

## Motivation/Background

- Proliferation of wireless devices (laptops, handhelds)
- Mobile: greater flexibility
- EVL VVP Proxy: individual video feeds to a Pocket PC
- Existing “mini” AG node work
- **Vision: tightly integrate handhelds with AG nodes, “leashed” to a proxy/filter**



Platform in use



iPAQ with Camera



Linux OS



Vic Screen-Capture:  
Send and Receive Video



RAT Screen-Capture:  
Send and Receive Audio



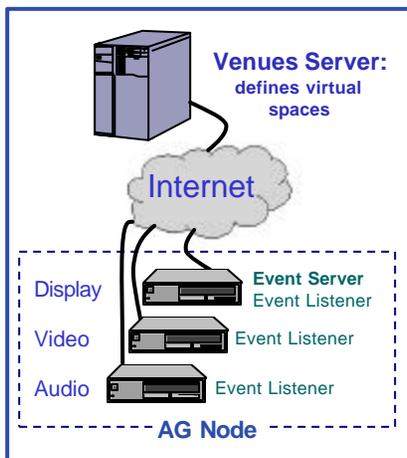
Vic and RAT  
Running Simultaneously

## Development Platform

- iPAQ with dual sleeve adaptor
- Linux OS
- Camera, color screen, microphone, speaker
- 802.11b wireless
- Vic: send/receive video (same as AG node)
- RAT: send/receive audio (same as AG node)

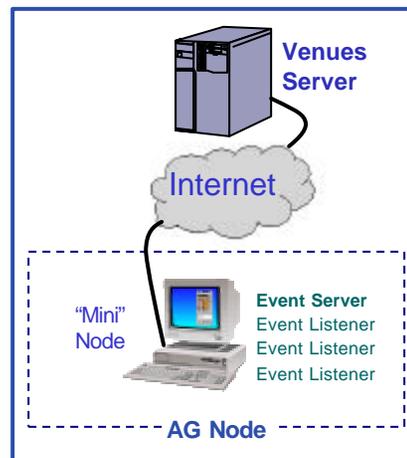
## Standard AG node

- Baseline capabilities
- Distributed: multiple machines
- Event server: directs node through virtual spaces
- Event listeners: directed by associated event server



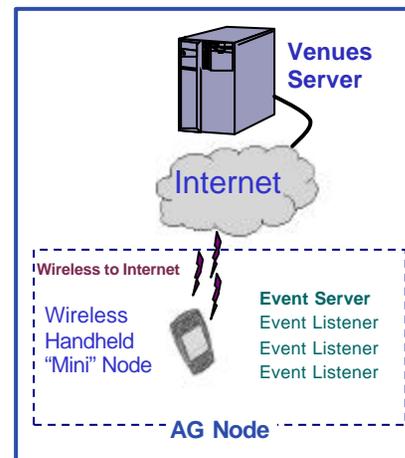
## “Mini” AG node

- Reduced computing power
- Reduced capabilities: fewer cameras, less display area, etc.
- Event server and event listener functionality in one machine



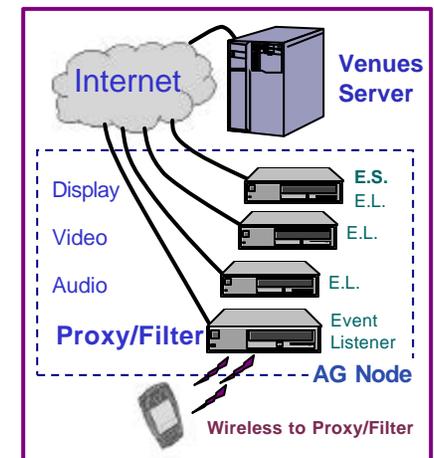
## Handheld as “Mini”

- Wireless
- Limited computing power
- Limited bandwidth available
- Feasible?



## Handheld “Leashed”

- Proxy is an event listener
- Handheld registers with proxy
- Handheld “leashed” to proxy, follows it through virtual space
- Receives subset of media available to the node



- Handhelds Demonstrated at the Retreat
  - Key: enable SOME valuable interaction between AG nodes and handhelds using multicast Vic and RAT (complete audio/video interaction not necessary, although desired)
  - Main platform: Wireless, full-duplex audio, receive streaming video
  - Camera platform: Wireless, full-duplex streaming video, not yet compatible with RAT
  
- Poster Explanation
  - Want the benefits of handhelds brought to AG node environments (e.g., extend the physical space)
  - Limited handheld resources: “mini-node” concept not practical with handhelds
  - “Leash” a handheld to a proxy/filter which is part of an AG node; handheld then “towed” through virtual space by the proxy/filter
  - Implementation
    - Wireless, multimedia-enabled handheld
    - Filter mechanism (see the EVL VVP Proxy) to provide a subset of audio/video streams available to an AG node
    - Tightly integrate this with AG nodes/Virtual Venues (e.g., make the filter an event listener)
  - Can then leverage the benefits of handhelds, without overwhelming handheld resources

## Images from the 2002 Retreat



Left: Main platform in use; full-duplex audio and receiving video



Below: Camera platform shows 2-way streaming video



Above: Main platform and a laptop interact wirelessly with streaming audio/video

- Integration with AG nodes
  - Develop mechanism to effectively filter multicast content for the Linux platform
  - Integrate this filter device as an AG node component; possibly run an event-listener on the filter machine
- Platform
  - Integrate camera functionality into the “main” platform
  - Investigate other equipment: alternate handheld platforms, newer iPAQs, Casio camera
  - Conduct performance analysis
- Web pages
  - <http://internet2.motlabs.com/ipaq/index.htm>  
(Platform: includes pics and video clips)
  - [http://internet2.motlabs.com/cve\\_handhelds/index.htm](http://internet2.motlabs.com/cve_handhelds/index.htm)  
(Work: info on the overall effort)
  - <http://internet2.motlabs.com/user/collab/index.htm>  
(Use: future collaborative workgroups study)
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Using the handheld platform within the Motorola Labs AG node



iPAQ Screen capture showing RAT and Vic



Finally got the camera working a few days before the Retreat!



A future implementation?