
NASA
HOW DO WE
COMMUNICATE
WITH
SPACECRAFT?

1
00:00:02,402 --> 00:00:04,404
How do we communicate with spacecraft?

2
00:00:04,938 --> 00:00:07,440
NASA.

3
00:00:07,440 --> 00:00:09,009
We Asked a NASA Technologist.

4
00:00:09,075 --> 00:00:11,611
We communicate with spacecraft
in a lot of different ways.

5
00:00:11,911 --> 00:00:15,665
We have a network of antennas
all over the world across all seven

6
00:00:15,665 --> 00:00:20,553
continents, along with satellites in space
that help transmit these radio waves.

7
00:00:20,754 --> 00:00:24,524
Astronauts, mission controllers
and scientists rely on this network

8
00:00:24,524 --> 00:00:29,129
to transmit messages and commands
and receive data such as never

9
00:00:29,129 --> 00:00:32,298
before seen images of our solar system
and universe.

10
00:00:32,532 --> 00:00:36,569
Spacecraft in orbit can only communicate
directly to ground stations on Earth

11
00:00:36,569 --> 00:00:39,401
if the satellite has a clear view of the ground station,

12
00:00:39,401 --> 00:00:42,442
which typically only occurs for a short period of time.

13
00:00:42,509 --> 00:00:46,413
The tracking and data
relay satellites, or TDRS, are a fleet

14
00:00:46,413 --> 00:00:49,983
of specialized communications
satellites in geosynchronous orbit.

15
00:00:50,050 --> 00:00:54,325
These satellites relay data from other spacecraft to ground stations,

16
00:00:54,325 --> 00:00:56,990
allowing NASA to provide near-continuous

17
00:00:56,990 --> 00:01:00,560
global communications
coverage to missions in low-Earth orbit.

18
00:01:00,727 --> 00:01:05,799
NASA is also developing ways to communicate with invisible infrared lasers.

19
00:01:05,799 --> 00:01:10,203
Laser communications offers
missions higher data rates than ever before,

20
00:01:10,203 --> 00:01:12,906
allowing us to transmit more data
at once.

21
00:01:13,073 --> 00:01:19,179
One mission doing that now is the Laser
Communications Relay Demonstration or LCRD.

22
00:01:19,179 --> 00:01:23,291
LCRD will work with the International Space Station, allowing more science

23
00:01:23,291 --> 00:01:27,520
and exploration data so we can continue
making discoveries about our planet.

24
00:01:27,554 --> 00:01:30,990
We also have a demonstration
called TBIRD, which is testing laser

25
00:01:30,990 --> 00:01:35,395
communications with huge bursts of data
from a small satellite in low-Earth orbit.

26
00:01:35,428 --> 00:01:38,798
And in the future, NASA plans to use
laser communications

27
00:01:38,798 --> 00:01:41,334
when humans return to the Moon
with Artemis.

28
00:01:41,534 --> 00:01:43,903
So how do we communicate with spacecraft?

29
00:01:43,903 --> 00:01:46,673
Mostly via
radio waves between space and ground.

30
00:01:46,773 --> 00:01:50,443
But NASA is pushing the boundaries
with laser communications

31
00:01:50,577 --> 00:01:54,380
to be able to receive more data
from further than ever before.