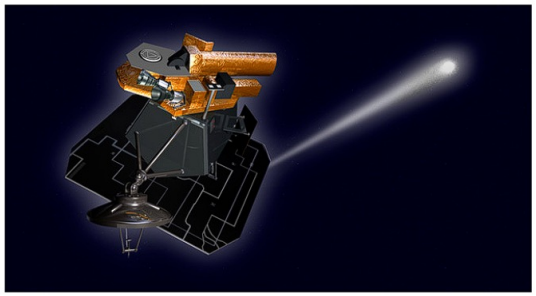
DTN in Operational Use

Scott Burleigh, IPNSIG

October 2008 - Disruption Tolerant Networking (DTN)
Tested on Spacecraft



Deep Impact Network Experiment (DINET)

Publication of RFCs 5325, 5326, and 5327 defining the Licklider Transmission Protocol

Phase 2	DARPA Disruption-Tolerant Networking program Phase 3
	More intense conversations.

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2008

Experimental use of DTN on the International Space Station

DARPA Disruption-Tolerant Networking program Phase 3

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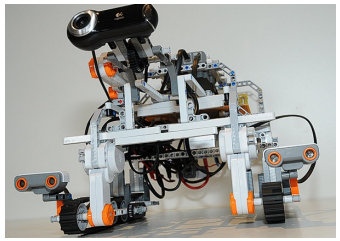
2009



Experimental use of DTN on the International Space Station

More intense conversations.

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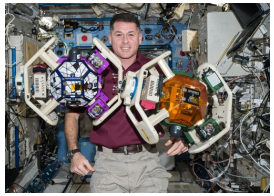
2011



Smartphone integrated with SPHERES

Experimental use of DTN on the International Space Station

More intense conversations.

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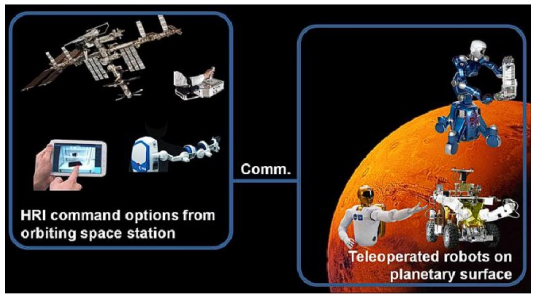
2012



Multipurpose End-To-End Robotic Operations Network

Experimental use of DTN on the International Space Station

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2013

Japan Aerospace Exploration Agency (JAXA) reports on new implementation of DTN protocols

Experimental use of DTN on the International Space Station

Operational use of DTN on the International Space Station (science)

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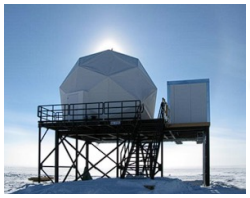
2016



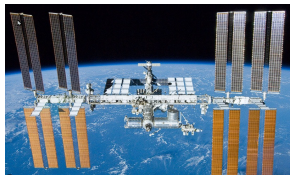


Photo taken in Antarctica is transmitted via DTN to astronaut on ISS over two TDRSS contacts.

Operational use of DTN on the International Space Station (science)

More intense conversations.

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2017

Infusion of ION into Deep Space Network (DSN) ground software begins.

Operational use of DTN on the International Space Station (science)

More intense conversations.

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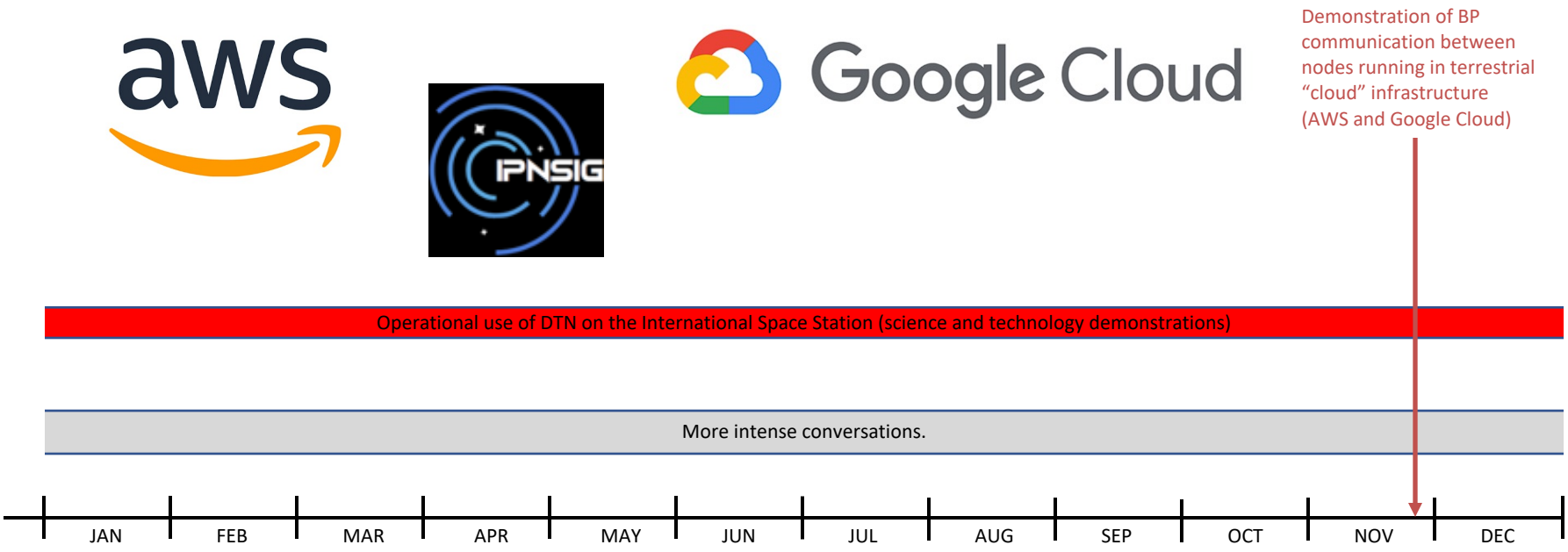
2018


