



# Interplanetary Internet Race

**SPEAKER: Senjuti Mallick - COMSPOC**

## Interplanetary Internet Race

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**Juisha Gandhi:** On the theme of Interplanetary Internet Race, as we continue to push boundaries of technology and exploration, the role of Internet in space becomes increasingly crucial. So today's session will focus on how space-based Internet systems are set to revolutionize global connectivity, the challenges we face in safeguarding the system by Sustainability, space sustainability, and all is also like a viable future exploration.

This event is especially important for Internet Society India Mumbai Chapter because it aligns with our annual newsletter theme: Space and Technology, where we dwell into the latest advancements and innovations at the intersection of these. Today we'll explore how space can play a transformative role in shaping the future and the career path and creating new opportunities for the people around.

So, let's embark on this journey. We're thrilled to have Senjuti with us today, Senjuti Mallick I'll be introducing her. She's a Senior associate in Compliance and Strategic Partnership. As the head of COMSPOC's legal team, Senjuti plays a pivotal role in providing legal support for her company's expanding global operations. She also collaborates functionally with key stakeholders worldwide and manages the complex process of exporting compliance for the organization. She holds an LLM from the Fletcher School of Law and Diplomacy at Tufts University, as well as a BA LLB from ILS Law College. So, her impressive background includes serving as an expert in Emerging Technologies Division at International Telecommunication Union, and she's also a

member of the International Institute of Space Law, IISL, and she's been actively contributing to the decisions on space and law policy.

Her remarkable achievements also include being named the Next Generation Space Sustainability Leader by the Secure World Foundation, and receiving prestigious scholarships, including the Young Professional Scholarship at the International Astronautical Congress and Malisetti Foundation Scholarship from the Space Generation Advisory Council.

When she's not navigating an intricacy of space law, she usually enjoys dancing, storytelling, and also hiking and gazing at the stars. So, we're very excited to have her today and hoping for a very insightful session.

**Senjuti Mallick:** Thanks a lot, Juisha, and thanks a lot, the Internet Society, Nupur, and the Mumbai chapter. I'm super excited to be here.

**Nupur Vih:** So my first question to you is, why is space important for humanity's future and why should people care about it?

**Senjuti Mallick:** So before I begin that, let me again, give a big shout, round of applause to Nupur and the Internet Society. I think the group for putting this together. I know that you guys have been like -- Nupur just brought me up to speed. I didn't know so much about you guys much, and I think this is a great initiative.

I, myself, am a part of several organizations where you just have to do things voluntarily, like you're just volunteers and this is outside of your day job, so big shout out to everybody who like participates in it, is running the events, and also like most importantly the audience it's you guys who come here, and you know just want to learn or know more things, or just give back, right, like if there's something...

I see this as like a two way process if you have things to share, please feel free to, if not within this session, outside of this as well, because learning is always a two way street.

So, the question, which is a loaded question, it's amazing, and I'm glad that you guys ask it, because I think I'd like to begin it this way. Can you imagine one day in the 21st century that you have a day on earth that has no Internet or TV connectivity or anything like that? Not having weather forecasts, or even I can't imagine anyone here not having a phone or an iPad or a laptop, if you're not able to use any of those.

Or not being able to use GPS or your navigation. Imagine you are traveling by flight or by train and you're unable to see any of the timings because they stopped reflecting. What would happen? It would just lead to a disappearance of a whole lot of services.

The main thing is that they are all our lifelines nowadays. Like we can't imagine life without that.

All of this is powered by the Internet. And all of this is also ultimately also powered by space, and I mean outer space here.

Space is actually like just a space that provides you vital technology for global communications, GPS navigation, weather forecasting, and even environmental monitoring.

Space exploration then opens up doors to new resources and scientific discoveries.

The reliance on space-based infrastructure has been growing day by day. It just like multiplies and it affects and touches upon almost everything that we do on Earth and in outer space as well, but what we do on Earth every day, a million times over and over again, right from global security to economic development to climate change.

And just fun facts, some inventions that were actually made for space that we use on an everyday basis, and some of you might even know it, but scratch resistant glasses that you have on, like your spectacles or your shades, digital photography, that was all came about because of space exploration, or the memory foam mattresses that you sleep on, that came about because they were built for astronauts.

