

Announcements

- Class participation is very important. You will be graded on your involvement in class discussions. There are no “dumb” questions. You will only be penalized for “no” questions/comments
- Late home works will not be accepted. I encourage you to start working on your home work project, right away.



Outline for today

Ubiquitous Computing Vision

- *The Computer for the Twenty-First Century*, Mark Weiser, Scientific American, pp. 94-10, September 1991
- *The Coming Age Of Calm Technology*, Mark Weiser and John Seely Brown, Xerox PARC, October 5, 1996



Introduction to Mark Weiser

- Mark Weiser was a chief technologist at Xerox PARC – Palo Alto Research Center
- He conceived the idea of Ubiquitous Computing in 1988
- For comparison
 - Gopher - 1991
 - Windows 3.1 – 1992
 - Netscape 1.0 – 1994
- He and his team built a lot of ubiquitous devices and experimented with these technologies, from '88-'9x.



Xerox PARC

- One of the best systems research labs, ever
- PARC researchers invented:
 - Personal computers - Alto
 - Mouse
 - Windows - Star
 - Bitmapped terminals
 - Icons
 - Ethernet
 - Smalltalk
 - Bravo – first WYSIWYG program
 - Laser printer
 - ...



The Computer for the Twenty-First Century

- Paper was written in 1991
 - Gopher - 1991
 - Windows 3.1 - 1992
 - Netscape 1.0 – 1994
- Seminal work in the area of Ubiquitous Computing –
It is nice to look back after 10 years and see where the world is compared to where Mark said it would be



Virtual Reality vs Embodied Reality

- Virtual Reality –
 - Attempts to make a world inside the computer
 - Users wear special goggles, gloves, body suites etc
 - E.g. Games, flight trainers etc
- Embodied Reality –
 - Invisible computing
 - E.g. computers in light switches, thermostats, stereos, ovens etc..
 - Location and scale are important in ubiquitous computing
- Their approach
 - Make aspects of everyday life active
 - Network it
 - Build it



Active badges

- Developed by Olivetti Research
- Worn by users to locate them



Parc tab

- Unistroke for data entry
- Electronic postit
- Many tabs per user



Parc pad

- Foot wide device (like a note pad)
- Computation happens in the infra-structure (servers)
- Results are displayed in the device
- User interaction happens in the device



Live board

- Distance collaboration
- Location aware –
 - Knows who is “close”



Topics

- Security
- Privacy
 - From overzealous marketing firms
- Electronic tags
 - everywhere



The coming age of Calm technology

- Published in 1996
- Notions of
 - Mainframe – many people share a computer
 - Personal computer – one computer per person
 -internet, distributed computing....
 - Ubiquitous computing – many computers share us



The periphery

- A calm technology will move easily from the periphery of our attention to the center and back
- Examples
 - Inner Office Window
 - Internet Multicast
 - Dangling String

