How We Communicate

New Horizons is Far Out! Long-Distance Communication

New Horizons launched from Earth at over 10 miles per second (over 36,000 mph) in 2006 and got a speed boost from Jupiter in 2007. It has been speeding out of the solar system ever since and is now over 4 billion miles away, yet NASA can still easily communicate with it!

Communication between Earth and New Horizons is done with sequences of binary data – zeros and ones (called “bits”) – like all computers.

The farther New Horizons travels from Earth, the weaker the signals received here by NASA’s Deep Space tracking network (DSN). NASA’s DSN antennas are huge, over 200 feet in diameter, so that they can collect the faint signals from New Horizons.

Communication Rate

- Mariner 4, 1.2m antenna @0.15 billion km = 8.3 bps
- Voyager, 3.7m antenna @19 billion km = 160 bps
- New Horizons, 2.1m antenna @5 billion km = 800 bps
- 56k modem —the internet in the mid-1990s on Earth
- Mars Reconnaissance Orbiter, 3.0m antenna @0.15 billion km = 500,000 - 4,000,000 bps

Communicating on Earth is fast with modern tech. For example, our Internet communications are often measured in the hundreds of millions of bits per second. In space, vast distances make it much harder to communicate. In 1964, Mariner 4, the first NASA probe to reach Mars communicated with Earth at just 8.3 bits per second. New Horizons is almost 1000 times as far as Mariner 4, but thanks to new technology it can communicate with Earth at over 1000 bits per second from the distant Kuiper Belt. It’s a lot faster, but it will still take New Horizons about 20 months to send all data to Earth from its January 1, 2019 flyby of the Kuiper Belt Object, “Ultima Thule.”