And they've been imbibed into using it for our life here or not.

**Nupur Vih:** Wow, okay. Thank you. Wow, that's amazing. I had no idea about that. Okay, thank you for answering that tough question. Okay, so my second question to you is how will space-based Internet systems like Starlink transform global connectivity?

**Senjuti Mallick:** So Starlink, that's the buzz of the town. Starlink, OneWeb, and any sort of space-based Internet system is revolutionizing global connectivity because it makes it possible to access the Internet from virtually any location on Earth, and space as well, but we'll focus on Earth right now, especially places that are remote and underserved areas.

Essentially anyone from anywhere can log in and have access. Access is the biggest thing, right? If you have access, it would have significant impact on education, healthcare, news and entertainment, your modern nomadic life, right? Like we're all hustlers, we want to be able to travel, we want to be able to work from Timbuktu, or sit on Mount Fuji and work remotely and be doing crazy jobs. Gaming, people who are like high on gaming, you need this sort of Internet and that's what space-based Internet systems bring about.

More importantly, I think what the space-based Internet systems do is that they are bridging the digital divide. In short, they will actually change how we connect, how we learn, how we do business.

For me, what's most important is that they make the world more equitable and globally more integrated. To give you some real world examples where your normal Internet could not reach and Starlink, a space-based Internet system, was able to do for the betterment of society, is, during the Ukraine war Starlink was used by the Ukrainian military for their operations.

Starlink is also helping scientists sitting in Antarctica to send their research in record time. Their research was just so heavy, right, to be able to just transport it quickly. In the hurricanes, for instance, that are happening, that have happened and are ongoing in the U. S., they help with rescue operations. One of the major things which you might have known, a few years ago there was a terrible humanitarian crisis in Sudan, Starlink jumped right in and was helping the administration with humanitarian operations in Darfur.

**Nupur Vijh:** Oh, wow. That's amazing. I had no idea that Starlink was doing so much. Thank you so much for enlightening us again.

Okay, so my third question is, What are the greatest threats to satellites that support global communication networks?

**Senjuti Mallick:** Great question. I will answer, I think Thank you. The way I bucket it is in three categories.

For me, the primary threat include: one is space debris; the second would be like cyber attacks; and the third would be potential acts of militarization.

I'll dive a little bit deeper. So, just to give like context in them, space debris is basically pieces of parts of rockets or satellites that are just left in space, and they create significant risk to operational satellites, and if we leave them unchecked, what's basically going to happen is that it's going to lead to a cascading collision, and this is known as the Kessler syndrome, so one particle is going to hit another particle, and it's just going to have this boomerang effect, It's going to multiply, and it's going to end up causing a whole lot of damage.

To put things in context if any of you have watched the movie Gravity, that could happen, where people who are flying in space could get hit by a debris, and it could lead to a loss of life, and of course, like satellites, etc.

As of today, there are more than a million debris pieces that are over one centimeter in diameter. Below that, there are trillions more. Just imagine the Earth and everything

around it -- if you see my background, these dots that you see, they're actually just like space objects and some of them are just debris pieces. So, the Earth has all these little dots around it, which has a lot of debris.

So yeah, that's my biggest pet peeve that I have is space debris needs to be controlled and that's one of the biggest threats. The second would be just cyber attacks, right? Cyber security risks would compromise the integrity of global communication. And finally, I think it would be intentional threats, which would be acts of militarization, like anti satellite weapons that you like send things up, you blow them out.

A lot of countries have done it. Russia, China, India, US, they keep doing it. And this would, this is not hypothetical, honestly. This would literally lead to real world implications with seizing of. Communications, banking, navigation, security. You would just not be able to work around them.

**Nupur Vijh:** Oh, thank you. By the way, you'll be surprised that we actually, in our newsletter, somebody is writing about space debris.

**Senjuti Mallick:** Oh, wonderful. That's amazing. I'm so glad to hear that.

**Nupur Vijh:** And, yeah, and I remember you telling me that, oh, you'll be willing to help us with our newsletter and everything, so I think we'll need your help with that as well.

