



GENSO

Global Education Network of Satellite Operators

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CubeSat Developers Workshop

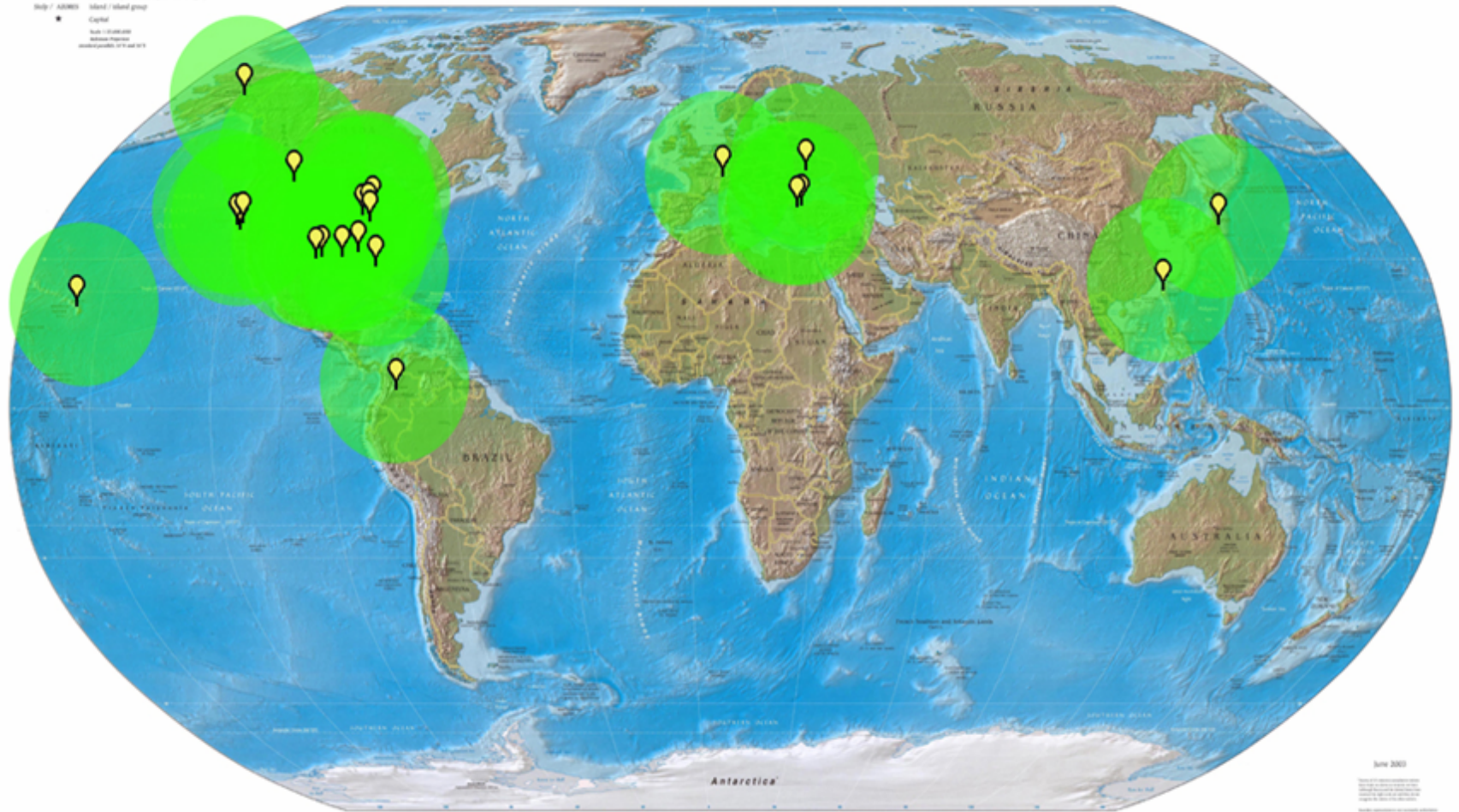
California Polytechnic State University, California

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The Ground Station Network

Physical Map of the World, June 2003

AUSTRALIA Independent state
Bermuda Dependency or area of special arrangement
Island / island group
July 7 / 1982
Capital
Scale 1:100,000,000
Antarctica
Antarctica 1959



June 2003
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GENSO Background

- Global Educational Network for Satellite Operators
- Originally started with the Japanese to combat interference (GROWS)
- Started under the International Space Education Board, a collaboration between CSA, ESA, JAXA, and NASA
- Project to link low-cost earth stations



GENSO Background

- A system to link ground stations using the Internet
- Only 1200/9600 baud data for now
- Three parts:
 - Central server
 - Authentication and registration
 - Ground Station Servers
 - Actual interface between rotors/radio and Internet
 - Mission Control Client
 - Scheduling of Ground Station Servers
 - 1 MCC per satellite

Central Server

- 3 central servers located around the world
 - Europe (Installed)
 - Cal Poly (Installed)
 - Japan
- Tasked with Authentication and Registration only
 - Registration of IP addresses of GSS and MCC
 - Statistics
- All other functions (scheduling, data transfer) will go peer-to-peer between Mission Control Clients and Ground Station Servers
 - This keeps the load off a single server when system scales

