customer sign-off, acceptance certificate, deployment completion confirmation
OS	Operational Services			
OS_01	Daily Procedures	Perform regular system health checks, manage routine CubeSat operations	Operational guidelines, CubeSat health data	Daily system health check logs, operational status reports
OS_02	Data Transmission	Establish and maintain data transmission processes	Communication protocols, transmission requirements	Established data transmission process
OS_03	In-orbit Anomaly management	Monitor for anomalies, troubleshoot and resolve in-orbit issues	Anomaly detection, in-orbit data	Anomaly resolution reports, corrective actions
OS_04	Ground Segment Troubleshooting	Resolve ground station and network issues, ensure continuous connectivity	Ground station data, troubleshooting guidelines	Resolved issues, connectivity reports, root cause analysis
OS_05	Scheduled Operational Maintenance	Plan and execute preventive maintenance tasks, perform software updates, track CubeSat health	Maintenance schedule, CubeSat operational data	Maintenance reports, updated software, updated system status
OS_06	Cybersecurity Monitoring	Monitor and manage cybersecurity risks during operations; update protocols and resolve security incidents.	Operational data, cybersecurity protocols, threat intelligence data	Security incident reports, updated cybersecurity protocols, threat mitigation actions
OS_07	User Terminal Operations	Manage and monitor user terminal performance; address terminal-specific issues and ensure seamless connectivity.	User terminal performance data, operational guidelines, customer feedback	User terminal status reports, resolved terminal issues, system improvement recommendations
OS_08	Reporting	Develop analytics and reporting protocols, create regular reporting processes for customer concerning service level agreements (SLAs) for data transmission rates, latency, and downtime.	Service data, performance metrics.	SLA reports, customer reports