**Senjuti Mallick:** Sure, and I'll be more than happy to.

**Nupur Vijh:** So my next question is, How can we safeguard space-based systems such as satellites that provide Internet services?

**Senjuti Mallick:** Great question. Well, it would probably take an entire thesis to try and answer that, but let me take a stab at it. I think it happens in like a multi-layered approach to it, and it certainly needs several prongs to happen together, and it's not 1, 2, and 3, and it's done. Everything needs to happen parallelly.

So, a), it would be that you need to have effective space debris management technology. What do I mean by this? It would mean that there should be mitigation strategies, there should be debris tracking that happens, and also ultimately there should be debris removal mechanisms to prevent collisions and damage to satellites.

One key component here is having a robust Space Situational Awareness, which is basically the ability to track and predict the movement of objects in space. Once you enhance your SSA, like Space Situational Awareness capabilities, we can actually monitor satellites better, detect potential collisions in a timely manner, and also proactively avoid them.

Essentially this is what my company does, too.

So secondly, what would happen is that we need to have very strong cybersecurity measures, because, as I said, that cybersecurity risk could be damning to the entire situation, so to be able to protect crucial space assets and help them from hacking, spoofing, signal jamming, interference, things like that. Cybersecurity disruptions would necessarily have to be curtailed. We need to have mechanisms for that.

Thirdly, I would say that international cooperation, although it might just seem like fancy terms, but it's actually not. Space is very important for everybody across the globe, right? There is no distinction between who has it better, who doesn't have it, like developed nations, non developed nations, etc. Nothing like that. It is important as much for each and every individual and country. International cooperation is extremely important because it helps with building treaties and policies that will help chart out what is responsible behavior in space

That ultimately also leads to a safe space, and a secure space, and also a more sustainable space.

Last, if I can say, is that we need to have backup strategies, resilient strategies that would ensure that if one satellite is compromised or something, that you have networks that can support it, and things can go right back up, and there, wouldn't be a complete blackout.

That would be all.

**Nupur Vijh:** Thank you. We have a hand up.

**Mugdha Chaturvedi:** Good evening, ma'am. I'm Mugdha, speaking from India. I'm a master's student, and I'm actually studying international relations, and in my master's thesis I'm actually working on space debris.

**Senjuti Mallick:** That's wonderful. Congratulations.

**Mugdha Chaturvedi:** So what I wanted to ask you is that I have had my first presentations where I've kind of worked on the chapterization of it. But what else could I add to a research of space debris to make it more effective? So what I'm looking at is an institutional approach, a case study for a particular country, and how does the space debris impact a country's space operation in terms of cost, and a cost benefit analysis in that case. So, what else can I add more to that research to make it a more effective one?

**Senjuti Mallick:** Great question, and we can obviously talk more about it offline, because you're writing an entire thesis.

But, I think one of the ways that I would approach is that it takes stats, like how much debris actually exists? Basically, you need to make this a reality for people. You need to make people understand that space debris is not something that is, you're talking in thin air. Why does it impact us? So, the way I would look at it is that explaining how much debris is there you obviously take information from like NASA, ESA, ISRO, whoever you want to take it from, saying that if debris increases, how does it impact you?

Because I think it, it appeals to people when you're able to tell them why is it important to you? Why should you be concerned? So, the why, like, why is this of concern? So you establish it there, and then you move on to, if it were to continue increasing, how does it affect your everyday life?

Like a general population, how does it affect your everyday life? And not just that, because you're writing an academic work, so you also want it to be speaking to the government. Why does it impact the government? Why does it impact national security? Like national security would be one of the main things.

If India satellite blows up because the debris hit it, how's that going to impact India severely from a security standpoint? So, I think that's how I would try to...

**Mugdha Chaturvedi:** Ma'am, another question which I had was that while reading about space, and concerns faced in terms of space diplomacy, and the the growing issues which have been looked at in that particular domain, I came across the thing of asteroid mining, and how countries are now looking at mining the close by asteroids for gaining resources.

What is the probability of that actually happening in the near future?

