

SHIPS, NOT BUILDINGS

MAKING ORBITAL ASSETS FINANCEABLE

Space companies can borrow against their contracts. They cannot borrow against their assets. This paper argues that the obstacle is not physics, capital or regulation, but a question about collateral that the sector has been asking the wrong way round.

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STATEMENT OF INTEREST

Fibonacci is building market infrastructure for the space economy: a classification standard, an asset register, a valuation methodology and published reference pricing. We own no space assets. We place no capital. We take no percentage of any transaction and no success fee, carry or equity in anything we assess. Those constraints are commercial choices, and they are the reason we can publish an argument like this one. Readers should nonetheless weigh that we have an evident interest in the conclusion that the instruments we intend to build are necessary.

This paper is not legal advice, and its author is not a lawyer. Every legal proposition here requires confirmation by qualified space and secured transactions counsel.

Where this paper relies on outside counsel, that reliance is stated: the core financing distinction in Section 1.2 and Section 3.4 reflects analysis from HFW, shipping and asset finance counsel, April 2026. The treaty and regulatory analysis in Section 3, and the control-based security proposal in Section 6, have not yet been reviewed by space regulatory counsel. Appendix A states the review status of every legal proposition in this paper individually.

Executive brief

This summary is written to stand alone. Readers who go no further have the argument.

THE CLAIM

Financing in the space sector is structured as project finance, secured against long-term revenue contracts, rather than asset finance, secured against the hardware. The reason is mechanical: a lender cannot repossess a satellite. It cannot be inspected, arrested, towed to port or resold, and practitioners in asset finance describe a security interest in an orbital asset as theoretical at best.

The consequence is not inconvenience. It is that borrowing capacity is gated by whoever signs the anchor contract. A company without that signature raises equity, dilutes, and is eventually acquired. The concentration of capacity and capital in a handful of balance sheets is not an outcome of competition on merit. It is the downstream effect of a missing instrument.

WHY THE USUAL FRAMING FAILS

Attempts to build property law for orbit start from real estate and run immediately into the Outer Space Treaty, which forecloses appropriation of territory by any means. There is no route to owning a place in orbit.

But there is a route to owning an object. The state of registry retains jurisdiction and control over an object launched into space, and that jurisdiction persists in orbit. That is flag state jurisdiction under another name, and it is the same foundation on which the entire apparatus of ship finance was built: registry, recorded mortgages, liens, classification societies, insurance priced off the class certificate, and arrest as the final remedy.

THE PROPOSAL

Maritime finance works because a creditor can arrest a ship. There is no orbital equivalent and there never will be. The sector has treated this as the end of the analogy. We think it is the beginning of the right question.

An orbital asset produces value only through four things acting together: the hardware in orbit, the ground segment that communicates with it, the command authority and operating knowledge required to fly it, and the regulatory authorisation that makes operating it lawful. Exactly one of those is beyond a creditor's reach. The other three sit on Earth, are contractual or administrative, and are transferable.

| *Enforceable security over an orbital asset runs through control, not possession.*

This produces a conclusion that is not obvious and, we believe, has not been argued: a security package built on control could be better collateral than a ship, not worse. A repossessed vessel sits in a port earning nothing. An orbital asset under substitute command keeps generating the revenue that services the debt.

Most of what such a package requires can be built privately, by contract, today. One element cannot: the authorisation must contemplate transfer of control to a qualified, US-domiciled substitute

operator. That is a small number of provisions inside a regime currently being designed, which is why this paper is being published now rather than later.

WHAT WE ARE ASKING FOR

Criticism, specifically. Tell us where this is wrong. We would rather be corrected than believed, and an institution asking to be trusted with judgments about other people's assets should behave that way from the beginning.

1. The claim

Space companies can borrow against their contracts. They cannot borrow against their assets.

That sentence is the whole of this paper. Everything that follows either establishes it, explains why it is true, or proposes what to do about it.

1.1 What this paper does not argue

A weaker version of this argument circulates and should be dispatched immediately, because it is wrong. The weaker version holds that there is no debt in the space sector. There is. Through early 2026, commercial station developers raised substantial debt alongside equity, with global banks participating. Capital is reaching this industry and the volume is increasing.