aws
IPNSIG
Google Cloud
Demonstration of BP communication between nodes running in terrestrial "cloud" infrastructure (AWS and Google Cloud)
Operational use of DTN on the International Space Station (science and technology demonstrations)
More intense conversations.
JAN
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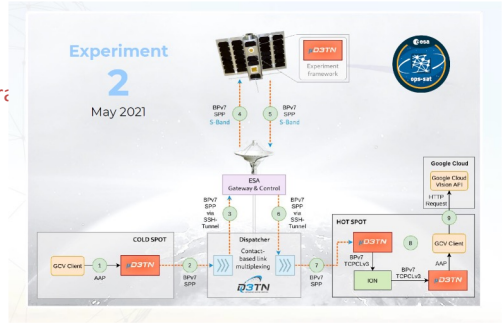
2020

Interagency Operations Advisory Group recommends BP for future space missions.

Multiple demonstrations of DTN between ground and space using OPS-SAT spacecra and multiple interoperable implementations of DTN



Launch of Lunar Communication Relay Demonstration satellite, to demonstrate BP communication over optical data links

Operational use of DTN on the International Space Station (science and technology demonstrations)

More intense conversations.

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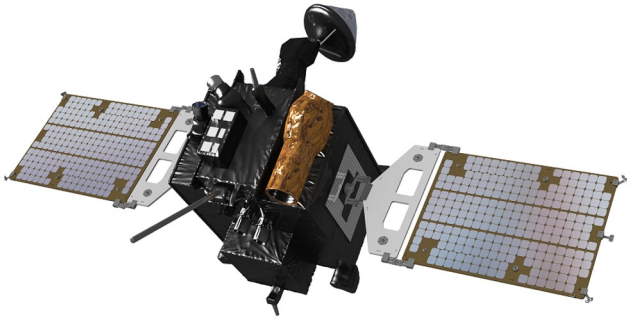
2021



Publication of RFCs 9171, 9172, 9173, and 9174 standardizing BP and BP Security

Operational use of DTN on the International Space Station (science and technology demonstrations)

DTN operations on Danuri (Korea Pathfinder Lunar Orbiter, KPLO)

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2022

JAXA reports on DTN protocol acceleration using system-on-a-chip

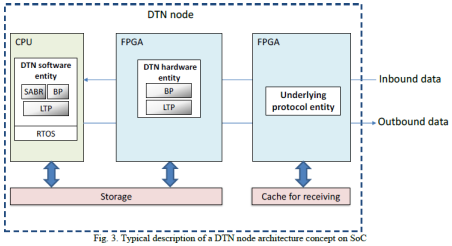

Fig. 3. Typical description of a DTN node architecture concept on SoC

ILLUMA-T

Operational use of DTN on the International Space Station (science and technology demonstrations)

DTN operations on Danuri (Korea Pathfinder Lunar Orbiter, KPLO)

More intense conversations.

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2023

DTN operations on Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission

ILLUMA-T Laser Relay Experiment using HDTN

Operational use of DTN on the International Space Station (science and technology demonstrations)

DTN operations on Danuri (Korea Pathfinder Lunar Orbiter, KPLO)

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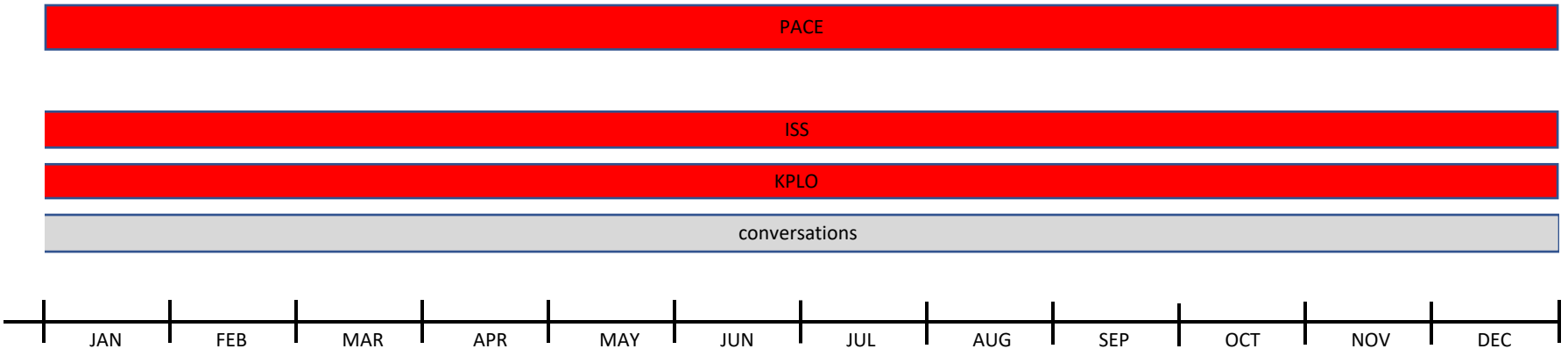
2024

DTN will be included in the architecture for the communications network supporting Lunar missions through the rest of this decade.



2025 and beyond