**Senjuti Mallick:** It's very likely. I would say that it's already ongoing. It's happening for research purposes, so it's not something that's fiction. It is a reality. It is happening. I can't think of them at the top of my head, but there are lots of important minerals and resources that you're actually able to take out of asteroids, and that will be able to fuel your energy, it'll be able to also act as just gas stations for you in space, and that's going to multiply space exploration tremendously.

Think of petrol pumps ? Asteroids could be petrol pumps for rockets and satellites, and therefore you can go further out into space. So all the research is on, and things like this have actually happened, but only for research purposes.

There are companies that, specifically, their business model is this. Once it becomes commercial to the extent that it can become profitable, it wouldn't take long for it to become non-probable in any circumstances, we've just not....

I think the international community hasn't allowed it to , become commercialized yet.

**Mugdha Chaturvedi:** Okay, ma'am. Thank you.,

**Senjuti Mallick:** You can look the country of Luxembourg, they have they have a national policy that allows for this, and so does the U. S.

Thanks for the questions.

**Nupur Vijh:** Yeah, that was a very meaningful discussion.

My next question to you is why, is space sustainability critical, and what measures can be taken to ensure long term viability of space exploration?

**Senjuti Mallick:** Thanks for the question. It's something that's very close to my heart, and despite everything that I do as my day job, et cetera, I think I am a big advocate for space sustainability.

Maybe I'll just take a step back here, and try to define what space sustainability is, because again, I don't want to just throw this as a term. For me, space sustainability is ensuring that all of humankind can actually continue to use outer space for peaceful purposes, not just now, but in the long term, so for all future generations. It should equally be present in the abundance that it is right now, as well.

The reason space sustainability becomes critical is because it is a finite resource, and many times we don't see it as that. We see it as an infinite resource, but it's not, it's actually a finite resource. The orbits around the Earth are becoming more and more crowded because of all the satellites, and rockets and everything has to be launched into space, and all the accumulation of debris.

A situation has a risen and will continue to arise where space could become unusable, so you potentially could not go to space, or you will have more and more threats of getting hit by something when you're in space. This is why it is crucial to ensure the long term viability. In space, and which is why space sustainability is so important.

What we need to focus on, according to me, for sustainability, is sustainable practices.

Some of the examples that I can throw out is like, designing satellites that would have the inbuilt capability to be able to de-orbit, and then improving tracking systems for debris removal. And then, obviously, removing debris. removing the debris from space, and then finally, we were talking about international cooperation, so making every sort of effort to foster more international cooperation, and also exchange of information for space traffic coordination and management.

So, what's going to end up happening is that, the more and more we think of long term, and long term acting responsibly, I think that's how we will move towards space



sustainability, and we can preserve space in future, which is safe, secure, and also sustainable.

For everyone on Earth, and for people who -- obviously, if Elon Musk or someone sets up a life on Mars, the same way for them. Over to you, Nupur.

**Nupur Vijh:** Thank you. So, many people believe that careers in space are only for scientists or engineers. Is that true?

**Senjuti Mallick:** Oh, not at all. I myself, am not. I do not believe that. In today's world, it's impossible to have that sort of belief at all. Space needs visionaries from all fields.

While, obviously, scientists and engineers play crucial roles in the space sector, but in the same amounts, today, we rely, and space relies, heavily on lawyers, policy experts, business professionals, marketing professionals, communicators, artists, you name it.

Just to give you an example, and for you to be able to visualize this, that we need lawyers to develop space treaties, we need policymakers to regulate, to be able to come up with frameworks that regulate space traffic, and then we need business leaders who can obviously commercialize space ventures, you have Jeff Bezos, you have Elon Musk as Shiny examples of that.

The last thing what I would say is that space exploration, or space in general, is a global multidisciplinary effort, and a sphere that has every sort of discipline within it, so there is room for everybody to contribute.

So yeah, space is not just meant for scientists and engineers.

**Nupur Vijh:** Okay. That gives a person like me hope.

**Senjuti Mallick:** Absolutely. Yes.

**Nupur Vijh:** Okay. Thank you. So, what advice would you give to young people who dream of working in space?

**Senjuti Mallick:** Ooh let's see. For many people you might think that space seems to be very distant, but the pathway to actually working in the space sector is way more accessible than it has ever been.

