

How orbital AI, biotechnology, and manufacturing may test existing patent law limits

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Todd Hopfinger, director in Sterne Kessler's electronics practice group, says IP owners are contemplating how patent rights will be enforced as commercial activity expands beyond Earth

Commercial activity in space is entering a new phase. SpaceX has announced plans for its Starlink AI system, an orbital computing platform designed to bring data-centre-class AI processing into space. Similar concepts are emerging across a range of industries, including biotechnology, semiconductor manufacturing, and advanced materials research. Companies are also developing private space stations, commercial research platforms, and in-space manufacturing capabilities as declining launch costs make new business models increasingly viable.

Much of the discussion surrounding these developments has focused on engineering challenges, launch costs, and commercial viability. However, they also raise a less obvious question for IP owners: what happens when patented technologies leave Earth?

Patent rights are generally territorial, but space activities are inherently international. As commercial operations expand into orbit, questions concerning jurisdiction, infringement, and enforcement may become increasingly important. In particular, spacecraft registration may become an increasingly significant factor in determining patent risk. More fundamentally, can existing patent law adequately address a commercial space economy?

Commercial space activities and patent risk

The scope of potential commercial activity in space now extends far beyond satellites. Companies are exploring orbital AI infrastructure, biotechnology research, semiconductor production, advanced materials manufacturing, commercial laboratories, and private space stations. These activities are motivated in part by the unique characteristics of the space environment, including microgravity conditions and access to solar energy.

Although these industries differ considerably, they share one important characteristic: they depend heavily on patent protection. Modern products and manufacturing processes often incorporate hundreds or even thousands of patented technologies. As commercial activity expands beyond Earth, patent disputes may eventually follow.

That raises a fundamental question: whose patent law applies when patented technology is used in orbit?

The existing legal framework

Patent rights are generally territorial. A US patent creates rights in the US. A European patent creates rights in the countries where it has been validated. The same principle applies throughout most of the world.

Outer space complicates that framework.

Under the [Outer Space Treaty of 1967](#), a country generally retains jurisdiction and control over a space object that is carried on its registry. [The Convention on Registration](#)

of Objects Launched into Outer Space establishes the framework through which space objects are registered and identifies the country responsible for maintaining that registry. Under the convention, a launching state records the space object on its national registry and reports that registration to the United Nations.

As a practical matter, the registry state generally provides the primary basis for jurisdiction and control over a spacecraft while in orbit.

Recognising this issue, US Congress enacted the Patents in Space Act in 1990. Under 35 USC § 105, inventions made, used, or sold on US-registered space objects generally are treated as though they were made, used, or sold within the US. The goal was straightforward: companies should not be able to avoid US patent law simply by moving activities into outer space.

The US approach is not universal. While many countries recognise the jurisdictional principles reflected in the Outer Space Treaty of 1967 and Registration Convention, Europe and many other jurisdictions generally have not adopted a broad statutory counterpart to Section 105. As a result, the legal treatment of patent activity in outer space remains fragmented and may depend on the particular countries and agreements involved.

Reexamining the Section 105 limitation

The US framework contains an important limitation. Although Section 105 generally treats inventions made, used or sold on US-registered space objects as occurring within the US, the statute generally does not apply to space objects registered in another country pursuant to the Registration Convention.

Historically, this distinction attracted little attention because commercial activity in space remained relatively limited. As investments in orbital computing, manufacturing, research and commercial space stations continue to grow, spacecraft registration decisions may carry increasing patent significance.

Consider an orbital platform that incorporates technology covered by a US patent. If the platform is registered in a jurisdiction where corresponding patent protection is unavailable, the resulting infringement and enforcement analysis may differ significantly from that applicable to a US-registered spacecraft.

Whether companies ultimately structure operations around registration decisions remains to be seen. Nevertheless, spacecraft registration could become an increasingly important legal and business consideration as commercial space activity expands.

Could spacecraft registries become a patent planning tool?

There are numerous examples on Earth of companies making strategic decisions based on legal jurisdiction.

Businesses often choose to incorporate in Delaware because of its well-developed corporate law. Ships are frequently registered under so-called “flags of convenience” that provide favourable legal treatment. Tax planning commonly involves jurisdictional considerations as well.

As commercial space activity expands, companies may evaluate launch locations, regulatory regimes, tax consequences, and patent exposure together.

An interesting question emerges: could spacecraft registration eventually become a factor in managing patent infringement risk?

If so, the choice of registry may become an increasingly important business and legal decision for companies operating in space.

Practical implications for patent owners

Patent owners should also consider how a growing space economy could affect patent strategy.

Historically, patent filing strategies focused on where products would be manufactured, used, or sold. If commercial activity increasingly occurs in orbit, patent applicants may also need to consider jurisdictions that could serve as spacecraft registries.

Patent owners may also wish to monitor launch activity, commercial space station operators, and developments in spacecraft registration practices. Contractual solutions may play a role as well, including licensing arrangements, supply agreements, joint development agreements, and other structures designed to address IP risk.

Put differently, future patent strategy may require thinking not only about where products will be sold, but also about where the spacecraft carrying those products may be registered.

Enforcement challenges beyond Earth

Even if a patent owner identifies potentially infringing activity in space, enforcement may be difficult.

How does a patent owner inspect an orbital manufacturing system? How is evidence collected? What happens if the relevant equipment never returns to Earth?

Jurisdictional complexity may also arise when multiple countries are involved as registration states, launching states, or locations of the operating companies.

Questions that are relatively straightforward on Earth may become substantially more complicated in orbit.

Is reform needed?

The legal framework governing patents in outer space has remained largely unchanged while commercial activity has evolved significantly.

For years, scholars and organisations have proposed various reforms, including harmonised international patent rules, space-specific patent systems, and other cooperative frameworks. Growing commercial interest in orbital data centres and manufacturing and research may increase pressure to revisit those proposals.

Whether through treaty reform, international cooperation, or changes to domestic law, policymakers may eventually need to reconsider whether existing patent rules adequately address a future commercial space economy.

Commercial activity in space is evolving far more rapidly than the legal framework governing patents in orbit. As AI infrastructure, biotechnology, manufacturing, and other industries move beyond Earth, patent disputes may increasingly turn on questions of jurisdiction rather than technology. One of the most important considerations may not be where an activity occurs, but where the spacecraft carrying that activity is registered, a decision that could influence patent risk, enforcement strategy, and commercial planning.

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