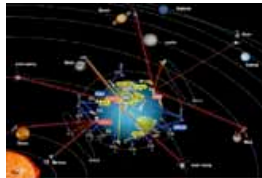


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## NASA to Boost Speed of Deep Space Communications

By Jeremy Hsu  
SPACE.com Contributor  
posted: 22 January 2010  
03:45 pm ET

Rovers and deep space probes can forget about quickly posting cool high-definition videos to YouTube, given the painfully slow data transfer rates for most of today's space missions.

But NASA wants to change that by fusing together three aged [space communication](#) networks into a much faster, more efficient data network worthy of 21st century missions to the moon, Mars and beyond. And it hopes to do it all without costing taxpayers an extra cent.

NASA's overhaul aims to boost space communication by as much as 50 times faster than today's data transfer rates, so that a Mars mission squeaking by on a few megabits per second might someday get as much as 600 megabits per second, if not more. That could enable far more [scientific payoff](#) per mission in the long run.

"Imagine what you can accomplish with a single mission instead of several spacecraft flying over several years to collect the data," said Badri Younes, NASA's deputy associate administrator for Space Communications and Navigation.

An upgraded network might support the very quick upload or download of huge video files the size of an HD YouTube video, as opposed to current capabilities that would struggle to transfer mp3 music files.

Younes worked at NASA's Goddard Space Flight Center for a decade before leaving to join the U.S. Department of Defense. But the U.S. space agency hired him back in August 2007 for the purpose of revolutionizing its space communication networks.

### From Chevy to Lamborghini

Younes faces the tricky task of creating a new space communication network out of NASA systems that have not had upgrades since the early 1990s. He also must ensure that the rebuilding period does not interfere with NASA's support of ongoing space missions, ranging from the International Space Station to Mars orbiters.

"It's like driving a 1960s Chevy that's beat up and losing paint while going at 90 mph, and being pushed to convert that into a Lamborghini while driving 90 mph without losing a beat," Younes told *SPACE.com*.

The challenge goes beyond consolidating command centers and launching new satellites to support NASA's Space Network (SN), Near-earth Network (NEN), and [Deep Space Network](#) (DSN). Younes has already begun to reduce maintenance and operation costs by putting in new automated and smart systems, so that he can transfer the cost savings within his \$400 million annual budget into new space communications capabilities and technologies.

In the past, NASA has cobbled together its space communication networks based on the demands of each new space mission. But that

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View of the Canberra Complex showing the 70m (230 ft.) antenna and the 34m (110 ft.) antennas. The Canberra Deep Space Communications Complex, located outside Canberra, Australia, is one of the three complexes which comprise NASA's Deep Space Network. The other complexes are located in Goldstone, California, and Madrid, Spain

piecemeal approach has limited the technological upgrades, because each mission had to pay out of its own pocket.

By doing a wholesale upgrade of a unified space communication network, Younes can offer mission managers capabilities that they would otherwise have never dreamed of. He has already targeted 2018 as the latest date for integrating the three existing space networks.

### Lasers point to the future

The U.S. space agency is already pushing new communication innovations such as disruption tolerant networking. The NASA-developed Internet protocol ensures that communication delays or disruptions from solar storms won't disrupt the flow of data packets across space networks, and has undergone testing in near-Earth as well as deep-space missions.

Speed boosts may come from newer Ka-band transmitters that still work in the radio spectrum — the [Lunar Reconnaissance Orbiter](#) can send or receive 100 megabits per second with its Ka-band transmitter. NASA also plans to implement communication protocols that can increase the virtual bandwidth available to space missions,

But one of the biggest communication revolutions will come from laser-driven optical communication, as opposed to current space communications based on radio frequencies. Lasers could allow data transfer speeds of up to 600 megabits per second, as Younes hopes, or perhaps even speeds surpassing 1 gigabit per second (1 gigabit = 1024 megabits) from the moon or Mars. That data stream could be even higher for a near-Earth spacecraft or outpost such as the space station.

NASA has already enlisted the help of MIT to build and demo a laser communications system aboard the Lunar Atmosphere and Dust Environment Explorer, slated for launch in late 2011. A successful test would go a long way toward ensuring that NASA's Constellation astronauts returning to the [moon](#) have a much faster connection to Earth.

