



GENSO

Past, Present, and Future

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A world map is visible in the background, showing the continents of North America, South America, Europe, and Africa. The map is dark and somewhat faded, serving as a background for the text.

Outline

- GENSO Overview
- R1 – Past
- R1E – Present
- R2 and Beyond – Future
- Summary

A satellite-style world map is visible in the background, showing continents and oceans. The map is centered on the Atlantic Ocean, with North and South America on the left and Europe and Africa on the right. The title 'General GENSO Overview' is overlaid on the top left of the map in a large, white, sans-serif font.

General GENSO Overview

- Started by ESA in 2007
- Project coded in Java
- A network of multiple ground stations connected over the internet
- The GENSO system consists of three modules
 - Authentication Server (AUS)
 - Ground Station Server (GSS)
 - Mission Control Client (MCC)

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GSS – Ground Station Server

- Groundstation connected to GENSO Network via internet – 1 GSS per ground station
- Requires computer running GSS software to be connected to ground station hardware
- Tracks satellites via “Bookings”
 - Bookings encompass all network spacecraft
 - Can prioritize a single satellite above all others
- Tracked satellites yield pass reports which are automatically forwarded



MCC – Mission Control Client

- Computer connected to GENSO Network
 - 1 MCC per spacecraft
- Only requires internet – no hardware needed
 - Can download satellite data from any location
- TLEs and other spacecraft data set by the person who registered it
 - Allows for automatic updates on all ground stations
- Able to directly connect to a GSS for uplink
 - Not automatic (must be approved by both parties)

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AUS – Authentication Server

- “Central” node which:
 - Validates user interactions
 - Facilitates communication between GSSs and MCCs
 - Secures the network
- The current AUS node is located in Vigo, Spain

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R1 – Release 1 ~ Overview

- Initial stable release of software
- Released to a select few for beta testing in July 2010
- Simple GUI with core functionality



R1 – Release 1 ~ Successes

- Automatic capture and forwarding of data via passive downlink
- Active uplink via GENSO network groundstation
- Increased amount of data

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R1 – Release 1 ~ Data

- 8 month lifespan of R1 Network:
 - Total Tracking Hours: 2,687
 - Total Data Bytes Captured: 3,773,353
 - 49 satellites registered
- Typical month at Cal Poly:
 - Tracking Hours GENSO: 152 hours
 - Tracking Hours non-GENSO: 39 hours
 - About 26% utilization

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A world map showing the Americas, Europe, and Africa, with a dark blue background. The map is slightly faded and serves as a background for the text.

R1E – Release 1 for ELaNa

- First mission-focused test case
- Deployed February 2011
- Network created specifically for ELaNa I with GSSs running the R1 software
- Only spacecraft are Explorer-1 [Prime], KySat-1, Hermes, ISS, AO-51
- Allow real-time distribution and use of TLEs in early mission stages

