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Boeing Look at a Higher Speed 802.11 PHY

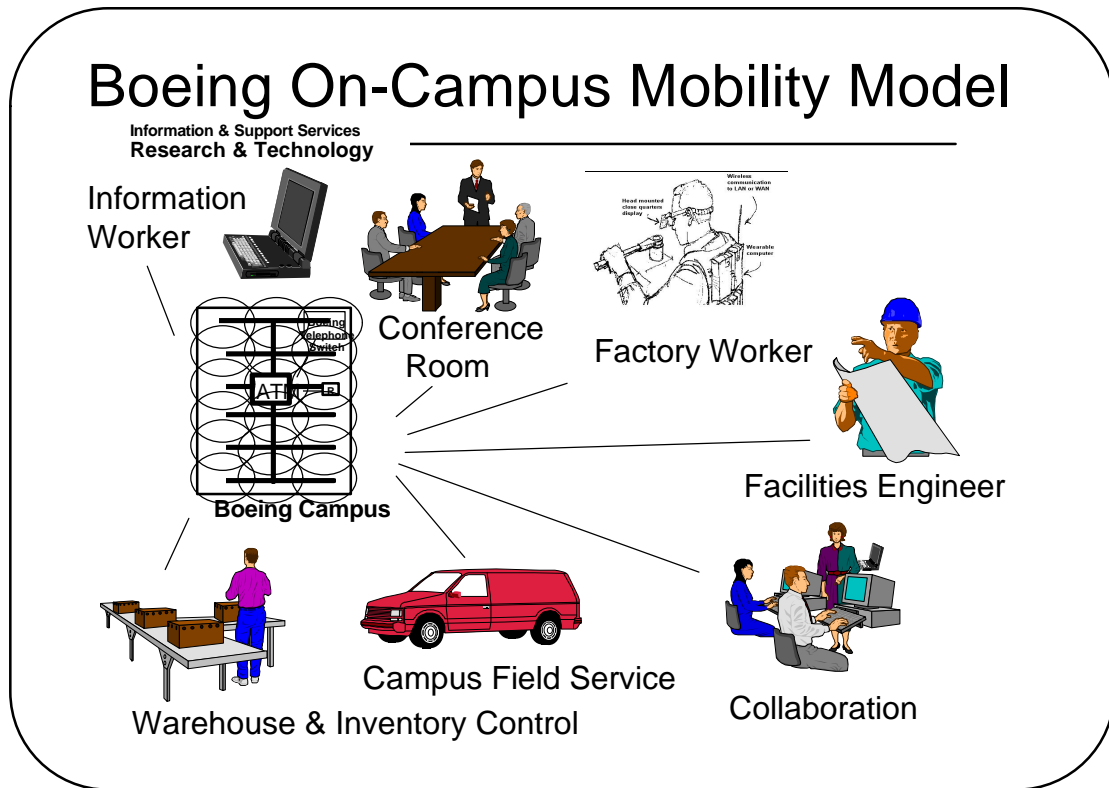
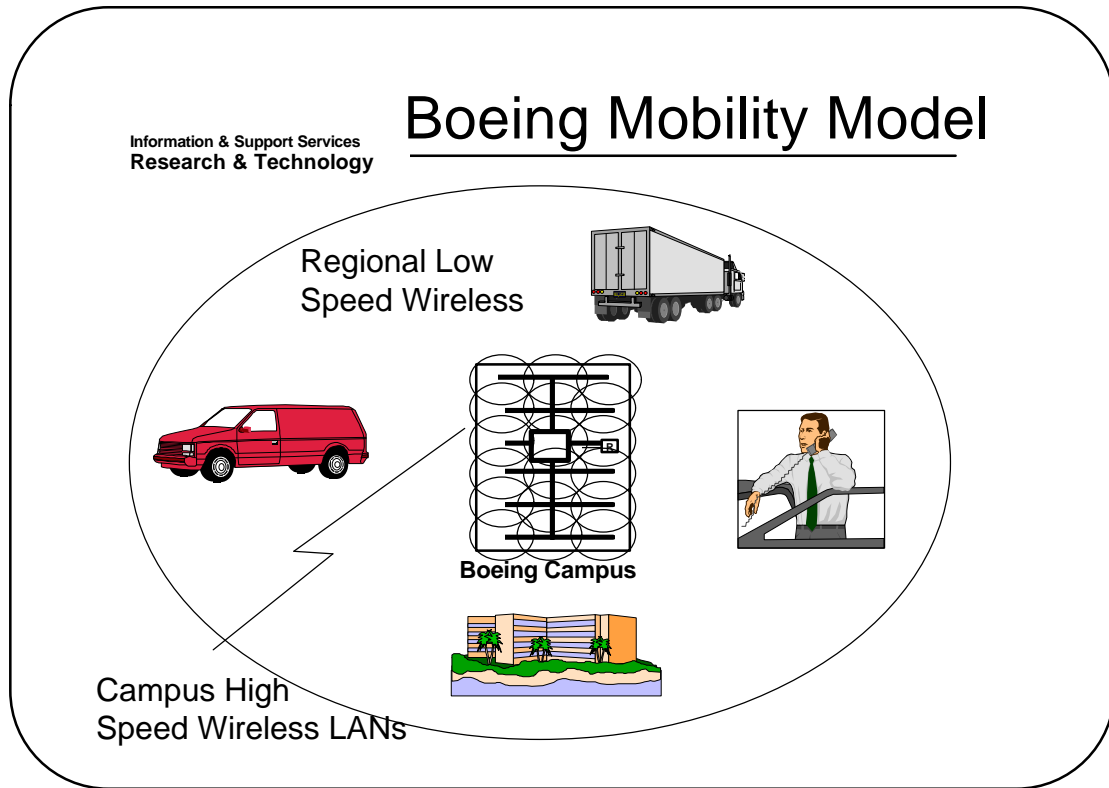