This paper also does not argue that regulators are the obstacle, that the sector is uninvestable, or that a new treaty is the answer. The first is untrue, the second is contradicted by the capital already deployed, and the third mistakes the order in which financial infrastructure has historically been built.

1.2 The distinction that matters

The relevant distinction is between two structures that are often conflated. Project finance is secured against a stream of contracted revenue; the lender underwrites the counterparty and the contract. Asset finance is secured against an identified asset; the lender underwrites the thing itself, and on default takes it.

Space financing is overwhelmingly the former. The reason given by practitioners is consistent and unglamorous: in the event of default or insolvency, a satellite cannot be repossessed in any practical sense, nor easily remarketed or liquidated. Its location, combined with the absence of a secondary market, makes it a highly illiquid form of collateral. Lenders therefore perceive a security interest in a satellite as theoretical at best, an asset that is inaccessible, uncontrollable and ultimately unreliable as recourse.

That is a fair description of the position, and it is why the collateral in these transactions is the contract rather than the object.

1.3 Why this determines who gets to build

If the collateral is the revenue contract, then debt capacity is gated by whoever signs it. In this sector that is typically a government agency or a prime contractor.

A company holding such a contract can borrow. A company without one raises equity, at a higher cost of capital, with dilution at every round, and arrives at a point where acquisition is the rational outcome. The technology is absorbed into a larger balance sheet, and frequently it is not developed further.

The chain is short and it is worth stating plainly. No title, no collateral. No collateral, no debt. No debt, equity only. Equity only, and the smaller participants are bought out.

This is not a complaint about the behaviour of lenders, who are underwriting rationally given the instruments available. It is an observation that the instruments determine the industrial structure. Change the instruments and you change who is able to build.

2. How the market works today

It is worth describing the present state concretely, because the absence of market infrastructure is easier to feel than to see.

An operator needs launch capacity, a component supplier, or a facility. There is no published price for any of it. They work a personal network or attend a conference. Having found a counterparty, there is no standard contract, so both sides instruct counsel to draft from first principles. There is no classification, so the buyer assesses technical merit themselves or takes it on faith. If insurance is required, it is quoted against an engineering judgment rather than an actuarial base. If financing is required, the lender looks past the asset and asks who has signed a revenue contract.

Every one of those frictions is a cost, and it falls hardest on the participant least able to absorb it. The established operator has the relationships, in-house counsel, a balance sheet and an anchor contract. The smaller one has none of them and pays at every step.

WHAT IS CONSPICUOUSLY ABSENT

- No published reference price for any traded quantity.
- No classification or condition standard for any asset class.
- No commercial register of ownership, condition or encumbrance.
- No standard contract instruments.
- No qualification pathway for a supplier attempting to enter.
- No actuarial base for the parties pricing the risk.

Each of these exists in every mature asset market. None of them exists here.

3. The legal anatomy

Four layers govern commercial activity in orbit. Three are functioning or being actively repaired. The fourth is empty, and it is the one this paper is about.

3.1 International framework

Three provisions of the 1967 Outer Space Treaty carry the weight, and they are regularly misread.

- Article II forecloses territory.** Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means. There is no path to owning a place in orbit or on a celestial body. Any commercial structure that depends on territorial ownership fails at the first step.

- **Article VI creates the licence.** States bear international responsibility for the national activities of their non-governmental entities in space and must authorise and continuously supervise them. This is why a private company requires a government authorisation at all.
- **Article VIII supplies the foundation.** The state on whose registry an object is carried retains jurisdiction and control over that object while it is in outer space. Jurisdiction attaches to the object and travels with it.

That third provision is the whole of the opportunity, and it is why this paper is titled as it is. You cannot own the place. You can own the object, and a recognised jurisdiction follows it.

A note on contested ground. Whether Article II binds private actors as well as states is genuinely disputed by serious scholars, and this paper does not resolve it. The argument advanced here does not depend on the resolution: it concerns security interests in registered objects, not claims to territory. Where the law is unsettled we say so rather than assert past it.