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R1E – Release 1 for ELaNa

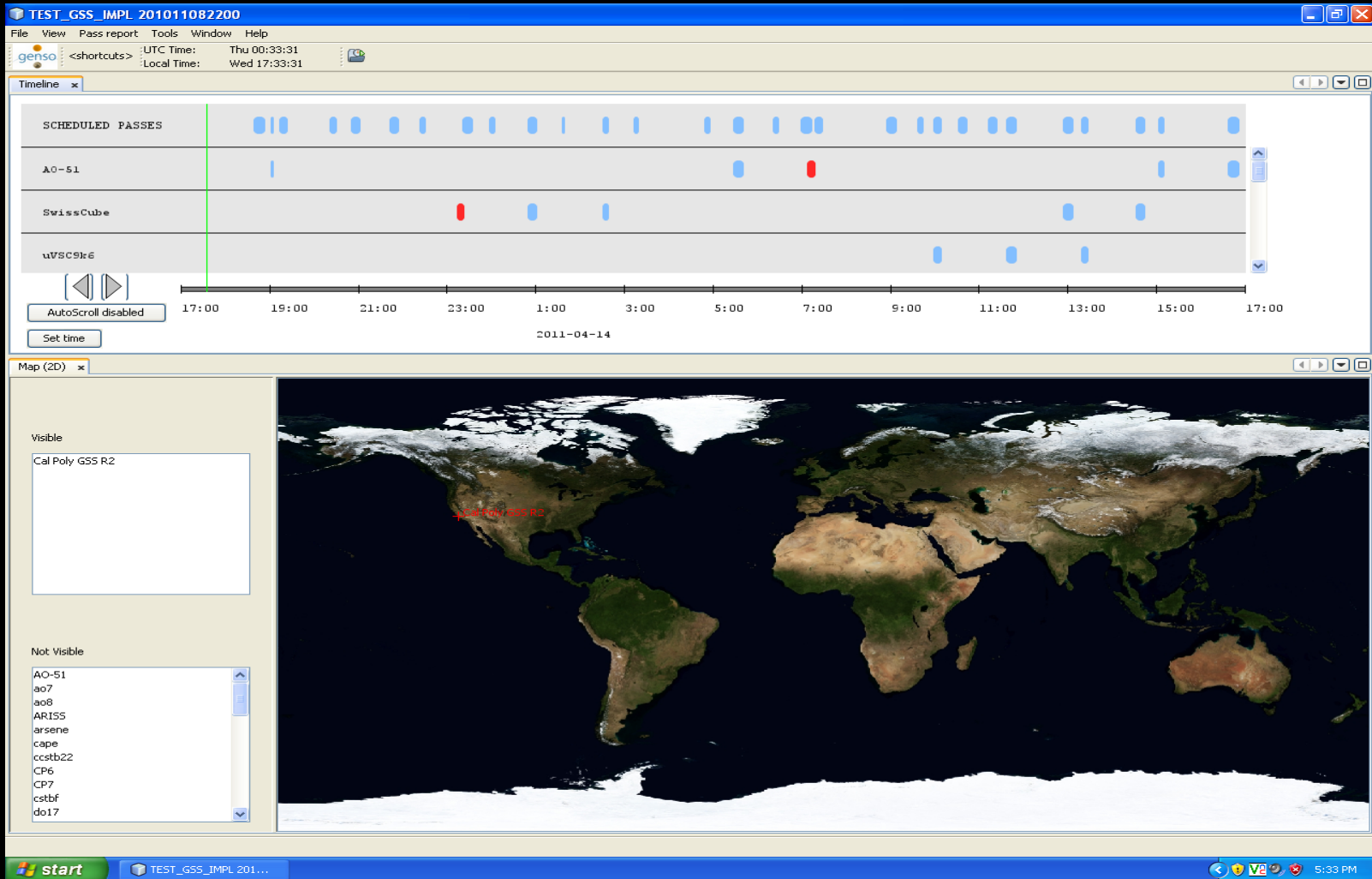
- Software testing and GENSO network expansion
- Less congested network containing only dedicated, active stations
- Used to support UT Austin's FASTRAC mission
- Gather more potential developers

