

World Without Wires

IEE Seminar

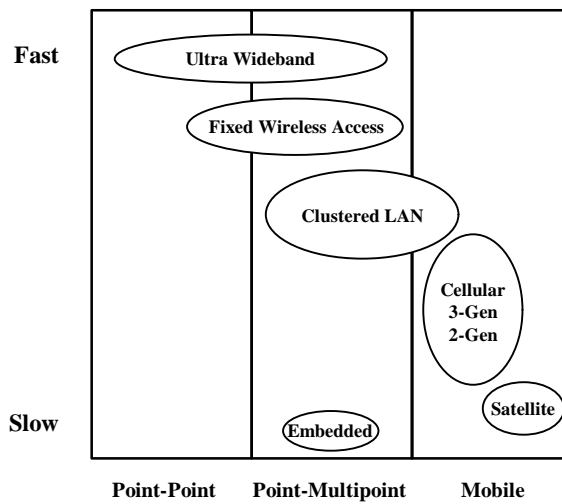
5 Dec 2002

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Wireless Communications Systems



Laboratory for Communications Engineering
University of Cambridge

VectaStar 3.5GHz FWA



- FDD/TDMA
- High order modulation (up to 64 QAM)
- 60 Mbps full duplex per sector (14 MHz pair of channels)
- High efficiency MAC (> 80%)
 - ATM packet based frame structure
 - ARQ rather than FEC for low overhead
 - highly efficient statistical multiplexing
 - very low delay
- Sophisticated priority scheduling, combining best of ATM & IP QoS
- Dynamic support for very low to very high bandwidths within a single sector
- Non Line of Sight support via innovative equalisation