So, don't be afraid to essentially explore any field that interests you, whatever it could be, engineering, it could be science, law, art, MBAs. Whatever it is, there is space for you in space. I can tell you that for sure.

My two cents are, stay curious. If you ever think that you're failing at something, don't see that as a door that's actually closing, but see that as a door that's actually opening up for other opportunities.

Also put your hand up where you think that the situation is very tough, or where an assignment is the toughest, put your hand up because you will get noticed.

I believe that the future of space is going to be determined by, and shaped by, people like you, with fresh ideas and passion for making a difference, and that's how space is. There's space for everyone.

The final thing that I would say is, and I always believe in that, is pull each other up. Be each other's champions, and cheer each other along. Space is a community, we are a community, and that's how we're going to move forward.

**Nupur Vijh:** Thank you so much. Okay, that marks the end of my questions. We have a lot of questions coming up. Our first question is from Pervez, he's saying, Are countries held accountable for space debris by the international community?

**Senjuti Mallick:** Are countries held accountable for space debris by the international community? No. No, they're not. The United Nations has treaties that make you sort of liable for it, but as many of you might know, not every international treaty is then ratified by every country.

So, unless it's actually becoming a national policy or a national law, you're not per se accountable for what you've done.

But, countries have started taking on this seriously. For instance, there's a Zero Debris Guideline, and many countries have started signing on to it, and making it a forward looking approach.

While nobody is actually taking out the debris just yet, at least they're making their launches in such a way that you're generating the least amount of debris. Many countries, like for instance, the U.S., have put it within their national mandate that whatever you put out in space, you have to bring it back within five years.

Earlier, for every country, it's actually 25 years and nobody even does anything. There's actually something known as the graveyard orbit. So, once your satellite stops working, you just push it out there, and that becomes your graveyard, it just stays there.

But, many companies it, countries like the U. S., and we want a lot of other countries to also do that, to be able to imbibe this within your national frameworks, where you will take it down within shorter periods of time, and not push it out into the graveyard orbit.

**Nupur Vijh:** Thank you. So there are two questions by Anoop. One is, what are different domains in space technology? I will let you answer that, and I'll ask you the second one.

**Senjuti Mallick:** Okay yeah, I'm not sure what angle this question is coming from. What are the different domains?

**Nupur Vijh:** The second follow up question is how can we contribute to space law and policy making?

**Senjuti Mallick:** That's really broad. I'll just take a stab at it, because it's like shooting daggars in the dark, but how do we contribute to space law and policymaking? You can start literally wherever you are. For instance, you are in college right now, you would want to partner with organizations, maybe reach out to ISRO, maybe ask them what are the problems that they are facing, and what are some of the regulatory issues that they have ?

Just to give you an example, if they say something like, hey, we're having an issue with dealing with the UN because, and dealing with the ITU because our satellite is not being Given the slot that it needs to go into, go run with that and be like, hey, I'm going to figure this out for you.

I'm going to say that, okay, these are the policies that the ITU has. These are the spectrum regulations. These are all the orbit regulations, and this is how we can go about it. I think that would be one simple way of doing it and, or the second would be I think somebody, Mugdha, she had a fantastic question, but I think it's also backed with something very concrete that you're doing, so write something, publish something.

There are lots of organizations in the nation and outside the nation that are non-profits. Maybe start something with the Internet Society, and be like, hey, we want to champion this. We are going to create more awareness. Maybe take space sustainability. I would be a big proponent of it. Run with space sustainability, and make it make people more aware of why it is so important.

