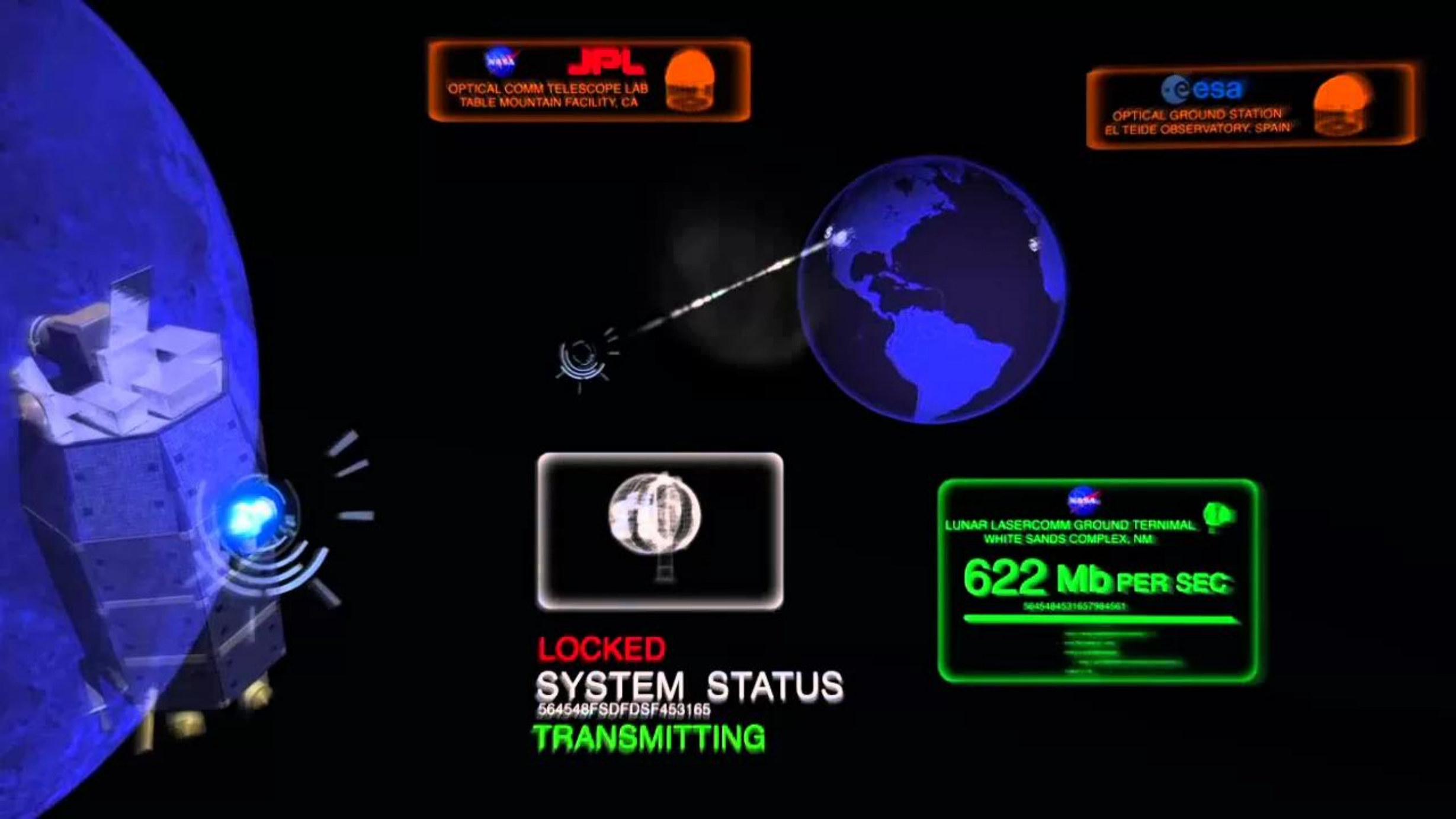
JPL
OPTICAL COMM TELESCOPE LAB
TABLE MOUNTAIN FACILITY, CA
esa
OPTICAL GROUND STATION
EL TEIDE OBSERVATORY, SPAIN
LUNAR LASERCOMM GROUND TERNIMAL
WHITE SANDS COMPLEX, NM
622 Mb PER SEC
LOCKED
SYSTEM STATUS
564548FSDFDSF453165
TRANSMITTING

1
00:00:06,090 --> 00:00:03,060
Projector Sound

2
00:00:06,110 --> 00:00:09,120
Beep

3
00:00:09,140 --> 00:00:12,130
On December 24, 1968, Apollo 8 captured

4
00:00:12,150 --> 00:00:15,190
the historic photo known as “Earthrise”.