"You have to start with the premise that anything you do in life can always be optimized," Younes said.

[Space Communications Patent Spans Solar System](#)

[Video - Target Moon: NASA's New Lunar Scouts, Part 2](#)

[NASA Launches Astronaut Internet in Space](#)

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NASA plans to speed up data transfers by fusing together three aged space communication networks into one much faster, more efficient data network. Credit: NASA

### MORE STORIES

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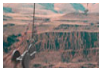
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rlb2 wrote:

posted 22 January 2010, 5:01 pm ET



That is good news for science and for commercialization of space. A Presentation I made in 2007 at the International Mars Society conference was about sending Commercially sponsored cheap missions to other worlds and extract out some 3D HD movies and YouTube like movies to be used to for research and recreational use, IMAX documentaries, Disneyland rides, watching real-time movie clips of a rover moving over the service of Mars while eating your hamburger at McDonalds etc, etc.

The device I proposed using to extract out the images would be a Balloon on Mars, Titan, or Venus propelled by the wind. One of the Device's I would use was "The Windsurfer" from a Balloon Presentation I made at the 2003 Mars Society Conference that also was published in Robert Zubrin's Book, "On to Mars II."

Here is a YouTube animation I made on that presentation:

"Martian Windsurfer - Adventure Rides and Theater Quality Videos"

<http://www.youtube.com/watch?v=Yg9OCyyPi4M>

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**rib2** wrote: posted 22 January 2010, 5:40 pm ET

Another note in 2005 when I made that presentation, "Martian Windsurfer - Adventure Rides and Theater Quality Videos" there were no talk of a superfast communication link only ideas for a laser transmission rates proposed in future communication satellites. The proposed new laser communication transmitting satellites work was cut from the NASA budget in around 2007, it's good to see that they are still working on it.

In 2005 the only way to make a 3D IMAX HD video of the surrounding area was to store it on a small storage like device that wasn't invented yet then slowly beam it back to earth, approximately 1 Teraflop storage device. We have that technology today.....

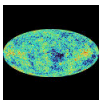
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**thinkforthefuture** wrote: posted 22 January 2010, 7:40 pm ET

Jeezuz its about time

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**KuleRucket** wrote: posted 23 January 2010, 7:50 am ET

"an HD YouTube video"

grammar please

<http://www.wsu.edu/~brians/errors/a.html>

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**Rascal\_sage** wrote: posted 23 January 2010, 12:01 pm ET

"An upgraded network might support the very quick upload or download of huge video files the size of an HD YouTube video..."

Finally!

Ever tried to download a video from a web site on Mars?

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**kennyr** wrote: posted 23 January 2010, 2:18 pm ET

Actually, "an HD YouTube video" is completely correct, according to the link you included. If the word begins with a vowel sound ("aitch dee"), use "an". Also, the second paragraph in your link discusses abbreviations, which also support using "an".

To get off of the silly English lesson, it's great to see NASA moving into the 2010's. Of course, I'll be VERY surprised if these planned upgrades can really be done "without costing taxpayers an extra cent." First time for everything, I guess.

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**T\_D** wrote: posted 24 January 2010, 11:53 am ET

Yeah, right - we need 600 Mb/s to study rocks on Mars. Please find life and announce it to get this over with. It's hard to imagine the severe implications for society once everyone realizes they've been lied to for decades by a small band of holier-than-thou scientists. But maybe you're right - pass the bag to the next generation, and let them clean up the mess.

T\_D  
<http://blog.gomarsgo.com>

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**TimeTheFinalFrontier** wrote: posted 24 January 2010, 1:23 pm ET

I like this guy, Younes. He's smart enough to see that the best time for an upgrade is when the equipment manufacturere are hungry for business and will sell equipment at razor thin margins.

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**Worloq** wrote: posted 25 January 2010, 8:05 am ET

My very first thought was about the biggest limitation to communication--the speed of light. Which was followed up on, "If NASA can change that, they deserve a hell of a lot more money than they're getting now."

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