VectaStar 3500

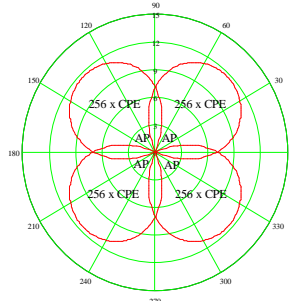


Customer Premises Equipment

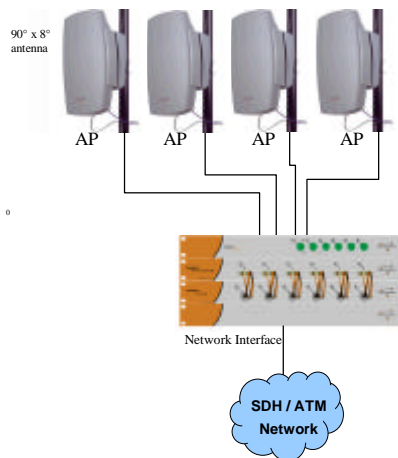


23" x 23" antenna

3 options for user interfaces
 100 BaseT
 100 BaseT & E1
 100 BaseT & 2x POTS



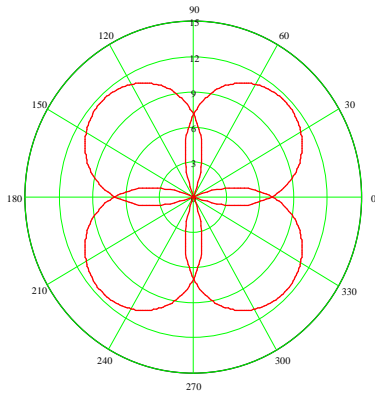
Standard 4 Sector Base Station



Deployment Configurations



AP beam patterns



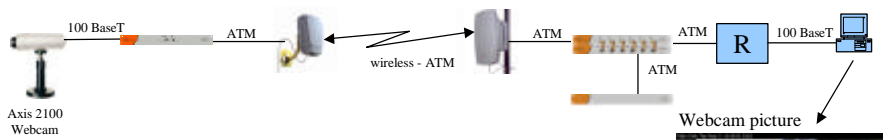
Point to Point backhaul links

Single sector

4 sector Base Station

Multi base station deployment

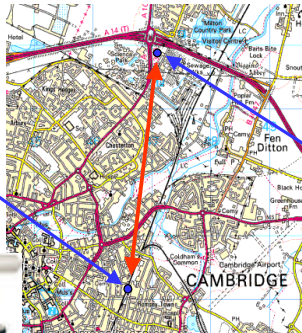
Remote Monitoring / Surveillance



VectaStar CPE with Webcam



4 km non-LOS radio link



VectaStar Base Station



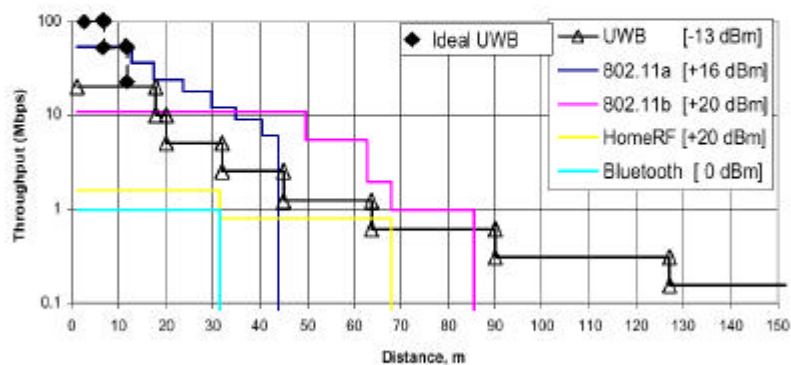
Ultra Wideband Systems



- Potentially high bandwidth (range 3 meters?)
- Digital camera to laptop link
- Can be used for precise location (range 50 meters?)
- Zones of security for high liability areas

Low Power UWB Comparable to High Power Wireless Systems

Throughput vs. Median Distance



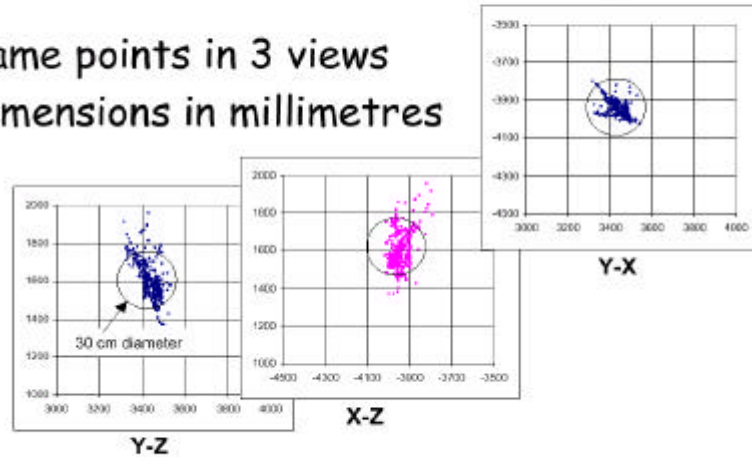
06-07 November 2001

TIME DOMAIN
THE POWER OF THE FUTURE

KS-12

Measure Scatter Plots of X, Y and Z Positioning

- ▶ Same points in 3 views
- ▶ Dimensions in millimetres



06-07 November 2001

TIME DOMAIN
THE PULSE OF THE FUTURE

KS:27

Embedded Radio Devices



light sensor



thermometer



light switch



display

- Short range (5 meters)
- Low bandwidth beacon
- Can be used for location
- Agility at very low power difficult

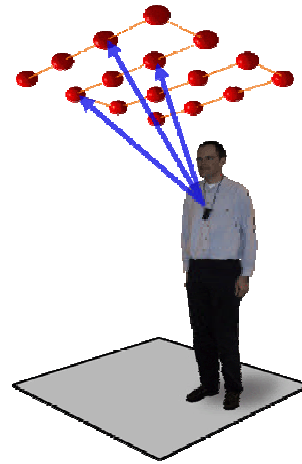


CyberSpice



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Locating Physical Objects



- Active Tag (Bat)
- 3cm, 3-D, accuracy 95% of the time
- LCE fully instrumented!

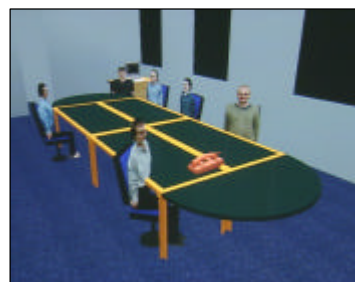


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Sentient Computing



Real
World



World
Model

- Use location sensors to make applications aware of the real world



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