5
00:00:15,210 --> 00:00:18,270
However, it would take several days for the rest of the world to

6
00:00:18,290 --> 00:00:21,440
see this awe-inspiring image.

7
00:00:21,460 --> 00:00:24,500
Today, NASA has the capability to send hundreds of

8
00:00:24,520 --> 00:00:27,640
“earthrise” like photos from the moon every second using lasers.

9
00:00:27,660 --> 00:00:30,690
The Lunar Atmosphere and Dust Environment

10
00:00:30,710 --> 00:00:33,820
Explorer, or LADEE, will

11
00:00:33,840 --> 00:00:36,870
investigate the Moon’s fragile atmosphere to enhance our knowledge of

12
00:00:36,890 --> 00:00:39,990
Earth’s nearest neighbor.

13
00:00:40,010 --> 00:00:43,030

LLCD, the Lunar Laser Communication Demonstration, will hitch

14
00:00:43,050 --> 00:00:46,070
a ride aboard LADEE to lunar orbit.

15
00:00:46,090 --> 00:00:49,240
Using a small and lightweight telescope, LLCD will

16
00:00:49,260 --> 00:00:52,320
transmit hundreds of millions of laser pulses each second to

17
00:00:52,340 --> 00:00:55,380
one of three stations on the Earth….. Each of which was chosen

18
00:00:55,400 --> 00:00:58,430
for it’s cloud-free skies.

19
00:00:58,450 --> 00:01:01,510
To begin data transmission, the space and ground terminals

20
00:01:01,530 --> 00:01:04,530
must first locate each other. This process begins

21
00:01:04,550 --> 00:01:07,590
when the ground terminal scans LADEE’s path to

22
00:01:07,610 --> 00:01:10,690
illuminate the spacecraft. LLCD senses the flash

23
00:01:10,710 --> 00:01:13,730
from the ground and points its beam back to the source.

24
00:01:13,750 --> 00:01:16,830
The ground terminal acquires the beam from

25
00:01:16,850 --> 00:01:19,870
space and establishes a communication link.

26
00:01:19,890 --> 00:01:22,970
With contact established and alignment locked,

27
00:01:22,990 --> 00:01:26,000
hundreds of millions of data bits begin to flow between the two

28
00:01:26,020 --> 00:01:29,080
terminals every second.

29
00:01:29,100 --> 00:01:32,100
Music

30
00:01:32,120 --> 00:01:35,150
Back on Earth, the ground terminal receives the laser pulses through an array

31
00:01:35,170 --> 00:01:38,270
of telescopes that focus the weak signals onto

32
00:01:38,290 --> 00:01:41,290
ultra-sensitive detectors. These detectors count the

33
00:01:41,310 --> 00:01:44,350
individual signal photons from the terminal at the Moon,

34
00:01:44,370 --> 00:01:47,370
and turn them into data bits at revolutionary download speeds.

35
00:01:47,390 --> 00:01:50,460
In the future NASA could download finer

36
00:01:50,480 --> 00:01:53,470
images, hundreds of 3-D HD video

37
00:01:53,490 --> 00:01:56,550
streams, and could even one day enable “telepresence”

38
00:01:56,570 --> 00:01:59,730

at the Moon and beyond for human explorers still on Earth.

39
00:01:59,750 --> 00:02:02,770
Together LLCD and LADEE

40
00:02:02,790 --> 00:02:05,930
will take the next step in expanding

41
00:02:05,950 --> 00:02:08,990
NASA’s space communication capabilities while renewing

42
00:02:09,010 --> 00:02:12,140
our sense of discovery about the Moon and the universe.

43
00:02:12,160 --> 00:02:15,190
Music

44
00:02:15,210 --> 00:02:18,320
Beep