



1  
00:00:04,710 --> 00:00:02,629  
one of the

2  
00:00:05,510 --> 00:00:04,720  
experiments that are brought up on board

3  
00:00:13,430 --> 00:00:05,520  
the

4  
00:00:15,030 --> 00:00:13,440  
satellite project that uh is going to be

5  
00:00:17,510 --> 00:00:15,040  
demonstrating some new technology and we

6  
00:00:19,269 --> 00:00:17,520  
have uh joining us remotely chris

7  
00:00:20,630 --> 00:00:19,279  
boshhausen who's going to be telling us

8  
00:00:22,710 --> 00:00:20,640  
a little bit about that experiment

9  
00:00:23,670 --> 00:00:22,720  
thanks so much for joining us chris hi

10  
00:00:25,509 --> 00:00:23,680  
brandi

11  
00:00:27,349 --> 00:00:25,519  
so tell us a little bit about the dub

12  
00:00:29,109 --> 00:00:27,359  
project what is it and what exactly is

13  
00:00:32,470 --> 00:00:29,119

your involvement in it

14

00:00:35,030 --> 00:00:32,480

so i work at planet labs and planet labs

15

00:00:37,590 --> 00:00:35,040

is a company that's trying to provide

16

00:00:39,670 --> 00:00:37,600

frequent images of the entire earth

17

00:00:40,869 --> 00:00:39,680

and so our ultimate goal is to launch

18

00:00:42,069 --> 00:00:40,879

100

19

00:00:45,990 --> 00:00:42,079

very large

20

00:00:47,350 --> 00:00:46,000

cameras in space in cubesats and provide

21

00:00:48,869 --> 00:00:47,360

high frequency

22

00:00:52,229 --> 00:00:48,879

updated high-resolution maps of the

23

00:00:54,950 --> 00:00:52,239

earth and so on the um cygnus we

24

00:00:57,189 --> 00:00:54,960

actually launched 28 of these cameras

25

00:00:58,549 --> 00:00:57,199

to run a number of experiments um and to

26  
00:01:01,029 --> 00:00:58,559  
test them out in

27  
00:01:02,549 --> 00:01:01,039  
in a fairly low orbit um and get used to

28  
00:01:03,990 --> 00:01:02,559  
running large numbers of satellites in

29  
00:01:06,469 --> 00:01:04,000  
space

30  
00:01:07,510 --> 00:01:06,479  
that sounds like a an ambitious project

31  
00:01:09,350 --> 00:01:07,520  
can you tell us a little bit about the

32  
00:01:10,870 --> 00:01:09,360  
satellites what their capabilities are

33  
00:01:12,710 --> 00:01:10,880  
what they're meant to do

34  
00:01:15,429 --> 00:01:12,720  
yeah so each satellite is called a dove

35  
00:01:18,310 --> 00:01:15,439  
and uh we picked that name because um we

36  
00:01:19,910 --> 00:01:18,320  
really wanted to you know represent the

37  
00:01:22,149 --> 00:01:19,920  
amazing use cases we think we could have

38  
00:01:24,469 --> 00:01:22,159

for our data like you know um just

39

00:01:25,990 --> 00:01:24,479

helping life and you know humanity on

40

00:01:27,030 --> 00:01:26,000

earth and helping our ecosystem and

41

00:01:29,990 --> 00:01:27,040

understanding what we're doing to our

42

00:01:31,109 --> 00:01:30,000

planet so the dove satellites are

43

00:01:33,190 --> 00:01:31,119

about

44

00:01:35,590 --> 00:01:33,200

30 centimeters by 10 by 10 centimeters

45

00:01:37,830 --> 00:01:35,600

or about 12 by 4 by 4 inches so a

46

00:01:40,310 --> 00:01:37,840

standard three cube sat

47

00:01:42,469 --> 00:01:40,320

they have almost i guess 80 of the

48

00:01:44,389 --> 00:01:42,479

volume inside is a giant telescope and

49

00:01:46,550 --> 00:01:44,399

so we wanted the to fit the biggest

50

00:01:48,389 --> 00:01:46,560

telescope we could in a cubesat

51  
00:01:49,590 --> 00:01:48,399  
and then uh we have all of the other

52  
00:01:51,830 --> 00:01:49,600  
things that a satellite needs like a

53  
00:01:53,350 --> 00:01:51,840  
control system radios storage and

54  
00:01:55,510 --> 00:01:53,360  
reaction wheels for moving the satellite

55  
00:01:56,950 --> 00:01:55,520  
around

56  
00:01:59,670 --> 00:01:56,960  
and all of these are meant to be taking

57  
00:02:01,910 --> 00:01:59,680  
photos of the earth for for how long

58  
00:02:03,990 --> 00:02:01,920  
so um the ones that we're putting in

59  
00:02:05,590 --> 00:02:04,000  
higher orbits we actually plan to have

60  
00:02:07,990 --> 00:02:05,600  
operational for a couple of years and

61  
00:02:10,309 --> 00:02:08,000  
provide continuous coverage um the

62  
00:02:11,990 --> 00:02:10,319  
nanoracks orbit that that we go into

63  
00:02:13,670 --> 00:02:12,000

