What's up with a demolition derby in orbital space?

BY ROGER COCHETTI, OPINION CONTRIBUTOR — 01/30/20 11:30 AM EST 108
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The recent launch of large numbers of small satellites by Space X is a reminder of the troubling issues ahead for the growing fleets of satellites that are zipping across our skies. We rely on these satellites for common things like finding our way around on the streets, getting on the internet, watching television, forecasting the weather, planning crops and much more; to say nothing of national defense. Although estimates vary, since the 1960s, around 9,000 satellites have been launched by a dozen countries — of which around 5,000 are still in orbit and around 2,000 are still in service. That is all dramatically changing now.

For most of this period, satellites were the primary preserve of large governments, mainly because of their great cost/complexity and military implications. Although a few U.S. and European companies either manufactured or operated communications satellites, these were either closely regulated or actually controlled by governments. A typical satellite might cost over $200 million to build and launch, take five years from start to operations, and involve as many as a dozen government approvals; not least of which were national security related.

Through the 1990s, communications and many other types of satellites were placed in a very high orbit of 23,000 miles directly above the equator, where they would orbit the Earth at the same speed the Earth itself was rotating. This "geostationary (GEO) orbit" would make any satellite appear to be stationary in the sky so it could serve as a suspended relay tower for TV, telephone, and data across the oceans and continents. The ground equipment consisted of large dish antennas and bunkers that often required a staff. Putting satellites into this orbit is enormously complex and costly, and consequently these GEO satellites were built to last ten years or more. And there were very few entrepreneurs.

For lots of reasons, this landscape began to change dramatically in the 1990s and more so around 20 years ago. Telecommunication deregulation, combined with the same dramatic advances in technology that gave us smart phones, opened opportunities for satellites never previously imagined. These opportunities were stimulated by a tidal wave of data and video generated through the internet and further deregulation in areas such as picture-taking (called remote sensing) satellites.

Add to all of this venture capitalists aggressively looking for the next iPhone investment, the rise of new technological and superpowers like China, India and Japan, the spread of rocket technology and the deregulation of rocket launches and you get the satellite environment of the 2020s: Hundreds of businesses have been started in over a dozen countries that would — if they all took place — deploy 50,000 to 100,000 new satellites.

Most of these would be small, inexpensive satellites in low earth orbit (LEO) of a few hundred miles, where they orbit the Earth every couple of hours. And they would connect to ground equipment ranging from a smart phone to a sheet of paper. By relying on smartphone-type technologies, mass production techniques, deregulation and the global outsourcing of launches and manufacturing, these new satellites will eventually wind up costing tens of thousands of dollars instead of hundreds of millions of dollars each. These dramatically lower costs will in turn create a feedback loop of new experiments, innovations and entrepreneurs that will drive the global satellite industry even further.

Governments, UN agencies and industry have been quite aware of the growing list of issues that this new satellite environment is creating, and for over a decade serious international negotiations and national programs and regulations have been under way.

Nothing has been more worrying, for example, than the prospect of tens of thousands of abandoned satellites and spent rockets zipping around the orbital lanes at 17,000 mph — space debris. To prepare for this, the U.S. Air Force (and now the U.S. Space Force) which prides itself for always knowing everything orbiting the Earth, has built a massive new generation of monitoring facilities, called The Space Fence. Even various astronomy organizations have begun to voice concern over the impact of thousands of small satellites crisscrossing the skies on their ability to observe the stars. And now, proposals have surfaced for a variety of orbital garbage trucks that might pick up space debris and clear the orbital lanes.

To be sure, space — including the areas of orbiting satellites — is vast by any human standard. And the likelihood of small satellites or space debris colliding in the near future is remote. And

many satellites can maneuver if they are aware of a pending collision. But if collisions do occur in orbit, they are likely to create thousands of tiny new debris zipping around orbital space at 17,000 mph.

While industry has done a lot to set standards, entrepreneurs have developed solutions and governments are negotiating frameworks, a core problem is the lack of an effective policy/legal framework to manage this risk on a global scale — which is the only scale on which it could be effective.

Most of the international legal framework to deal with the prospect of a demolition derby in orbital space is based on the 1960s-1990s satellite era: large satellites in geostationary orbit under military supervision. There is not, for example, even a universally-accepted definition of where national air space ends and outer space begins or of who has the right-of-way in orbital space.

Many would assert that this lack of a universally-accepted, international legal framework is beneficial because it invites experimentation and innovation and would compare it to the unregulated environment that gave rise to the internet. Others suggest that unregulated orbital space compares with the high seas in that, to a large extent, what one does on the high seas has always been between that person and their own country.

But the high seas analogy gives rise to another analogy that could also emerge in orbital space: flag of convenience registrations. Just as ships in the high seas might be registered in countries described as "flags of convenience" for regulatory or economic reasons, little would prevent satellite operators from formally registering their satellite fleets through flag of convenience countries for regulatory or economic reasons. In the satellite environment of the 2020s, this could easily be done while outsourcing the manufacturing of the satellites to businesses in one country, the launch to businesses in another country, and the management of the satellites to businesses in yet another country.

Whether orbital space in the 2020s evolves into a nationally-regulated, an internationally-regulated, a code-of-conduct-regulated or an unregulated environment, it is rapidly changing and few of the tools developed between the 1960s and the 1990s will fit it well.

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