

# National Infrastructure for Collaboration in CESNET Network

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*Internet2 Fall Member Meeting 2011*  
Raleigh, NC, 2011-10-05



# National Collaborative Infrastructure

- H.323/SIP infrastructure
  - MCUs, content servers
  - HW/SW end-points
  - uplink to GDS
- Webconferencing
  - Adobe Connect
  - open-source alternative (e.g., BigBlueButton)
- Interfacing to PSTN (and Skype?)
  - audio only, inbound calls from PSTN only
- Optional integration of high-end tools
  - e.g., UltraGrid and CoUniverse



# National Collaborative Infrastructure

- Multiple resource providers:
  - backbone (server) infrastructure – NREN operator (CESNET) + a few large NREN participants
  - endpoints – all NREN participants
- Providers need to retain their share of autonomy
  - they need to prioritize requests of their stakeholders
  - the remaining capacity may be used for peak request mitigation of other providers peak requests...
  - ... but only in a way that doesn't threaten own (priority) requests
  - rule-based automation for limited capacity sharing
  - manual approval/denial of request exceeding limits covered by the rules



# National Collaborative Infrastructure

- Design principles:
  - user-empowered approach
  - co-allocation of resources
  - support of heterogeneous resources (multiple vendors and multiple standards)
  - autonomy of management per institution
  - sharing of resources for peak utilization
  - maximization of utilization of “home” resources
  - integration with AAI
  - integration with directories (H.350)
  - standardization



# Pilot Use Cases

- Normal allocation of a virtual room
  - if capacity of requestor's "home infrastructure" is exceeded  $\implies$  buildup of cascading with specific instructions for each client
- Co-allocation of resources
  - H.323/SIP for multipoint audio/video
  - webconferencing for multipoint data sharing
  - recording service



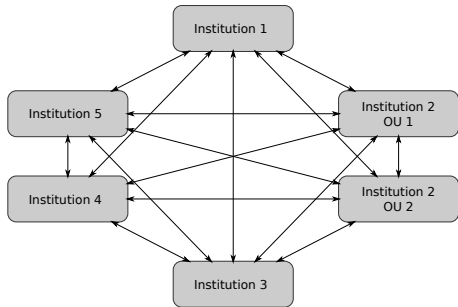
# Pilot Use Cases

- Allocation of large event with peak capacity
  - manual approval/denial at respective resource providers if capacity request is beyond automated rule-based authorization
  - minimization of number of resources
    - ◆ MCU cascading brings concurrent license wasting
  - buildup of cascading with specific instructions for each client



# Architecture

- Equality and (almost-)autonomy of resource providers
  - negotiating independent agents
  - one agent per institution or organization unit (whatever has its own rules)
  - centralized user interface to allow for single point of contact, possibly mirrored across multiple locations

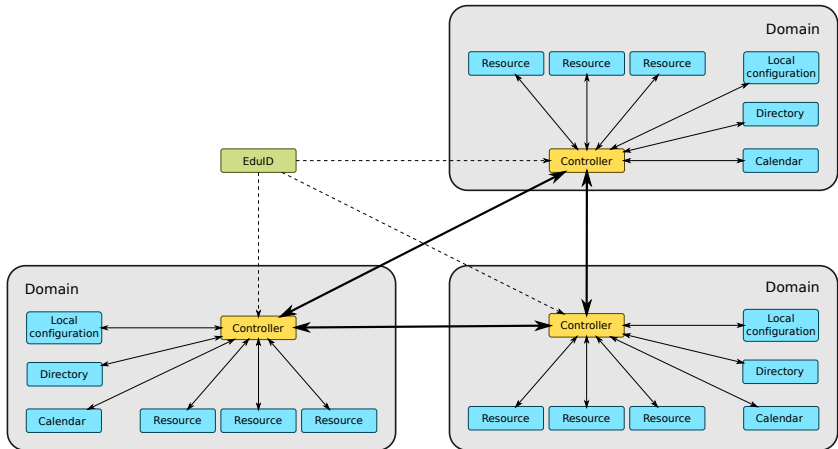


# Architecture

- Definition of APIs (object model) for infrastructure elements
  - abstraction that would allow easy development of device connectors
- Interconnection to federated AAI (Shibboleth)
  - utilization of existing AAI sources
  - development of a rule-based authorization language to describe automated acceptance/denial of requests



# Architecture



# Pilot Infrastructure Elements

- Minimum set (mandatory for us) includes:
  - MCUs
    - ◆ Codian 4510
    - ◆ Codian 4515
  - recording servers
    - ◆ TANDBERG TCS
  - webconferencing servers
    - ◆ Adobe Connect
- International collaboration would help us to broaden the supported portfolio

# International Collaboration

- We have the resources to do the development, but larger collaboration will enable:
  - adoption by a larger community, because it will suit broader needs
    - ◆ participation in design phase
  - more supported systems
    - ◆ participation in development phase
- Who's willing to contribute/participate?
  - development
  - testing
  - early adoption



# UltraGrid Updates

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# Current State – Toward Production-Grade Software :)

- Stabilization of all features spread across various experimental versions
  - HD/2K video support (4:2:2, 4:4:4)
  - tiled 4K video support (with Linsys Quad/i and DeckLink Quad)
  - SAGE tiled screen support
  - full audio support (PortAudio, Jack, embedded in HD-SDI)
  - support for mono-audio (e.g., echo-canceling mics)
  - pure GL rendering for Mac (no SDL dependencies anymore!)
  - full-duplex operation (both sender & receiver)
  - fixed packetization for arbitrary packet length
  - fixed many bugs (e.g., threading issues with RTP, potential deadlocks with audio), completely revised and documented code



# Current State – Toward Production-Grade Software :)

- Supported platforms:
  - Linux
    - ◆ tested distributions: Ubuntu, Fedora, Debian, OpenSUSE
  - MacOS X 10.5, 10.6
- Supported HW:
  - BlackMagic Intensity (Linux & Mac)
  - BlackMagic DeckLink HD (Linux & Mac)
  - BlackMagic DeckLink Quad (Linux & Mac)
  - BlackMagic MultiBridge (Linux & Mac)
  - AJA Kona & Kona 3G (Mac)
  - DVS Centaurus & Centaurus II (Linux)
  - Linsys Quad/i (Linux)
  - ClearOne Chat 150 (echocancelling mic)



# Current State – Toward Production-Grade Software :)

- Successfully demo'ed with NIH/NLM (Craig Locatis & Kai Zhang) in last week of September
- Planned release: early October
  - source distribution
  - updated documentation
  - packages for major distributions with all the dependencies
  - protocols from reference measurements

# Until End of 2011

- Features to be expected
  - new RTP packet format that allows for high-packet rate and arbitrary payload (CESNET TR 24/2010)
  - 4K without tiles (capture depends on availability of DeckLink 4K, display can be done using Kona 3G even now)
  - multi-receiver (aka iHDTV tiled mode, but more flexible)
  - DXT1/DXT5 compression on GPU (decompression is already there for free)
  - native audio (ALSA on Linux, CoreAudio on MacOS X)
  - JPEG compression/decompression on GPU (?)
  - JPEG2000 compression on GPU, HW decompression (?)
  - joint release with CoUniverse (?)
- Planned release: December 2011





# Thank you for your attention!

This effort is supported by LM2010005 project.