3.2 Domestic authorisation

In the United States, commercial space activity is licensed across three agencies with bounded remits. Launch and reentry sit with the Federal Aviation Administration. Spectrum sits with the Federal Communications Commission. Earth imaging sits with the commercial remote sensing office at NOAA.

Between those remits lies a gap that has been open for years: no agency clearly authorises what an object does once it is in orbit. When servicing vehicles docked with and refuelled an ageing communications satellite, the launch was licensed and the rendezvous, docking and servicing were not. When a debris capture demonstration flew, no single agency held clear authority to authorise removal.

That gap is now being closed. An executive order in August 2025 directed the Department of Commerce to propose a process for individualised mission authorisations covering activities under Article VI that existing frameworks do not clearly govern. In March 2026 the Office of Space Commerce published its proposal for a voluntary Space Commerce Certification: a one-stop interagency review with a defined decision timeline and a presumption of approval subject to stated grounds for denial. In August 2026 it published notice of a pilot programme to implement it. The covered activities include satellite servicing, debris removal, commercial stations, in-space manufacturing and lunar missions.

This is the most consequential development in the sector's regulatory position in years, and Section 6 of this paper argues it is also the natural home for something it does not currently address.

3.3 Resource rights

A separate body of law addresses ownership of extracted materials. The United States legislated in 2015, Luxembourg in 2017, the United Arab Emirates in 2019 and Japan in 2021. The Artemis Accords affirm that resource extraction does not inherently constitute national appropriation under Article II.

The prevailing reading is that Article II bars appropriation of celestial territory but not ownership of extracted resources. Enough states have legislated on that basis for it to be workable in practice, whatever its eventual academic resolution. It is not the subject of this paper, but it is worth noting that the sector has already demonstrated it can build functioning commercial law inside the Treaty's constraints when it chooses to.

3.4 Financing and secured transactions

There is no recognised instrument for taking security over an orbital asset, no priority regime between competing creditors, no classification standard a lender could underwrite against, and no remedy on default.

An instrument was written. The Space Assets Protocol to the Cape Town Convention, adopted at Berlin in 2012, was designed to create exactly this: recognised international interests in space assets, an international registry, priority rules and default remedies. It requires ten ratifications to enter into force. It has one. The aircraft protocol under the same convention has been in force since 2006 and underpins a large share of global commercial aircraft finance.

THE FOUR LAYERS

Layer	State	Direction of travel
International framework	Settled and stable	Slow, consensus-bound
Domestic authorisation	Gap for in-space activity	Actively closing
Resource rights	Workable under national laws	Contested but functional
Financing and security	Empty	No current work

4. The precedent

Everything the space economy lacks was built once already, for an asset class with the same defining problem: valuable, mobile, and permanently outside any nation's territory.

What matters about the maritime case is not the analogy but the sequence. It is instructive because of the order in which the pieces arrived.

4.1 The order of construction

- **1688 — a room.** Edward Lloyd's coffee house becomes the place where merchants, shipowners and the men willing to underwrite voyages could find one another. No institution, no charter.
- **1734 — published information.** Lloyd's List begins publishing ship movements, arrivals, losses and rates. Information that had been private and relational becomes public and comparable.
- **1760 — classification.** Lloyd's Register begins surveying and grading vessels against a published standard. A private body with no statutory authority whatsoever. Underwriters adopt it because they will not write the risk without it.

- **Then — insurance.** Marine insurance becomes actuarial rather than instinctive, because there is now a standardised condition input and accumulating public loss data.
- **Then — finance.** Registry records title. The ship mortgage becomes a recorded, rankable security interest. Lenders will lend against the vessel because they can identify it, assess it, insure it and enforce against it.
- **Then — remedy and priority.** Maritime liens establish who is paid first. Arrest and judicial sale give a creditor real recourse.
- **1936 — trade terms.** INCOTERMS standardise who bears cost and risk at each point of a cross-border shipment. Customs and bonded regimes handle goods in transit between jurisdictions.

