

# Data Flow, Networks, and Protocols

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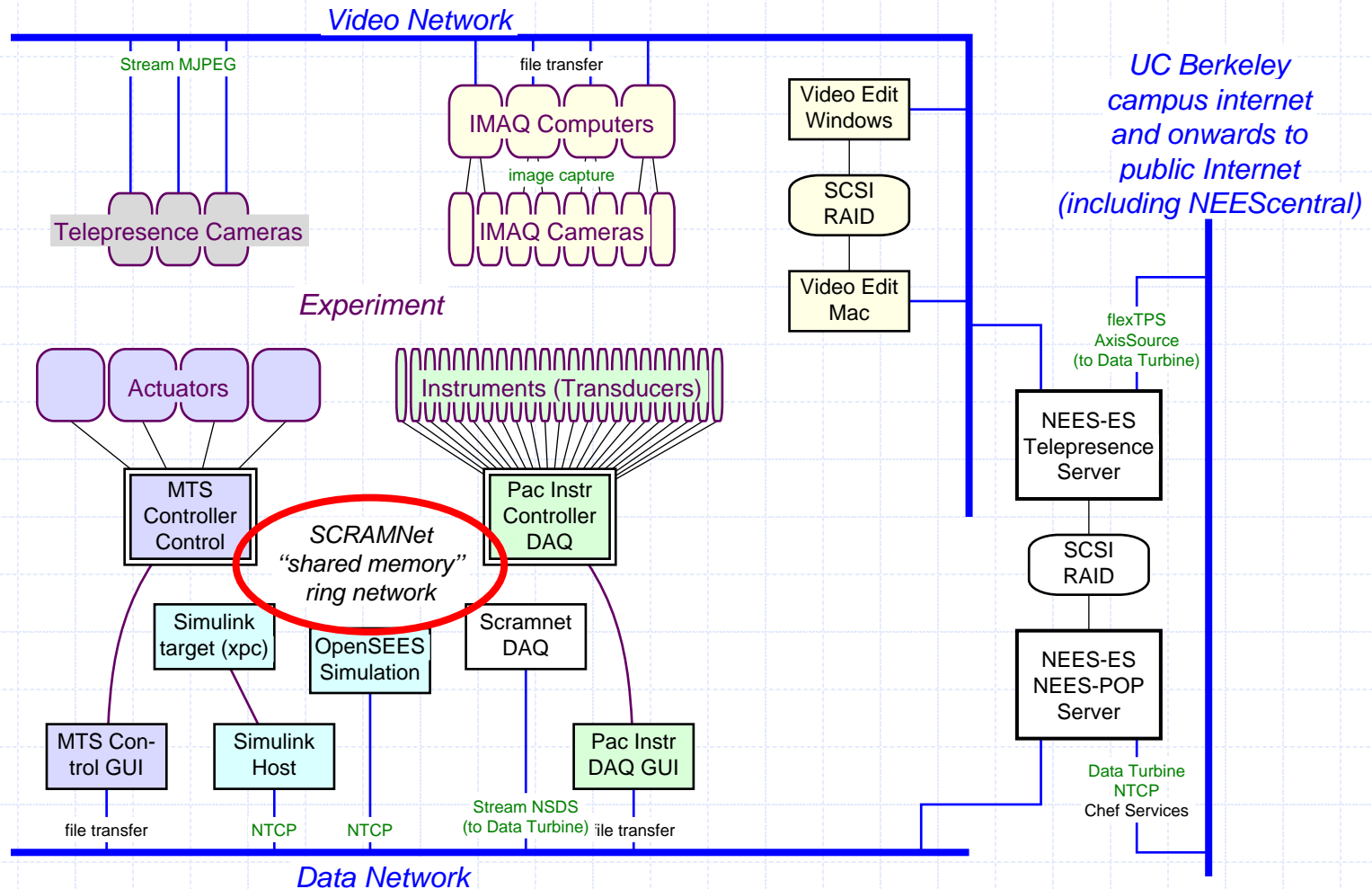
The George E. Brown, Jr. Network for Earthquake Engineering Simulation



# Three Uses for Data

- ◆ Feedback for hybrid simulation models and processes (high sample rate and low latency).
- ◆ Streaming to observers and researchers (low sample rate, some latency)
- ◆ Capture for post-experiment analysis and archive (high sample rate and high latency).

# Network Diagram



# SCRAMNet

- ◆ Ring network providing “shared memory” among connected devices.
- ◆ MTS Controller for use with simulation.
- ◆ Pacific Instruments Controller for use with simulation and streaming DAQ data.
- ◆ Simulink “xpc” Target for use with simulation.
- ◆ OpenSEES for use with simulation.
- ◆ “Scramnet DAQ” for use with streaming data via NEES-POP Data Turbine, and viewed via the Real-Time Data Viewer (RDV).

# Image Acquisition System (IMAQ)

- ◆ IMAQ consists of cameras that capture to the local disk of connected computers and software on workstations for synchronizing and editing streams.
- ◆ National Instruments DIADEM software (Windows) for synchronizing data streams.
- ◆ Various Mac software for video editing.
- ◆ Currently, our cameras connect to local computers via firewire.

# Data Turbine

- ◆ Stream live data via the NEES-POP to researchers and observers.
- ◆ Stream DAQ (transducer instrumentation) data from the Pacific Instruments system via “scramnet\_daq” software (local software based on Paul Hubbard’s FakeDAQ software).
- ◆ Stream Telepresence System (TPS) cameras via AxisSource software (provided from NEESit).
- ◆ Streams from all sources are fairly closely synchronized.

# Thank you!

Development and operation of the nees@berkeley equipment site is sponsored by NSF.

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