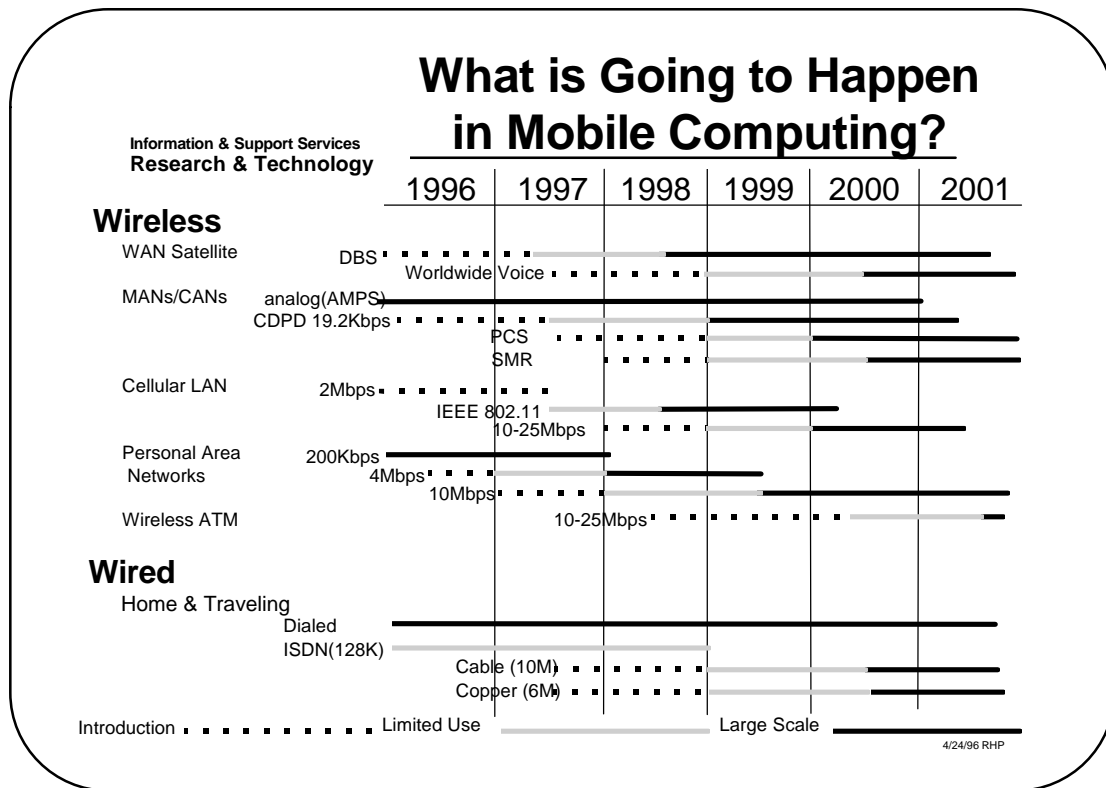
Delivered to the IEEE 802.11
Committee at Vancouver, BC, Nov 96

