

Dynamic Coalition on the Interplanetary Internet

Activity Report for the year 2024

This report summarises the activity of the DC on the Interplanetary Internet (DC-Interplanetary) since its inception until the session at IGF Riyadh in December 2024.

Background about the DC (standing explanation)

The Internet has evolved dramatically from its inception – from the tongue-in-cheek 1962 Galactic Network concept by J.C.R. Licklider and the very real Arpanet project, to the birth of packet switching and TCP/IP, the rise of the World Wide Web, web browsers, and social media. Today, the Internet permeates almost every aspect of human life, becoming an integral and still evolving part of our society.

This evolution can also make steps into Space, as humanity ventures farther into our solar system. A global momentum is underway, with governments, space agencies, academia, and the private sector actively involved in efforts beyond our Earth domain. For example, numerous programs have been initiated worldwide to deploy communication network infrastructures and capabilities on and around the Moon. These efforts lay the foundation for what could evolve into an Interplanetary Internet - one that may eventually connect planets across our solar system. With commercial innovation reducing launch costs and access to space, it is foreseeable that diverse communication networks provided by various actors, including those of the private sector, will start interconnecting with each other, forming a "network of networks" in space.

As we look ahead, we must draw on the lessons from the Internet. One of its greatest successes has been the emergence of **multistakeholder governance** — a process that has ensured openness, sustainability and inclusivity of the Internet. The Dynamic Coalition on the Interplanetary Internet was created to inherit and extend this *DNA* to the emerging space network, helping to shape a common, open, and shared Interplanetary Internet - one that enables a sustainable future in space.

Activities conducted in the past year 2024

IGF Riyadh Session (16 December 2024)

We had a very successful workshop, with many attendees that were interested in our activities. The report produced is copied below.

The session was opened by Vint Cerf, who provided the historical perspective and the vision for the Interplanetary Networks.

He briefly described the first steps of Interplanetary Communication, dating back to the mid-60's, and the technical progress made in later years. It became clear that a new robust protocol was needed to manage interplanetary communications.

He concluded stating that this technical development, involving also relevant commercial interests, required a governance model. And this is the main reason why this issue is brought here at the IGF.

The second speaker was Yosuke Kaneko. He focused on the technical aspects of interplanetary communication and its challenges.

He described the progress made since the first Apollo mission in 1969, and how this progress has been the result of a tremendous effort not only by national space agencies but also the private sector, as well as international partnerships. He described the LunaNet, that will become the foundational infrastructure for us to communicate with the astronauts and the moon and the infrastructure that we will deploy on the lunar surface.

Since we need to design a governance system for these processes, the speaker suggests that we should look at what has been done to design and implement a governance system for the Internet. It is the multi-stakeholder model that has contributed to make the Internet so robust and successful, and we should use it as a model for the Interplanetary Networks governance.

He concluded his contribution mentioning the unique challenges of the Interplanetary communication, like the long delays due to the limited speed of light, or the movement of the planets and spacecrafts that can be an obstacle to the signal. The Delay-Tolerant Network (DTN) technology is the answer to solve these problems.

The third speaker, Samo Grasic, described in more detail the DTN technology, providing also examples of application.

He stated that the DTN is essentially a protocol that is delay and fault tolerant, i.e. that can cope with the disruptions created by long delays in receiving answers to the messages and faults created by temporary unavailability of the stations. He described some practical applications on Earth of the principle: for instance the one by which nomadic populations in Northern Scandinavia can track the movement of their reindeer herds; or the one by which data are collected by a helicopter flying over remote villages and delivered at the destination when these earth stations are within reach. This technology can be used on Earth, and can also be used in space.

He concluded describing the pilot project he is working on, that is to actually build an operational DTN network, that uses actual machines, actual protocols, and actually spreads it globally.

The last speaker, Mohamed-Slim Alouini, focused on applications of the technology to "connect the unconnected".

His first example was about a village in remote areas, where current communication technologies are either not available or have prohibitive costs. They had educational libraries that needed to be updated daily. In this case, with DTN technologies, we can use anything as a transportation system, as for instance a bus travelling to these remote areas, that can carry the information to be delivered to destination when the recipients is within reach. The libraries will receive the updates depending on the schedule of the bus, but this would be good enough in this case.

The second example is related to IoT. To connect these devices in real time is not always possible, because of several factors, including energy consumption that a real time connection would require. However, DTN will allow to limit the transmission to the time window when the device is visible by the recipient.

The last example is about underwater communication to collect data from sensors. There are physical limitations to the range that can be covered, so again DTN can be used to have an actual transmission only when a suitable vehicle for the information is within reach. Also, you want to have a wake-up system that allows the device to be in sleep mode between transmissions. There are many areas in which there is opportunity for research.

The moderator made two comments: progress in communication is not just providing more speed and bandwidth to “privileged” users but also providing meaningful access to underserved users; there is urgency to develop and deploy a multi-stakeholder governance model for the Interplanetary Networks before decisions are taken by commercial interests and other powers without users having a voice.

There were several questions, both on technical issues as well as on governance, that concluded the session.

The recording of the session can be seen at <https://www.youtube.com/watch?v=QchXL48o5Kk>.

Other activities at the IGF in Riyadh (December 2024)

Besides holding a session, the DC-Interplanetary participated in activities of the DC Coordination Group, including the initial planning meeting, the preparation of the joint session, the setup and staffing of the joint DC booth.

In particular Samo Grasic and Rana Alshaeri have been instrumental in getting the joint DC booth up and running, including fixing some technical problems about the local equipment.

Plans for 2025

In alignment with the Pact for the Future, adopted in 2024, the DC-Interplanetary continues to serve as a platform for multistakeholder engagement and information exchange between the Internet and space communities.

- In preparation for IGF 2025, our DC plans to participate in an intersessional webinar titled “Future of Multistakeholder Governance.” This event will provide an opportunity to present the current space governance landscape to the Internet community and emphasize the importance of carrying forward the multistakeholder approach for the future Interplanetary Internet.
- Our DC will also support and promote the activities of the Interplanetary Networking Special Interest Group (IPNSIG), affiliated with the Internet Society (ISOC), which advocates for a multistakeholder process in the development and governance of an interplanetary network.
- Looking ahead, DC-Interplanetary aims to actively contribute to discussions on space governance at key upcoming events organized by UNOOSA, including the next UNOOSA Space Bridge initiative, COPUOS and its subcommittees, and UNISPACE+50 (UNISPACE IV), planned for 2027. We view 2025 as a preparatory phase toward these important milestones.
- Through these efforts, our DC may propose a governance framework for the Interplanetary Internet, drawing on the NETmundial+10 Multistakeholder Statement on Strengthening Internet Governance and Digital Policy Processes released in 2024.