Note what came last. The customs and tax machinery, the part that most resembles what people mean by law, arrived roughly two and a half centuries after the coffee house. It could not have come first. There is no coherent way to write customs treatment for a transfer of title that no system can yet record.

Information precedes classification. Classification precedes insurance. Insurance precedes finance. Law codifies what practice has already established.

4.2 The insurance comparison

The contrast between the two markets is sharper than the general analogy suggests, and it is the part of this paper most likely to be recognised as accurate by readers who work in it.

Marine insurance is a mature market with three centuries of loss data and an independent classification input on every hull. Space insurance is roughly a dozen underwriters worldwide, collecting on the order of half a billion dollars in annual premium against billions of dollars of insured value, and it has been violently unstable.

In 2023 the market collected approximately \$557M and paid approximately \$995M, a loss ratio near 180%, on named losses including ViaSat-3, SES O3b mPower and Inmarsat-6 F2. Across 2023 and 2024 Canopus placed its book into run-off, Brit, Hiscox and Volante exited the class, and Munich Re scaled back. Rates hardened to levels not seen since the early 2000s. Then in late December 2025 a military communications satellite insured for over \$400M was notified as a likely total loss, moving the 2025 underwriting loss ratio from roughly 15% to roughly 75% on a single event.

The industry's own account of the underlying problem is the most useful evidence in this paper. Underwriters identify the core difficulty as the scarcity of actuarial data: with relatively few insured missions and largely bespoke spacecraft, they price against engineering assessments, manufacturer track records and mission-specific technical review rather than statistical loss models. The method is, by the market's own description, substantially subjective.

That is a precise statement of the problem Lloyd's Register was created to solve, written by the party that would benefit from solving it.

It also has a consequence that is rarely stated. Where risk cannot be priced against the individual asset, it is priced against the class average. Disciplined engineering teams therefore subsidise undisciplined ones, every year, and no mechanism exists by which a well-built asset can demonstrate that it is one.

4.3 The aviation control case

Aviation is the useful control because it ran the same experiment more recently and succeeded. The Cape Town aircraft protocol entered into force in 2006 and became foundational to aircraft finance. The space protocol, adopted six years later under the same convention, has not entered into force at all.

The difference was not the drafting. It was that aviation had an organised private finance constituency — registries, appraisers, established repossession practice, lenders with portfolios to protect — that wanted the instrument and pushed for it. Space had no such constituency in 2012.

4.4 Where the analogy strains

We would rather name the differences than have a critic find them first. Three matter.

First, reflagging. A shipowner can move a vessel's registry between flag states relatively freely, and lenders routinely use that flexibility as part of a deal's structure. There is no established procedure for moving a space object's registration from one state to another once it has been registered under the Registration Convention. State-of-registry jurisdiction over an orbital asset is, in current practice, effectively fixed at registration rather than portable at the owner's initiative.

Second, jurisdiction and liability do not track the same state the way they usually do at sea. Flag-state jurisdiction and flag-state liability are, genuine-link disputes aside, broadly the same question in maritime law. Under the Outer Space Treaty and the Liability Convention, jurisdiction runs to the state of registry while liability can run to any "launching state" — the state that launched, procured the launch, or from whose territory or facility the object was launched — which may or may not be the same state. A control-based security package has to be built around whichever state actually holds jurisdiction over the object, and that state is not always as obvious as a flag.

Third, there is no enforcement layer underneath the jurisdiction. Maritime flag-state jurisdiction sits inside a larger structure of port-state control, coastal-state jurisdiction and a physical place to arrest a vessel into. Article VIII gives an orbital object a jurisdiction; it does not give it a port. That is not a flaw in the analogy so much as the reason this paper does not attempt to import an arrest remedy at all — Section 6 is built to work without one.

None of these differences is fatal to the proposal in Section 6, for the same reason: the control-based mechanism does not depend on reflagging and does not depend on a physical enforcement layer. It depends only on the state of registry recognising a change-of-control pathway inside the authorisation it already issues — a narrower ask than importing the rest of maritime law wholesale. But they are real differences, not rhetorical ones, and a reader who knows maritime law will notice them faster than most.