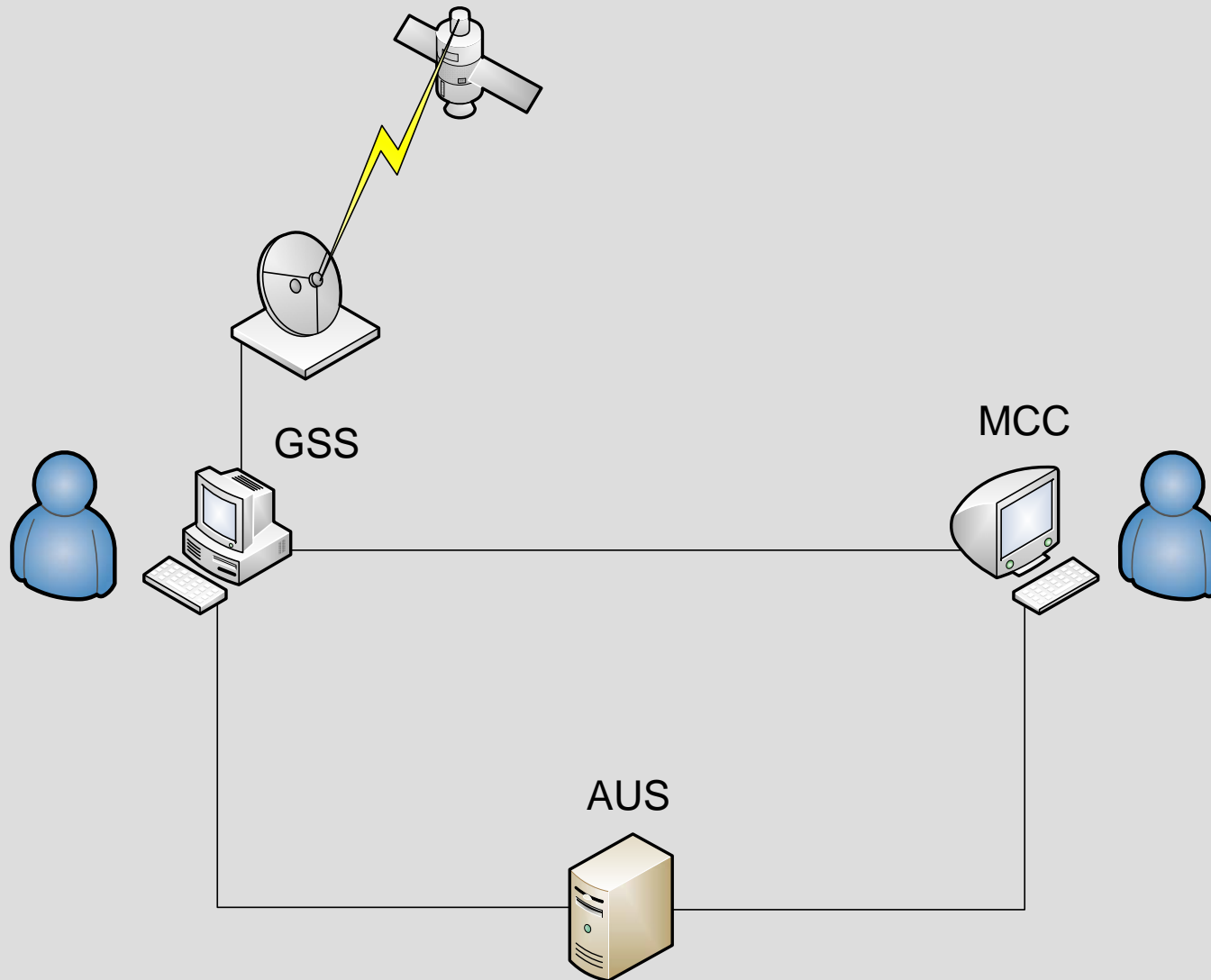
Ground Station Server

- Compatible with a majority of ground stations currently operating (Cross-Platform)
- “Passive” tracking:
 - Will continuously track all satellites it can decode
 - Will supply data to MCC
- “Active” tracking:
 - Someone at a MCC is actively controlling the rotors and radio, looking at the decoded data, and listening to the audio
 - Must be scheduled prior to satellite pass and cleared with GSS
 - Requires offline interaction and parties that know each other
- Store data locally and stream to MCC as bandwidth allows
- IRC and/or Skype client?

Mission Control Client

- A program that runs on a personal computer that can control Ground Station Servers
- Uses the Central Servers to get IP addresses for individual GSS, then contacts the GSS's directly to:
 - Schedule an active session
 - Download decoded data
 - Control the radios and rotors to track a satellite during an active session
 - IRC Client ?
 - Skype Client?

Overall Picture



“Reference” Earth Station

- Icom IC-910 radio with computer interface
- M² OR2800P-DC for Azimuth and MT-1000 for elevation
- Symek TNC 31S
 - Possibly software in future
- Antennas:
 - 2MCP22 for 145 MHz
 - 436CP42UG for 437 MHz
 - 1 meter dish for S-band (downlink only)

Where Are We Now?

- GSS installed in the US, Europe, and Japan
- Two central servers installed
- Alpha testing scheduled to be completed at the end of summer
- Beta testing to start in 2009

Getting Involved

- www.genso.org
- Apply for the mailing list
 - <http://atl.calpoly.edu/mailman/listinfo/genso-us>

Questions

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