from the space station

64

00:02:15,350 --> 00:02:13,680

um is a little lower and so the

65

00:02:17,910 --> 00:02:15,360

satellites will last somewhere between

66

00:02:19,990 --> 00:02:17,920

you know five to seven months on average

67

00:02:22,229 --> 00:02:20,000

and how i think this is not the first um

68

00:02:24,150 --> 00:02:22,239

flock that you've put into orbit how how

69

00:02:25,830 --> 00:02:24,160

how's your other flock fared and uh can

70

00:02:27,190 --> 00:02:25,840

you tell us any anything about the

71

00:02:29,350 --> 00:02:27,200

results from it

72

00:02:33,110 --> 00:02:29,360

so great yeah so um we actually launched

73

00:02:37,110 --> 00:02:33,120

two so far and so the um first one was

74

00:02:38,550 --> 00:02:37,120

on a previous antares flight um and uh

75

00:02:39,990 --> 00:02:38,560

that almost all of those satellites

76  
00:02:41,830 --> 00:02:40,000  
thing all the two of them have deorbited

77  
00:02:43,350 --> 00:02:41,840  
now and so the ones we have now are the

78  
00:02:44,229 --> 00:02:43,360  
replacements for those

79  
00:02:51,670 --> 00:02:44,239  
um

80  
00:02:54,309 --> 00:02:51,680  
wakata was kind enough to spend a lot of

81  
00:02:56,550 --> 00:02:54,319  
hours um assembling together the largest

82  
00:02:58,070 --> 00:02:56,560  
dispenser packs you see in these images

83  
00:02:59,350 --> 00:02:58,080  
um and then the satellites were taken

84  
00:03:01,670 --> 00:02:59,360  
out of the hatch

85  
00:03:02,869 --> 00:03:01,680  
and ejected into space over about a one

86  
00:03:05,030 --> 00:03:02,879  
month period

87  
00:03:06,869 --> 00:03:05,040  
um so you know one of the cool things

88  
00:03:07,589 --> 00:03:06,879

about launching from the space station

89

00:03:08,710 --> 00:03:07,599

is

90

00:03:09,830 --> 00:03:08,720

normally when you're on a rocket

91

00:03:11,350 --> 00:03:09,840

everything happens so quickly and

92

00:03:12,630 --> 00:03:11,360

there's no live video no one ever sees

93

00:03:14,229 --> 00:03:12,640

their satellites

94

00:03:15,910 --> 00:03:14,239

and so we're really privileged that

95

00:03:17,509 --> 00:03:15,920

we're able to get these really amazing

96

00:03:20,149 --> 00:03:17,519

high-res pictures of our satellites in

97

00:03:21,589 --> 00:03:20,159

space it's a rare and and um you know

98

00:03:23,030 --> 00:03:21,599

fascinating opportunity and the pictures

99

00:03:24,869 --> 00:03:23,040

look so good

100

00:03:26,149 --> 00:03:24,879

i remember seeing some of the video of

101

00:03:28,309 --> 00:03:26,159

those satellites launching and it was

102

00:03:30,149 --> 00:03:28,319

exciting to see so how does this new

103

00:03:32,229 --> 00:03:30,159

round um add to what you've already done

104

00:03:33,750 --> 00:03:32,239

what what does it bring to the project

105

00:03:38,149 --> 00:03:33,760

so one of the things we're trying to do

106

00:03:39,670 --> 00:03:38,159

at planet labs is um is sort of redo how

107

00:03:40,949 --> 00:03:39,680

um system engineering is done on

108

00:03:42,630 --> 00:03:40,959

spacecraft so if you think about it

109

00:03:44,949 --> 00:03:42,640

system engineering was more or less sort

110

00:03:47,589 --> 00:03:44,959

of codified as a discipline around the

111

00:03:49,350 --> 00:03:47,599

time of apollo and a lot of the rules

112

00:03:50,949 --> 00:03:49,360

that i used to use when i was at nasa

113

00:03:51,910 --> 00:03:50,959

and other places haven't been updated in

114

00:03:54,070 --> 00:03:51,920

a while

115

00:03:56,550 --> 00:03:54,080

so meanwhile this entire industry of

116

00:03:58,630 --> 00:03:56,560

software was born um that has completely

117

00:04:00,869 --> 00:03:58,640

different approaches to solving problems

118

00:04:02,149 --> 00:04:00,879

so we've tried to build satellites as if

119

00:04:05,190 --> 00:04:02,159

they were software

120

00:04:08,390 --> 00:04:05,200

and so what we have on um this next

121

00:04:10,550 --> 00:04:08,400

flock are bug fixes and feature updates

122

00:04:11,830 --> 00:04:10,560

and so we have things we've added and

123

00:04:14,149 --> 00:04:11,840

from the lessons we learned from the

124

00:04:15,990 --> 00:04:14,159

first block we're able to you know roll