5. The strongest objection

The space protocol did not merely lack support. It was opposed, and by the most organised commercial voice in the sector. The Satellite Industry Association argued against it on the grounds that existing models and practice of asset-backed finance for space equipment were sufficient, and that the protocol added an unnecessary supranational layer with definitions too vague to be useful.

Any argument of the kind advanced in this paper has to take that seriously rather than route around it.

5.1 The objection, made as well as we can make it

The satellite industry had, by 2012, several decades of commercial operating history. Geostationary communications satellites were a well-understood asset: high value, long-lived, in stable orbits, with loss experience running back to the 1970s. Operators had long-term transponder contracts with creditworthy counterparties. Project finance against those contracts worked, was well understood by a stable group of lenders, and priced acceptably.

Against that, an international instrument creating a new registry, a new priority regime and new definitions imposed real cost and real uncertainty for a benefit the industry did not perceive it needed. Adding a supranational layer to a functioning market is a reasonable thing to resist. The objection was not obstruction. It was an accurate assessment of that industry, at that time.

5.2 Why the circumstances differ now

Three things have changed, and none of them requires the 2012 objection to have been wrong.

- **The asset classes are new.** Commercial stations, in-space servicing vehicles, orbital compute and manufacturing platforms, and lunar surface infrastructure have no decades of loss history, no standardised architecture and no established contract counterparties. The conditions that made project finance adequate for geostationary satellites do not hold for any of them.
- **The sponsors are different.** The companies developing these assets are not the incumbents who filed the objection. They are earlier, thinner-capitalised, and considerably more exposed to the cost of equity-only funding.
- **The revenue is not contracted the same way.** A geostationary operator sells long-term capacity to creditworthy buyers. A servicing vehicle, a station or an orbital compute platform frequently has neither the contract duration nor the counterparty quality that project finance depends on. Where the contract cannot carry the financing, either the asset carries it or nothing does.

There is a fourth point worth conceding. If the satellite industry was right that a supranational instrument was the wrong vehicle, that is an argument for building the machinery privately and contractually first, and treating codification as a later consequence rather than a starting move. This paper accepts that. Section 6 proposes almost nothing that requires an international agreement.

6. Control, not possession

Maritime finance works because a creditor can arrest a ship: seize it in a friendly port, hold it, and sell it. There is no orbital equivalent and there never will be. A satellite cannot be inspected, boarded, towed or remarketed.

The sector has generally treated this as the point at which the analogy fails. We think it is the point at which the question has been posed incorrectly.

6.1 What a creditor can actually reach

An orbital asset produces value only through the combination of four things:

- The hardware in orbit.
- The ground segment that communicates with it.
- The command authority and operating knowledge required to fly it.
- The regulatory authorisation that makes operating it lawful.

The first is the only one a creditor cannot reach. The other three are on Earth. They are contractual or administrative rather than physical. They are identifiable, they can be documented, and they are transferable.

An asset whose hardware is inaccessible but whose ground segment, command authority and authorisation can pass to a qualified substitute operator is not uncollateralised. It is collateralised differently, and the mechanism runs through control rather than possession.

6.2 Why this may be better collateral, not worse

The conclusion that follows is not intuitive, and we have not seen it argued.

When a lender arrests a ship, the ship stops working. It sits in a port under guard, generating no revenue, accruing berthing costs and depreciating, while the creditor arranges a sale into a market that knows the vessel is distressed.

An orbital asset under substitute command does not stop working. If command authority transfers cleanly, the asset remains in service and continues generating the revenue that services the debt. The creditor's recovery is not a forced sale of an idle object but the continuation of an operating business.

A repossessed ship earns nothing. An orbital asset under substitute command keeps paying.

That is a strong claim and we advance it as a proposition to be tested rather than a settled conclusion. It depends on transfer being technically feasible, contractually pre-arranged and regulatorily permitted, and none of those is currently standard. But if it holds, the sector has been mispricing orbital collateral in the wrong direction.

