1
00:00:06,869 --> 00:00:04,870
i'm here with bogdan waida and he is

2
00:00:08,950 --> 00:00:06,879
from the jet propulsion laboratory and

3
00:00:10,549 --> 00:00:08,960
bogdan we're talking about opals but

4
00:00:11,830 --> 00:00:10,559
it's not the kind that i like i don't

5
00:00:13,589 --> 00:00:11,840
think let's talk about your research

6
00:00:15,430 --> 00:00:13,599
that's right we're not talking about the

7
00:00:17,830 --> 00:00:15,440
actual gemstone we're talking about the

8
00:00:21,750 --> 00:00:17,840
optical payload for laser comp science

9
00:00:23,670 --> 00:00:21,760
and we're trying to do is put a laser on

10
00:00:25,990 --> 00:00:23,680
the international space station and

11
00:00:28,150 --> 00:00:26,000
perform a technical demonstration of

12
00:00:31,029 --> 00:00:28,160
optical communications

13
00:00:33,350 --> 00:00:31,039

and currently in space the way they

14
00:00:35,910 --> 00:00:33,360
communicate between spacecraft and the

15
00:00:38,869 --> 00:00:35,920
ground is through radio waves much like

16
00:00:41,350 --> 00:00:38,879
uh or you get the radio in your car uh

17
00:00:44,229 --> 00:00:41,360
well uh laser communications for a

18
00:00:46,470 --> 00:00:44,239
couple of reasons is able to generate

19
00:00:49,990 --> 00:00:46,480
much higher data rates

20
00:00:52,150 --> 00:00:50,000
than conventional rf radios so

21
00:00:55,430 --> 00:00:52,160
for the same amount of power that is

22
00:00:57,910 --> 00:00:55,440
required you can get data rates that are

23
00:00:59,110 --> 00:00:57,920
sometimes 10 to 100 times faster than

24
00:01:00,229 --> 00:00:59,120
you can with

25
00:01:01,670 --> 00:01:00,239
with

26
00:01:03,670 --> 00:01:01,680
radio frequency

27
00:01:04,950 --> 00:01:03,680
our particular payload

28
00:01:07,030 --> 00:01:04,960
is actually trying to do something

29
00:01:08,550 --> 00:01:07,040
that's relatively modest by optical

30
00:01:10,469 --> 00:01:08,560
communication

31
00:01:12,149 --> 00:01:10,479
standards and that's because the focus

32
00:01:13,750 --> 00:01:12,159
is not so much to show that we can do

33
00:01:14,710 --> 00:01:13,760
high data rate but rather to show that

34
00:01:17,350 --> 00:01:14,720
we can do

35
00:01:18,789 --> 00:01:17,360
optical communication so

36
00:01:21,830 --> 00:01:18,799
the sort of rates that we will be

37
00:01:24,070 --> 00:01:21,840
getting is about 10 to 50 times faster

38
00:01:25,429 --> 00:01:24,080

than what you would get at home in your

39
00:01:26,469 --> 00:01:25,439
typical

40
00:01:31,270 --> 00:01:26,479
cable

41
00:01:32,870 --> 00:01:31,280
laser that's about 500 times

42
00:01:35,749 --> 00:01:32,880
more powerful than this one this is

43
00:01:37,990 --> 00:01:35,759
about five milliwatts of optical power

44
00:01:39,749 --> 00:01:38,000
our laser is about two and a half watts

45
00:01:42,310 --> 00:01:39,759
of that and that that's what allows us

46
00:01:45,350 --> 00:01:42,320
to achieve um this sort of data rate so

47
00:01:48,149 --> 00:01:45,360
how does it work uh so it's it's uh the

48
00:01:49,910 --> 00:01:48,159
concept itself is very fairly simple

49
00:01:53,109 --> 00:01:49,920
enacting it is is that the challenging

50
00:01:56,149 --> 00:01:53,119
part so as the iss flies over our ground

51
00:01:58,630 --> 00:01:56,159
station in in california our

52
00:02:00,870 --> 00:01:58,640
laser will essentially try to keep uh

53
00:02:04,230 --> 00:02:00,880
the spot pointed uh to our ground

54