Agenda

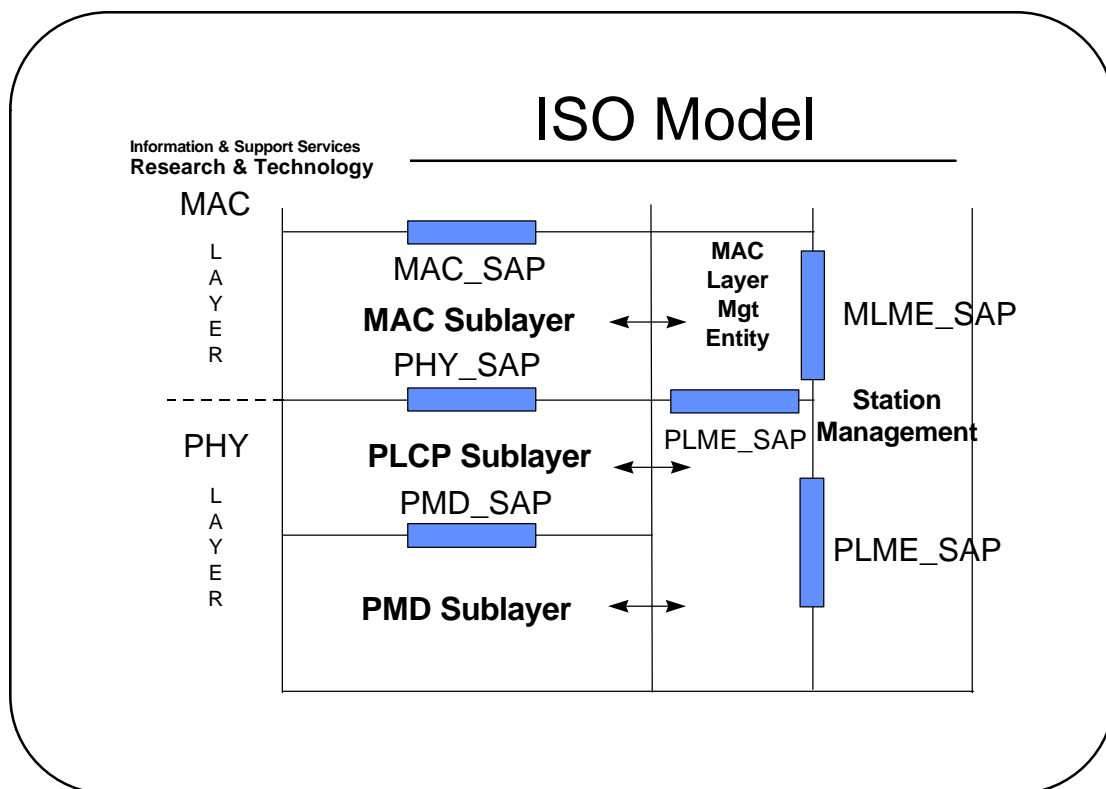
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- Boeing Wireless Models
- Evolution of Mobile Computing Comm
- ISO Model
- Limitations of 802.11 at Higher Speeds
- Examination of the MAC Capabilities
- Other Limitations
- Proposal





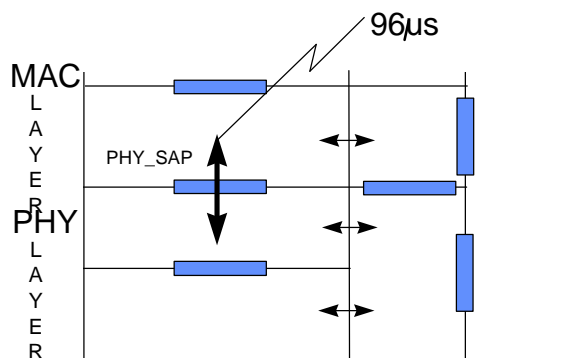
- ### Other Standards Activities
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- Wireless LAN Interoperability Forum (WLI)
 - Wireless ATM