This claim assumes the handoff itself does not become the failure. A command-authority transfer executed for the first time under financial distress carries real operational risk — an unrehearsed substitute operator could do more damage to an asset's revenue-generating capability than a calm repossession ever could, and insurers underwriting the resulting risk are right to ask about it. That risk is exactly why Section 6.3 requires the substitute operator to be qualified and identified well in advance rather than located in a crisis, and why the ground segment and command-authority arrangements have to be documented and rehearsed before default, not improvised after it. A control-based package that skips that discipline is not a weaker version of this proposal. It is a different, worse one.

6.3 What such a package requires

We have developed the transaction architecture in detail and will discuss it with lenders, insurers, operators and counsel who have a serious interest in it. This paper states the shape rather than the drafting, for a reason we would rather be candid about than disguise: the argument is more useful to the sector if it is examined before it is copied, and we would prefer to be corrected by people engaging with it directly.

At the level of principle, a control-based security package needs four things:

- **Documented and transferable ground segment arrangements**, so that the party controlling the asset can change without the asset being lost.
- **Command authority preserved outside the operator**, so that the knowledge required to fly the asset survives the operator's failure.
- **A pre-identified, qualified, US-domiciled substitute operator**, identified well in advance rather than located in a crisis.
- **An authorisation that contemplates transfer of control**, under conditions the regulator sets in advance.

The first three are private. They can be built by contract today, using instruments that already exist in other secured lending markets and require no new law of any kind. The fourth cannot.

6.4 The one thing that needs public action

An authorisation to operate in space is, at present, generally treated as personal to the holder. If the holder fails, the authorisation is not an asset that passes to anyone. That is a defensible default when the only concern is supervision. It is a significant obstacle when the concern is also financing.

What would change it is modest: that mission authorisations include a defined change-of-control pathway, a route by which a qualified, US-domiciled substitute operator can be identified in advance, and recognition of recorded security interests over the authorised activity.

This is not new regulation. It is a small number of provisions inside a regime that is being designed now, and it sits squarely within the stated purpose of that work. The Office of Space Commerce has framed its mission authorisation programme around enabling activities that currently face uncertainty, and around American commercial competitiveness. Private capital cannot fund what it

cannot secure. An authorisation regime that does not contemplate financing will authorise activities that then fail to raise the money to happen.

6.5 Objections

OBJECTIONS AND RESPONSES

Objection	Response
This turns the regulator into a debt collector.	It does not. The regulator pre-clears a pathway and retains complete discretion over whether any substitute operator is fit. It continues to do what it already does — approve operators. It enforces nothing.
Transferable authorisations weaken supervision.	The opposite is more likely. A pre-qualified substitute means a failing operator's assets pass to a vetted party rather than being abandoned in orbit. Orphaned assets are a debris and liability problem, and this reduces them.
Sovereign discretion cannot be fettered, so lenders gain no certainty.	Certainty is not the requirement. Aircraft finance operates with regulatory approval conditions throughout. A defined pathway with known criteria is enough to move the risk from unpriceable to priceable, which is the entire objective.
National security will block transfers in practice.	Conditions can and should include nationality, ownership and export control screening. Building those in at the outset is what makes such a pathway approvable at all.
No operator will engineer for transferability.	They will if it lowers their cost of capital. That is what a classification standard is for, and it is why the standard has to come before the legal change rather than after it.
There is no case law. No lender has tested a control-based security package, so why would any lender rely on it?	Every instrument this paper argues for started exactly this way. Lloyd's Register carried no statutory authority and no loss history in 1760; underwriters adopted it before it was proven, because the alternative was pricing blind. We intend to support qualified operators through the OSC Mission Authorization Pilot on these terms as it runs, building an actual record rather than asking anyone to take the mechanism on argument alone. Case law is not a precondition to starting. It is what starting produces.

7. What this changes

The absence of this machinery is not neutral. It allocates opportunity, and it allocates it in a direction worth naming.

WHAT THE CURRENT ARRANGEMENT COSTS

- A company with better technology and no anchor contract loses to a company with worse technology and a signed customer, because only one of them can borrow. That is competition on access, not on merit.
- Capital concentrates. If only the anchored can borrow, the anchored acquire the rest, and acquired technology is frequently shelved rather than developed.