**Nupur Vijh:** Thank you. I have, I see Nanda's hand up.

**Nandita Koshul:** Hi. Thanks, Nupur, and first of all, love your background, I think it is one of the best that I have seen. It makes me feel like that I'm already into the theme. And second, thank you so much for being here and sharing your knowledge and your perspectives with us, so, thank you so much for that. Thirdly, like coming to my question, so, I work, I come from an insurance industry in Canada, and while we were talking a lot about cyber security for Internet satellites and safeguarding them, that made me think that, with the growth of Internet satellite constellations, like we discussed, Starlink or OneWeb, I wanted to know what kind of, influence or demand do you see for space insurance, or if I may be very specific, what unique risks do you think

these space-based Internet providers face, and where cyber insurance can come in, because we are one of the leading providers of cyber insurance, so for sure, I think this is one of the areas where we can look to explore further. So, what is your take on influence, or demand for these space insurances when it comes to Internet-based constellations and the risks that they face?

**Senjuti Mallick:** Thanks, Nandita. Thanks for the question. I think it's very pertinent in today's world, especially with the commercialization that's happening in space, and so many, SpaceX, OneWeb, all of these satellite based Internet satellite based Internet capabilities that are growing up.

Space insurance is going to be, and in my opinion, has also started gaining a lot of importance. I can tell you that every conference, there is one panel that is dedicated just to that, which only speaks to how important it is. The reason why it may not have picked up just yet, as on today, is because space for many countries is still a very national security focus thing, and something that's only governments do.

The more and more that is going to be the commercial industry that goes into space. So, you'll have your something that, what is it? Richard Branson is doing, these sorts of ventures, then you make maybe a thrill activity that people can just go out and take a ride in space. Once these things become a reality and not just an experiment, insurance is going to boom, the need for insurance, because of the threats that also exist in space.

You're going to have your life threat there, you're going to have the debris threat there, you're going to have so many types of unknown things. Space is unknown, but you have this thrill that you still want to go there.

One way of maybe looking at this is also how the Titan, the submarine that went under sea and then imploded a few months ago, that was just extreme sports. That happened, but these things exist. So, I'm saying that once this becomes a reality that people just want to go and do it for the thrill as well, we need to call you.

**Nupur Vijh:** For sure, and I guess you'll be there.

**Senjuti Mallick:** Yeah.

**Nupur Vijh:** Thank you so much for that answer.

**Senjuti Mallick:** Pleasure.

**Nupur Vijh:** Okay, we have last four questions.

Oh, we have a lot more questions, because we have people who have filled out the registration form as well, and they have asked questions.

Okay, so first question, does ISS use the Internet from the geostationary satellites, or LEOs, or does it use a different arrangement?

**Senjuti Mallick:** I believe, but you were talking about the International Space Station, and to my knowledge, they use from everywhere that they can get, because they need to be protected the most. They have people on board at all times, and if you might be following the news, there are four astronauts even stranded there.

So, they will need maximum information from every sort of information board that is there, so they certainly use Internet from LEO, Geo, and even SpaceX now, which is in LEO, but yeah.

**Nupur Vjih:** Okay, thank you. So, aniket has posted a question saying, How can technologically advanced countries address the concerns raised by major spacefaring nations regarding regulation of space-based Internet services, particularly in terms of security, sovereignty, and fair access?

**Senjuti Mallick:** Yeah, that's a very good question. There are a few places that I would say that they need to start, one is the biggest platform is the UN, because you always have representation there. So you have your set agendas. And then you have the UNOOSA, which is the Outer Space Affairs Office of the UN. Then you have the ITU, international Telecommunication Union, and they are going to be big champions of it. That would cover the UN sphere.

The second would be in your country's bilateral and multilateral agreements that it does with other nations.

So, for instance, countries in some of the African nations which may be facing a lot of challenges themselves, because a lot of disruptions that are going on because they're in war torn zones, et cetera, et cetera, but they still are maybe entering into collaborations with India, like India is sending some rockets for them, et cetera.

So, that is another platform for nations that may not be as developed, as second nation that they are entering into agreements with, for them to then use that as a platform for reciprocity. They'd be like, Oh, we provide you this, or you're going to do this for us, but also be our champion on the world forum, be our champion in, if something happens, give us all that information. And that's how it works.

Okay, like India would then be willing to share, to the extent possible, all the space data with them and also help them out with any disaster that might happen, or other sort of political agenda that might be there.

**Nupur Vjih:** So, I think Narola has a question: how can someone become a space policy maker or get into space field if they do not have astrophysics, or not from that field?

