ESOcast 23: A telescope's wire to the world	
00:00 [Narrator] Astronomers are observing the sky at ESO's Paranal Observatory in the Chilean Atacama Desert. In the course of the night, the telescopes on the mountain will collect around 125 gigabytes of data — enough to fill more than 25 DVDs. Until now, sending this huge amount of data back to ESO Headquarters in Garching, Germany, every day was a massive technical challenge. But a new, fast link promises to make these difficulties a thing of the past.	
ESOcast intro This is the ESOcast! Cutting-edge science and life behind the scenes of ESO, the European Southern Observatory. Exploring the Universe's ultimate frontier with our host Dr J, a.k.a. Dr Joe Liske.	
00:54 [Dr J] Hello and welcome to another episode of the ESOcast. Today we will visit the barren landscape of the Chilean Atacama desert. Here, an international consortium that includes ESO has recently finished installing a new high-speed data cable. This is part of a project to improve the communications link between Paranal and ESO headquarters in Germany.	

01:19 [Narrator] The project is called Enabling Virtual Access to Latin American Southern Observatories, or EVALSO for short. It is part-funded by the European Commission's FP7 programme.	
1:33 [Narrator] 4. ESO Headquarters in Garching a few weeks before EVALSO's completion. This site is five time zones and eleven and a half thousand kilometres away from Paranal. The night might be over for the astronomers in Chile, but work is in full swing here, with powerful servers downloading and archiving the new observations from the VLT. Because of limited bandwidth in the microwave connection between Paranal and the internet data backbone, it isn't always possible to get observations through straight away. Most of the time, VLT data arrives within a few minutes, but sometimes it takes hours. Delays of this magnitude aren't really a problem — but the operation of the recently commissioned VISTA, the Visible and Infrared Survey Telescope for Astronomy, poses much bigger challenges as it produces about four times as much data as the VLT every night.	
2:32 [Dr J] In the past, the connection between the observatory and the outside work consisted of a microwave link, which was somewhat limited. Even after an upgrade this spring, it was only able to transfer data at about the same rate of your broadband internet connection at home. Now remember, this had to serve a whole astronomical facility with several world-class telescopes as well as the normal internet and email traffic of the more than 100 staff that work there. So this meant that bandwidth had to be rationed. In particular, the data from VISTA could not be sent through this link. Since the output from VISTA far exceeded the capabilities of the microwave link, the observations from this telescope had to be saved on hard disks first, and then physically shipped back to Europe. A simple, but somewhat impractical solution for a state-of-the-art observatory.	

03:25 [Narrator] At the heart of EVALSO is 100 km of newly laid data cable, connecting the Chilean city of Antofagasta and two observatories: Paranal and Cerro Armazones. Armazones and its nearby peak currently host the observatory of the Ruhr-University of Bochum, and if all goes to plan, the European Extremely Large Telescope – E-ELT – will be built on this mountaintop in the coming decade. In practical use, EVALSO is more than a hundred times quicker than the old microwave link, and it can be upgraded to be faster still. With EVALSO, a whole DVD movie can be sent from Paranal to ESO Headquarters in a matter of seconds. On the microwave link that would have taken more than an hour! And this means that EVALSO doesn't just make ESO's work faster and easier. It opens up the possibility of new ways of working for the staff and users of the observatories.	
04:31 [Dr J] And it all comes down to this. At the core of this cable is a bundle of plastic optical fibres. Each of them is only about twice as thick as a human hair, and the whole thing is surrounded by padding and a tough skin. Digital information is encoded as a series of extremely short flashes of light. These are shone down the fibre, and decoded at the other end. It's the same tried and tested technology that underpins international phone and internet connections, and it allows tremendous amounts of data to be transferred very rapidly. So although it's just an ordinary cable, it has the potential to trigger big changes at Paranal.	

05:09 [Narrator] EVALSO will mean smoother and quicker operations for the VLT and a change of pace for the VISTA telescope. Staff in Europe will now be able to work remotely with their colleagues in Chile, without having to make the long journey to Paranal, because videoconferencing will be easier and smoother. In the case of sudden events like gamma-ray bursts, which can only be observed for a few hours, this means that experts far away could be able to participate fully in the action almost as if they were there. This is crucial since there isn't enough time to travel to the observatory before the gamma-ray burst fades away.	
05:50 [Dr J] For VISTA, the changes will be more fundamental. Soon, the data from this telescope will be sent back to Europe immediately for analysis. So instead of a long wait of up to ten days while the hard disks are shipped to Germany, staff at ESO Headquarters will have virtually instant access. With the work complete and the testing over, EVALSO is now coming into service. As a result, this remote mountaintop in Chile doesn't fell quite as remote any more. This is Dr J signing off for the ESOcast. Join me again next time for another cosmic adventure.	
06:26 [Outro]	ESOcast is produced by ESO, the European Southern Observatory. *ESO, the European Southern Observatory, is the pre-eminent intergovernmental science and technology organisation in astronomy designing, constructing and operating the world's most advanced ground-based telescopes.*

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