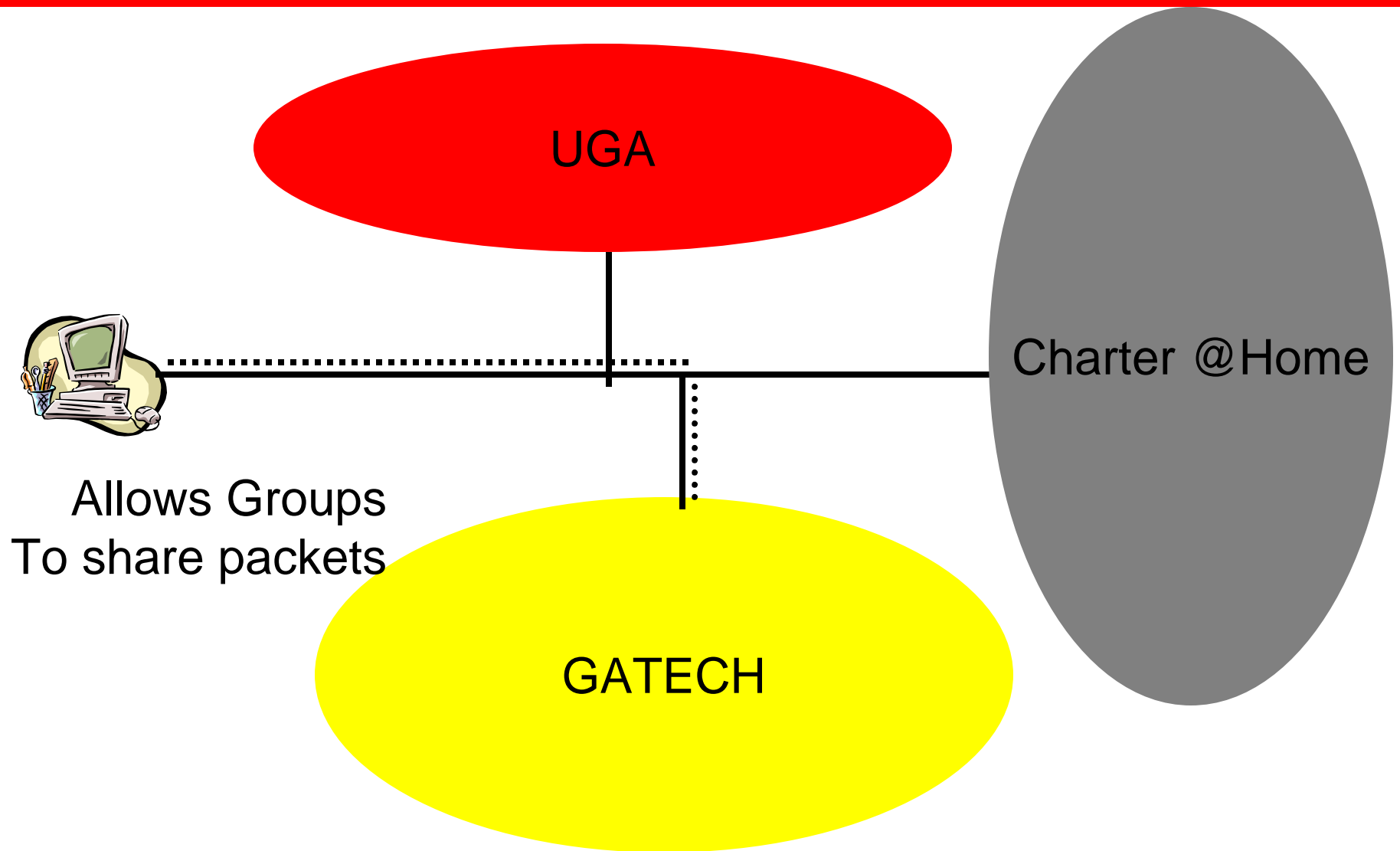


Inner Office Window

- Notion of connectedness
- Boundary well defined



Internet Multicast



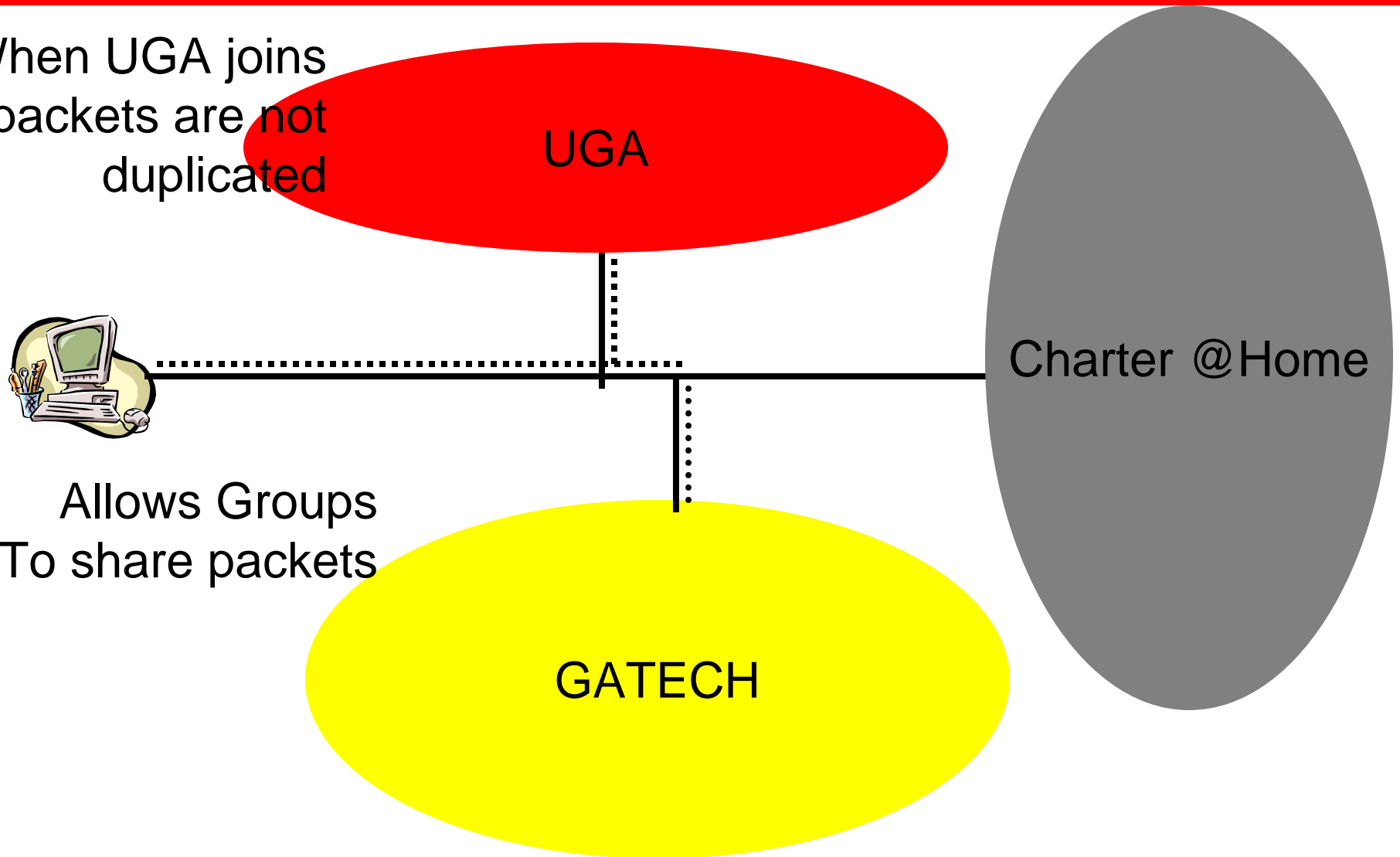
Jan 11, 2001

CSCI {4,6}900: Ubiquitous Computing

15

Internet Multicast

When UGA joins
packets are not
duplicated



Dangling String

- Small motor connected to ethernet
- Whenever a packet goes by, it twitches
- With a busy network it whirls along



“Future”

- 10 million pixels (80 dpi over several feet)
 - Still too expensive
- Embedded processors
 - 1 billion operations / sec low power
 - Reality: Hitachi SH4 – 200MHz low power
- Matchbox size removable hard drives at 60 MB
 - Reality: 1 GB microdrive



“Future”

- 1000x800 high contrast display



“Future”

- Remove fixed configuration of devices
 - Universal plug and play, Jini etc..
- High speed wireless networks everywhere
 - 3G wireless networks upto 384 kb (deployment slow)
- Close range wireless networks
 - Bluetooth, HomeRF
- Wireless LAN
 - 802.11b (11 Mbit – right here in the class)



Missed technologies

- World Wide Web
- Is WWW ubiquitous?