- Risk priced against the class average means disciplined operators subsidise undisciplined ones indefinitely.
- Capable suppliers have no pathway into the supply chain, and primes cannot find qualified vendors. Both sides lose to the absence of a qualification route.
- Where commercial finance cannot reach, public money fills the gap, and the taxpayer carries risk that priced capital would willingly have taken.

WHAT BECOMES POSSIBLE

- Assets that can carry debt carry cheaper capital, and cheaper capital means more is built by more participants.
- A classification input allows underwriters to distinguish a well-built asset from a poorly built one, which rewards engineering discipline instead of averaging it away.
- Insurers acquire the actuarial base they say they lack, which is a precondition for a stable risk transfer market.
- A qualification pathway turns capable terrestrial manufacturers into space suppliers, which is what broad participation in this economy actually looks like.

One structural observation deserves stating, because it explains who tends to resist this kind of work. Market infrastructure never benefits the incumbent. An established participant already has the relationships, the balance sheet and the anchor contract; the current arrangement suits them precisely. Registers, standards and published prices are always, structurally, a redistribution toward the smaller participant. That has been true of every institution of this type since the first published shipping list, and it is the reason building one is worth the effort.

8. What we are doing, and what we ask

Fibonacci is building the private instruments described in this paper: a classification standard for orbital assets (thebrokerage.space/standard), an asset register recording ownership, condition and encumbrance, a valuation methodology, and published reference pricing. The standard will be published free and open to criticism. We will charge for assessment against it and never for the standard itself.

Alongside this paper we are commencing publication of a reference price series in a single asset class, at thebrokerage.space/price-series. It will be modest at first — dated observations of what things actually cost — and it will be published whether or not it is flattering to any participant, including us. It exists because the maritime sequence began with a list, and because an institution that intends to make judgments about assets should first demonstrate that it can accurately record what is happening in front of it.

We are participating in the mission authorisation process as an informed private party. We hold no government mandate and claim none. Where operators are willing, we intend to support more than one submission through the OSC Mission Authorization Pilot on the control-based terms this paper describes — not as a substitute for any lender's own diligence, but because a mechanism with no

track record earns one the same way every instrument in Section 4 did: by being used before it is proven, not after.

The ask

Criticism, specifically.

If the legal analysis in Section 6 is wrong, we want to know from the people who would know. If a control-based security package has been tried and failed, we want the history. If the maritime sequence is being misapplied, tell us where. If the objection in Section 5 remains stronger than our answer to it, say so.

■ *We would rather be corrected than believed.*

An institution asking to be trusted with judgments about other people's assets should behave that way from the beginning, not after it has acquired enough standing that correction becomes expensive. We are at the start of this, and the invitation is genuine.

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Appendix A — Evidence and its strength

WHAT WE RELY ON, AND HOW FIRMLY

Claim	Basis	Strength
Station developers raised debt alongside equity in early 2026	Trade and legal press reporting on named transactions	Strong
Space financing is predominantly project finance, not asset finance	Asset finance practitioner analysis, 2026	Strong
Lenders regard security over an orbital asset as impractical to enforce	Same	Strong
Cape Town Space Assets Protocol has one ratification of the ten required	UNIDROIT status register	Strong
The Satellite Industry Association opposed the protocol as unnecessary	Academic survey of the protocol's history	Strong
Space insurance: ~12 underwriters, ~\$500–600M annual premium	Broker market reports and sector analysis	Good
2023 loss ratio near 180% on named losses	Broker and sector reporting	Good
2023–24 capacity exits and scale-backs	Trade press	Good
Late-2025 total loss moved the 2025 loss ratio from ~15% to ~75%	Broker quarterly market update	Good
Underwriters attribute pricing difficulty to actuarial scarcity	Market analysis and underwriter commentary	Good
Mission authorisation: executive order, March 2026 proposal, August 2026 pilot notice	Federal Register, agency publications, legal press	Strong
Control-based security would function as described	Reasoning by analogy to existing instruments	Untested — the proposition of this paper

The final row is the point. Everything above it is reported fact. The proposal in Section 6 is an argument, and it is offered as one.