**Senjuti Mallick:** Oh, that's not a problem at all. Well, you need some sort of basic education and whatever it might be. Let's say you've done international relations. This is just like me shooting in the dark. You've studied law, or you've maybe done something totally different, I don't know. But, for you, one of the things would be to get a foot in the door.

Like, where do you get a foot in the door? Work with some of the commercial companies. I'm not sure where you're based, but there are lots and lots of startups that have come out across the globe that are working on space issues. Definitely, there's been this movement, and they definitely need people who are non-engineers, and they are non-scientists, because they need people who can also talk different languages.

By languages, I don't mean like Hindi, Kannada, like nothing like that. I don't mean that. What I mean is that you are able to dumb down the technical knowledge, and say it at a level, more layman's language, that people can actually understand what you are trying to say. So, you will be able to find those opportunities there.

You can also potentially go and work with your government and, like maybe ISRO, if you're based out of India, or in NASA, if you're based out of the US, or CNES, if you're based out of France, go and work with them. They have policy divisions that need people like you.

**Nupur Vijh:** Okay, thank you. Just the last question. Anoop, you can go ahead and unmute yourself.

**Anoop Kumar Prasad:** Thanks for the session. It was a wonderful session. My name is Anoop Kumar Prasad. I'm also the founder and contributor for Planetary Digital Peers. This is a grassroots level initiative.

So, my question to you is, as the Starlink has started providing Internet through the many countries and all, are they governed by the IT policies, or they are governed by some specialized space laws? First question.

And second is if there are space intrusion threats, as you talked earlier. So, who looks after this, and what are the digital footprints they leave off? Thank you.

**Senjuti Mallick:** Starlink is definitely governed by the IT policy of the nation, that's the launch nation, and you also have policies from the ITU, the International Telecommunication Union, that you have to obviously go through, but the larger portion is your national policy or your national laws. For instance, in the U. S. it's extremely stringent, you have two FAA and FCC boards that you have to go through, and, if you don't go through, there's also costs that are assigned to you, if you're not compliant with something.

But, I cannot assure you that every other nation... I believe that India also has several of those in place.

And then your second question was?

**Anoop Kumar Prasad:** It was about the digital threat, and what kind of footprints they leave off. Because for the digital ecosystem, we have digital footprints that we can trace off if there is any threat or intrusion, but for space kind of activities, are there same kind of log activities, or is it something different, and what kind of carbon emissions they do? I too want to know that.

**Senjuti Mallick:** I will caveat this by saying that I'm obviously not an expert on this, but from my knowledge and from like being a part of the commercial space industry, and have also done it globally in different jurisdictions, I can say that there is obviously a lot of digital footprint that is left. There's a lot of carbon emission which is also left there, which is why the space sustainability also becomes a big prong to how you make space safe, secure and sustainable for generations to come.

Unfortunately and this is our hard reality, much with climate change, et cetera, et cetera, this doesn't rise up to a level where it has taken the front seat for every conversation. It hasn't, unfortunately

I don't think we are doing a lot. We should be doing, it's a part of conversations, but what are we doing towards it? Not so much.

Except that I can say that, for instance, the UN has its own long-term sustainability frameworks that countries have signed on to. You have the Zero Debris framework that has come about, a lot of countries have signed up to that, which is obviously going towards reducing debris and therefore also reducing some sort of carbon footprint that you leave.

And finally, it's for nations to also say things like, hey, we are sending out satellites and rockets into space, but in four years, in five years, once they're done with their mission, we bring them down, then you're actually pulling it back out of that system and you're ensuring that sort of footprint is not left there.

If, say in one year, it has malfunctioned, you don't just abandon it in space, you bring it back. You bring it back and you do something with it. You either re-evaluate it or you sort of fix it and send it back again instead of throwing it.

So yeah, these would be some of the ways that I would look at it.

**Anoop Kumar Prasad:** Oh, that's great. Thank you for answering that. It was really good interacting with you. Thank you.

**Nupur Vijh:** Okay. Thank you. So, just the last question is what role can international organizations like ISOC play in promotion of interplanetary Internet?