125

00:04:18,550 --> 00:04:16,000

out about 200 small changes which we

126

00:04:20,069 --> 00:04:18,560

call bugs so bug fixes

127

00:04:22,150 --> 00:04:20,079

well how exactly did you get hooked up

128

00:04:24,469 --> 00:04:22,160

with the cygnus cargo craft is has that

129

00:04:25,909 --> 00:04:24,479

been a good partnership for you

130

00:04:28,150 --> 00:04:25,919

oh it's been amazing the folks at

131

00:04:29,350 --> 00:04:28,160

orbital have been very kind and

132

00:04:31,189 --> 00:04:29,360

one of the interesting things about

133

00:04:33,749 --> 00:04:31,199

running a hardware company like software

134

00:04:34,950 --> 00:04:33,759

is you um you want to release as late as

135

00:04:37,110 --> 00:04:34,960

possible because you still might have

136

00:04:39,909 --> 00:04:37,120

bugs and so the folks at orbital have

137

00:04:42,550 --> 00:04:39,919

been very receptive to late delivery as

138

00:04:44,310 --> 00:04:42,560

have our nasa partners but i think the

139

00:04:46,710 --> 00:04:44,320

the real key to this has been nanoracks

140

00:04:50,070 --> 00:04:46,720

who have provided the service for us to

141

00:04:51,189 --> 00:04:50,080

get access to space in this way and

142

00:04:54,230 --> 00:04:51,199

um

143

00:04:55,510 --> 00:04:54,240

you know the amount of sort of

144

00:04:57,270 --> 00:04:55,520

things that you have to take into

145

00:05:00,070 --> 00:04:57,280

consideration when you're launching on a

146

00:05:02,550 --> 00:05:00,080

manned to a manned space station is huge

147

00:05:04,629 --> 00:05:02,560

and nanoracks do a splendid job really

148

00:05:05,990 --> 00:05:04,639

helping us work through those processes

149

00:05:08,070 --> 00:05:06,000

and make sure that what we're delivering

150

00:05:09,749 --> 00:05:08,080

is safe for the astronauts to handle so

151  
00:05:11,990 --> 00:05:09,759  
we wouldn't be in space without in this

152  
00:05:14,070 --> 00:05:12,000  
way without anorex

153  
00:05:15,270 --> 00:05:14,080  
i'm glad you are in space uh what's

154  
00:05:16,950 --> 00:05:15,280  
what's the next step for you what

155  
00:05:19,510 --> 00:05:16,960  
happens after this

156  
00:05:21,189 --> 00:05:19,520  
so while we with the birth um the the

157  
00:05:22,790 --> 00:05:21,199  
the capsule signals capital birth of the

158  
00:05:24,390 --> 00:05:22,800  
station this morning or yesterday and

159  
00:05:26,390 --> 00:05:24,400  
the hatch is opened i guess as you just

160  
00:05:28,310 --> 00:05:26,400  
said um so

161  
00:05:30,310 --> 00:05:28,320  
we can't wait to see

162  
00:05:32,790 --> 00:05:30,320  
our satellites pulled out of cargo and

163  
00:05:35,590 --> 00:05:32,800

and um starting to be assembled and then

164

00:05:38,150 --> 00:05:35,600

like on the previous flock 1a um you

165

00:05:39,990 --> 00:05:38,160

know they'll go out in space and we'll

166

00:05:42,710 --> 00:05:40,000

probably have a small you know launch

167

00:05:44,230 --> 00:05:42,720

viewing party here and um i've never

168

00:05:46,230 --> 00:05:44,240

seen so many engineers scream when they

169

00:05:47,430 --> 00:05:46,240

see a satellite actually spit out of the

170

00:05:49,270 --> 00:05:47,440

space station

171

00:05:51,270 --> 00:05:49,280

and float off into space so

172

00:05:53,510 --> 00:05:51,280

um that i guess is going to take about

173

00:05:55,510 --> 00:05:53,520

two weeks and so that gives us a little

174

00:05:57,510 --> 00:05:55,520

more time to prepare for the first

175

00:05:59,430 --> 00:05:57,520

orbits around the earth um so we're

176

00:06:00,870 --> 00:05:59,440

setting up our ground stations now

177

00:06:02,710 --> 00:06:00,880

for contact with the satellites in about

178

00:06:04,230 --> 00:06:02,720

two weeks

179

00:06:05,909 --> 00:06:04,240

all right we'll be watching here as well

180

00:06:08,550 --> 00:06:05,919

we can't wait to see that that again was

181

00:06:11,110 --> 00:06:08,560

chris boshhausen uh the co-founder of

182

00:06:12,950 --> 00:06:11,120

planet labs which is uh sent up a

183

00:06:14,390 --> 00:06:12,960

new fleet of satellites that's going to

184

00:06:16,390 --> 00:06:14,400

be launched from the space station soon