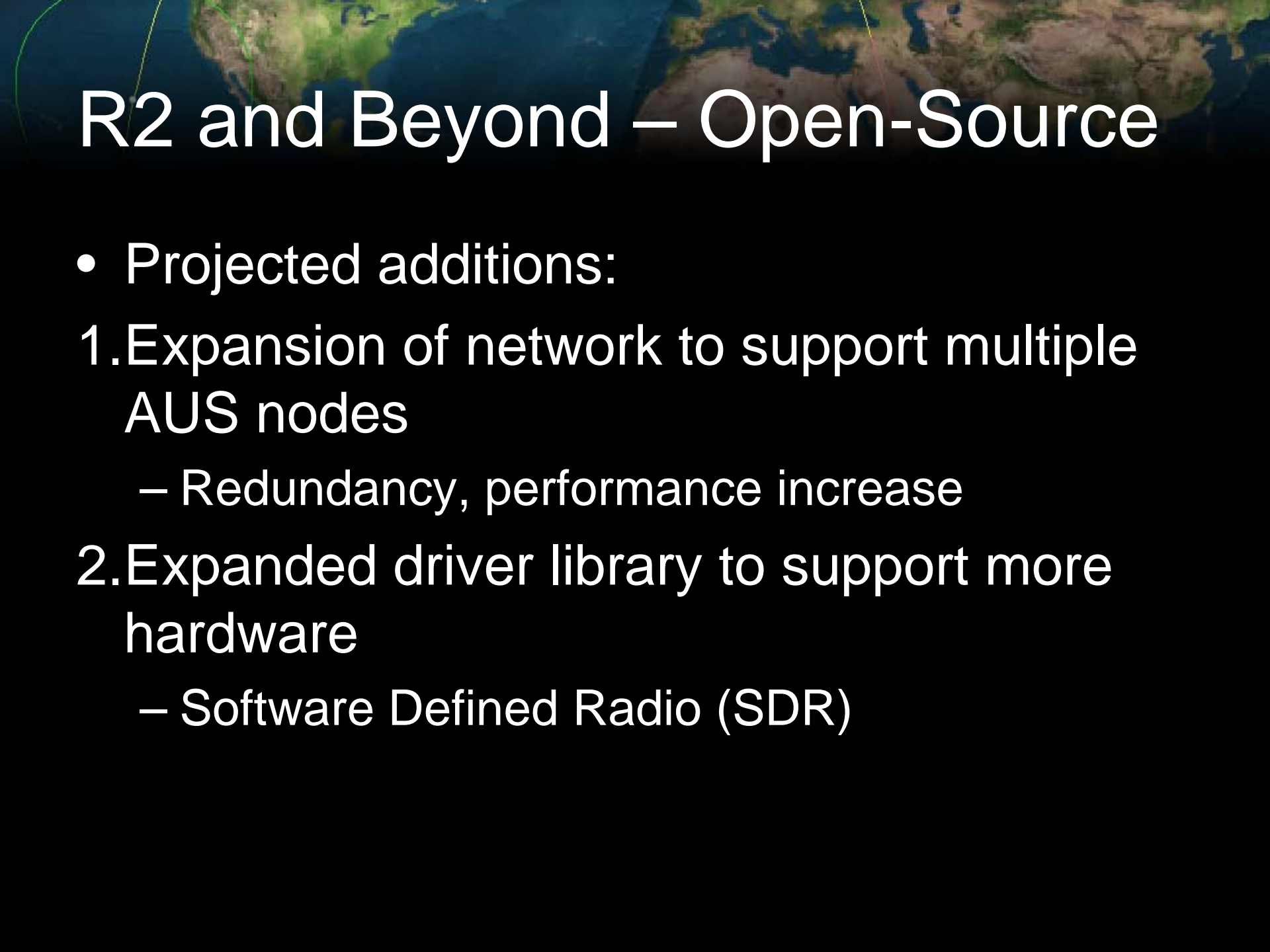
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R2 and Beyond – Release 2





R2 and Beyond – Open-Source

- Projected additions:
 1. Expansion of network to support multiple AUS nodes
 - Redundancy, performance increase
 2. Expanded driver library to support more hardware
 - Software Defined Radio (SDR)



GENSO – Long term

- GENSO validated by ELaNa missions
 - Widespread use
 - Network expands to worldwide coverage
 - “24/7” communication time
- Data collected increases immensely
- Support for every launch
 - Automatic data collection (“set and forget”)
 - Automatic early mission verification (beacons)
 - Only active communication and spacecraft priorities must be coordinated

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Summary

- R1 – Stable testing release
 - Successful proof of concept test
- R1E – Mission-support test release
 - Successfully supporting FASTRAC
- R2 – Currently being verified
- Beyond – Open-source release
 - Follows R2 completion

The Network – Main Nodes

- University of Vigo
- Cal Poly
- COSMIAC
- University of Texas at Austin
- International Space University (ISU)

Universidade de Vigo

CAL POLY



THE UNIVERSITY OF
TEXAS
AT AUSTIN

INTERNATIONAL
SPACE UNIVERSITY
ISU INTERNATIONAL
SPACE
UNIVERSITY



GENSO – Getting Involved

- Contact us:
 - rclange@calpoly.edu (Connor Lange)
 - craig.kief@cosmiac.org (Craig Kief)
- GENSO Info on the Web:
 - <http://www.genso.org/index.php/>
- GENSO Info-Session
 - Free Educational Presentations now available for GENSO via Skype or Oovoo



Questions?