00:02:05,990 --> 00:02:04,240
station and uh to give an analogy it's

55
00:02:06,950 --> 00:02:06,000
the equivalent of me trying to use this

56
00:02:09,029 --> 00:02:06,960
laser

57
00:02:12,150 --> 00:02:09,039
to point to an area there's a diameter

58
00:02:14,869 --> 00:02:12,160
about a human hair from about 20 to 30

59
00:02:17,270 --> 00:02:14,879
feet away while i'm moving at about half

60
00:02:19,270 --> 00:02:17,280
a foot per second so that's precision

61
00:02:21,190 --> 00:02:19,280
right there that's right it's all about

62
00:02:23,350 --> 00:02:21,200
the precision and that's really the most

63
00:02:24,949 --> 00:02:23,360

difficult point part about

64
00:02:27,030 --> 00:02:24,959
about optical communication is the

65
00:02:29,030 --> 00:02:27,040
pointing because the beam is so narrow

66
00:02:31,350 --> 00:02:29,040
so what do we gain on earth and in space

67
00:02:33,110 --> 00:02:31,360
from learning about this um

68
00:02:34,390 --> 00:02:33,120
it helps it

69
00:02:36,949 --> 00:02:34,400
increases

70
00:02:39,990 --> 00:02:36,959
future emissions ability to bring back

71
00:02:43,830 --> 00:02:40,000
more science data for the same amount of

72
00:02:46,869 --> 00:02:43,840
uh of resources that that you put in so

73
00:02:49,750 --> 00:02:46,879
in low-earth orbit the upcoming earth

74
00:02:51,830 --> 00:02:49,760
science missions are generating data

75
00:02:53,270 --> 00:02:51,840
at rates that are much higher than we

76
00:02:54,869 --> 00:02:53,280
are able to bring them down we're

77
00:02:56,229 --> 00:02:54,879
approaching that

78
00:02:58,229 --> 00:02:56,239
that that

79
00:03:01,110 --> 00:02:58,239
point right now

80
00:03:03,030 --> 00:03:01,120
and so optical communication can offer a

81
00:03:04,630 --> 00:03:03,040
relief and allow us to bring down much

82
00:03:06,390 --> 00:03:04,640
more data

83
00:03:08,149 --> 00:03:06,400
for deep space

84
00:03:10,070 --> 00:03:08,159
it has also deep space applications so

85
00:03:11,910 --> 00:03:10,080
if you think of a mars mission for

86
00:03:14,550 --> 00:03:11,920
example you could have a satellite in

87
00:03:17,589 --> 00:03:14,560
orbit about mars that is able to

88
00:03:18,630 --> 00:03:17,599

transmit much higher data rates

89
00:03:21,509 --> 00:03:18,640
about

90
00:03:23,589 --> 00:03:21,519
40 times faster than we currently have

91
00:03:26,309 --> 00:03:23,599
available wow so when are we going to

92
00:03:28,869 --> 00:03:26,319
see this laser from the station opals is

93
00:03:30,789 --> 00:03:28,879
currently scheduled to launch in 2013 so

94
00:03:32,630 --> 00:03:30,799
if everything goes well that's when

95
00:03:34,229 --> 00:03:32,640
we'll be going up and we will be

96
00:03:35,589 --> 00:03:34,239
operating for about

97
00:03:37,990 --> 00:03:35,599
90 days

98
00:03:39,350 --> 00:03:38,000
and if everything goes well hopefully

99
00:03:41,190 --> 00:03:39,360
even beyond that

100
00:03:45,190 --> 00:03:41,200
it will go well i know it thank you bob

101
00:03:48,789 --> 00:03:46,789
this is mission control houston again

102
00:03:49,990 --> 00:03:48,799
that was a look at the upcoming opals

103
00:03:51,750 --> 00:03:50,000
experiment that will be flying up to the

104
00:03:53,429 --> 00:03:51,760
international space station coming up

105
00:03:54,869 --> 00:03:53,439
later on this year if you would like to

106
00:03:59,110 --> 00:03:54,879
learn more about it just log on to the

107
00:04:00,789 --> 00:03:59,120
nasa website at www.nasa.gov