Limits on 802.11 at Higher Speeds

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- Limit in the 96microsec preamble plus 32microsec header plus packet transmit state timing for the PHY_SAP
- At 25Mbps, 102791 bytes could conceivably be passed through the PHY_SAP. The largest size packet allowed through the present SAP is 4095 bytes.



25Mbps
 96X10-6s preamble+
 32X10-6s header+
 max 32760X10-6sX
 25X106bps = 822328b
 102791 octets

10Mbps
 96X10-6s preamble+
 32X10-6s header+
 max 32760X10-6sX
 10X106bps = 328880b
 41110 octets

Limits on 2.4GHz at 10Mbps

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1. 80Mhz-wide band
79 hops at 2Mbps (1MHz/channel), 16 hops at 10Mbps (5MHz/channel)
2. Channel Diversity
Decreasing number of channels increases interference
3. FCC Power Flux Density
Can't cross the FCC power flux density requirements
4. Preamble Clock discovery
Above 2Mbps there could be clock jitter problems

Limits on NII/Supernet at 25Mbps

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1. 350Mhz-wide band (5150-5350MHz and 5.725-5875MHz)
70 hops at 25Mbps (5MHz channels)
2. Channel Diversity
Still greater chance of interference at 70 vs 79 hops @ 1Mbps and 2Mbps
3. FCC Power Flux Density
From the NII/Supernet
4. Preamble Clock discovery
Much higher clocking speed

Results of the Future Work Meeting 11/11/96

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Agenda:

- Overview of user needs
- Overview of other standards activities
- Discussion
- Modulation methods
- Frequency allocations
- How the new PAR meets the 5 criteria for PAR processing
- Set requirements for the higher speed

Overview of User Needs

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Boeing Presentation

- Lots of questions about Boeing requirements for wireless high bandwidth
- Questions about the vendor position for customers such as Boeing-how many customers are there like Boeing. Shouldn't they be targeting consumer or small company customers rather than the Boeings.
- Lots of questions about the Boeing intent on three dimensional CAD. The answer was that three dimensional CAD will be everywhere, including in the warehouses and factories.

ITT GLOMO Discussion

- ITT attended the session with interest in delivery of information to military people using high bandwidth wireless LAN technology.

Other Standards Activities

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Vic Hayes gave a report on ETSI and Hiperlan

Hiperlan 1,2,3,&4

Hiperlan 1 is 5.1GHz

Hiperlan 2 is 17GHz

Hiperlan 3 is 60GHz

ece.wpi.edu for Hiperlan information

Vic mentioned that ETSI did not go to the ITU and so the ITU is upset with ETSI and is refusing to do business with them since they have not worked with the ITU.

Requirements for Higher Speed

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Requirements/Objectives

- Interoperability - preferred but not required (with 802.11 specification)
- frequency band - should we consider higher speeds in the 2.4GHZ band
- Start with about 150MHZ band near the NII and Hiperlan bands
- Data rate - 25Mbps, consider fallback
- Sensitivity (Range) - study will be conducted on spectral efficiency vs sensitivity vs range vs immunity etc.
- Transmit power - regulatory
- Overlapping networks capability
- Power consumption
- Multipath immunity - methods more immune to multipath, ie work will be conducted on channel models and immunity to multipath
- Interference immunity - (modulation, protocol)
- Economics (complex/efficient vs low cost) - complex/efficient vs low cost
- Power consumption - mechanisms for power conservation (sleep modes)

Frequency Allocations

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Conclusion: not important to specify the band but a range, such as 150MHZ near NII frequencies

PAR Requirements

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There are five criteria for a PAR:

Broad market potential

Compatibility

Distinct Identity

Technical Feasibility

Economic Feasibility

Proposal

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- Create a new 10Mbps based on the NII/Supernet proposal

AND

- Create a new 24 or 25Mbps based on the NII/Supernet proposal