Legal propositions and review status

The table above grades empirical and market claims. Legal propositions are a separate category and are graded separately here, by their review status rather than their evidentiary strength.

Legal proposition	Basis	Review status
Space financing is structured as project finance rather than asset finance, because an orbital asset cannot practically be repossessed (§1.2, §3.4)	HFW, shipping and asset finance counsel, April 2026	Reviewed — outside counsel source

Legal proposition	Basis	Review status
Article II forecloses appropriation of orbital territory by any means (§3.1)	1967 Outer Space Treaty, primary text	Pending space regulatory counsel review
Article VI requires state authorisation and continuing supervision of private space activity (§3.1)	1967 Outer Space Treaty, primary text	Pending space regulatory counsel review
Article VIII — the state of registry retains jurisdiction and control over a launched object, and that persists in orbit (§3.1). This is the foundation the paper is built on.	1967 Outer Space Treaty, primary text	Pending space regulatory counsel review — highest priority, given how load-bearing this claim is
Description of the FAA / FCC / NOAA authorisation gap and the OSC Mission Authorization Pilot (§3.2)	Federal Register notices, agency publications	Pending space regulatory counsel review
Survey of national resource-rights statutes and the Artemis Accords (§3.3)	National statutes (US, Luxembourg, UAE, Japan), Artemis Accords text	Pending space regulatory counsel review
Status and history of the Cape Town Space Assets Protocol (§3.4)	UNIDROIT status register, academic survey	Lower interpretive risk — factual record, not legal opinion
The control-based security proposal in its entirety (§6) — that an orbital asset can be collateralised through control of ground segment, command authority and authorisation, rather than through possession of the hardware	Original analysis, reasoning by analogy to maritime and aviation finance	Untested — this is the paper's own contribution, offered for scrutiny, not a settled legal position
Objections and responses to the control-based proposal (§6.5)	Original analysis	Pending space regulatory counsel review
Reflagging is not established practice for registered space objects, unlike maritime vessels (§4.4)	Registration Convention practice, general space law scholarship	Pending space regulatory counsel review
Jurisdiction (state of registry) and liability (launching state) do not necessarily track the same state for a space object, unlike the maritime flag-state model (§4.4)	Outer Space Treaty, Liability Convention, primary text	Pending space regulatory counsel review

No legal proposition in this paper should be treated as a settled position until it carries a status of “reviewed.”

Appendix B — What we have not resolved

Publishing open questions is unusual and we think it should not be. These are the things we do not know, and we would welcome answers.

- Whether a control agreement over ground segment arrangements is enforceable against an insolvent operator across the relevant jurisdictions.
- How priority would be determined between a creditor with recorded control rights and one with a security interest in the object itself.
- Whether the terms of recent station debt were secured, and against what.
- Whether any classification or rating body already claims this ground. Established marine classification societies are the obvious potential entrant and we would rather collaborate than collide.
- The size of the addressable market for classification and registry services, sized from the bottom up.
- Whether operators would in fact engineer for transferability in response to a classification incentive, or whether the incentive is too indirect.
- Whether foreclosure on the equity of a licence-holder — rather than a direct transfer of the authorisation itself — would itself trigger the same change-of-control review this paper assumes. This paper takes the position that it should, and is not aware of that question having been tested.

Appendix C — Terms

- Asset finance.** Lending secured against an identified asset, where the lender underwrites the asset and takes it on default.
 - Project finance.** Lending secured against a stream of contracted revenue, where the lender underwrites the contract and its counterparty.
 - Perfection.** The steps that make a security interest effective against third parties, rather than only between the parties to it.
 - Priority.** The order in which competing creditors are paid from the same collateral.
 - Classification.** Independent assessment of an asset against a published standard, producing a grade that third parties rely on.
 - Mission authorisation.** Government authorisation of an in-space activity, as distinct from the licensing of launch, spectrum or remote sensing.
 - Ground segment.** The terrestrial infrastructure — antennas, networks, operations centres — through which a space asset is commanded and monitored.
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Ad Astra Per Naturam