**Senjuti Mallick:** What role can ISOC play? I think I should really give the mic to the champions of ISOC. They are sitting here, and I think they know a lot more than I do of the sort of work that they can do.

Some of my recommendations might sound menial, but it's actually not, like creating awareness is so important that we sort of undermine it unnecessarily. The more people become aware of the risks, and of the situation, the more you work towards finding solutions to it.

So, I think my appeal to ISOC would be, perhaps you can have committees or subcommittees that look at how the Internet race has been for different nations, and I know that you guys have chapters across the globe, so in each you can do a comparative analysis for...

India France, Japan, US, an African nation, none of them are homogenous societies, they're so different from one another. You can look at what the challenges are there, and you can look at what is working for one nation, and it's not working for one nation, and you can actually use this as a white paper, and you come out with this, and then you can actually...

Governments are very receptive to this, so if you take it to your representative in the government, I can assure you, because I've done this in the past, but a different thing, they recognize something that you've come out with, and maybe something that you come out with will become policy.

And yeah, that's how I would take a stab at it, and I'm sure you'll be successful -- ISOC, and all the people involved with it.

Thank you so much.

**Nupur Vijh:** Okay, so, if anybody has any more questions, if it is okay with you, Senjuti, I can pass your email to them.

**Senjuti Mallick:** My email, which would be my first name dot my last name at Gmail, would be the best.

**Nupur Vijh:** Yes. Yes. Thank you so much.

**Mugdha Chaturvedi:** Excuse me, ma'am. I have a last question, which is a very small one, if I could.



**Senjuti Mallick:** Sure. Whenever somebody says it's small, it's never small, but I will do my best. Go ahead.

**Mugdha Chaturvedi:** So ma'am, in 1967, when we talk about UN, we formed a law in UN regarding space, and that was something which happened the global scale when we talk about space exploration.

**Senjuti Mallick:** Yeah, the OST. Yeah, go ahead.

**Mugdha Chaturvedi:** So now, after so many years, and we see that so many new participants are coming up in the field of space exploration and space research, do we see any amendments actually happening in the law?

**Senjuti Mallick:** In the Outer Space Treaty? No, unfortunately not.

There are five treaties that are there in space from dinosaurs years, and we haven't seen any amendment to that. However, what we are seeing as additional resources, and not as amendments to them, are you have your General Assembly resolutions that come out. You have the Artemis Accords that is led by the US and allied nations, and then you have the ILRI, which is pretty much the Artemis Accords, but it's sort of led on the China front. They are taking on, and they have taken the OST, and they have revised that, and come up with a framework which is more to do with today's times and like a more revamped approach to it. So, yeah.

**Nupur Vihh:** Thank you so much. That is very kind of you to take so many questions and give us so much of your time.

That's very sweet of you.

**Senjuti Mallick:** Absolutely.

**Nupur Vihh:** Okay. Jigmet over to you, please.

**Jigmet Dolker:** So, yeah, on behalf of Internet Society, India ISOC Mumbai Chapter, I, Jikmet Dolker, would like to state that we are actually honored to have our distinguished speaker with Ms. Senjuti Mallick. Thank you so much, ma'am, for taking out your precious time and enlightening the audience about shaping the future of space exploration, and then from satellite networks, and you talked about interplanetary data transfers and space sustainability.

Seriously, your enthusiasm, it has helped me. I'm sure it has helped others too.

Additionally, I would like to thank our president, Ms. Nupurwesh, and our vice president, Ms. Juisha Gandhi. I mean, from coordinating to accomplishing, they have been doing it passionately.

And of course, our advisors, Ms. Shweta, Ms. Nandita, and Mr. Prateek, they have been guiding us and then they have been helping us throughout every turn. And also our sincere appreciation to the designers and all the volunteers and participants for their valuable time, and for actually actively participating. Thank you all for making this event a grand success.

**Senjuti Mallick:** Thanks for everybody who was behind the scenes and putting this together, so big shout out to you, and a big applause. And yeah feel free to reach out and have a great weekend.

**Nupur Vijh:** Happy Diwali to you.

**Senjuti Mallick:** Happy Diwali to everybody.

Okay.