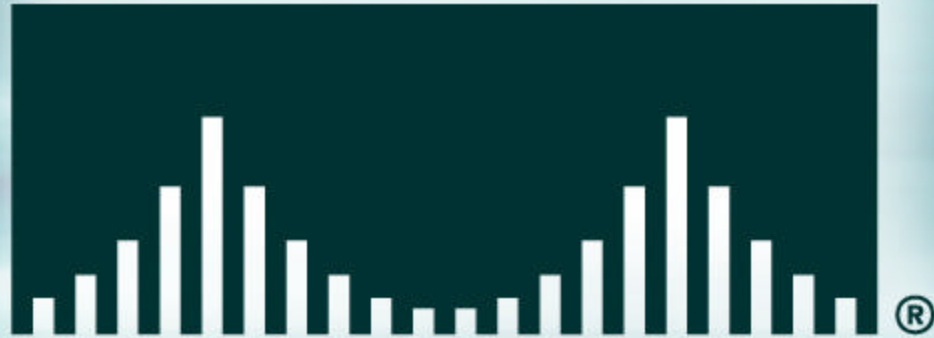


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CSIRO-Macquarie Technology Trends 2003 Seminar Series

The Future of Wireless LANs

David Skellern

Technology Director, Cisco Systems Wireless Networking Business Unit

Professor of Electronics, Macquarie University

10 February 2003

Agenda

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1

Where do WLANs fit in the scheme of wireless things?

2

What is 802.11?

3

What is/will be standardised by 802.11?

4

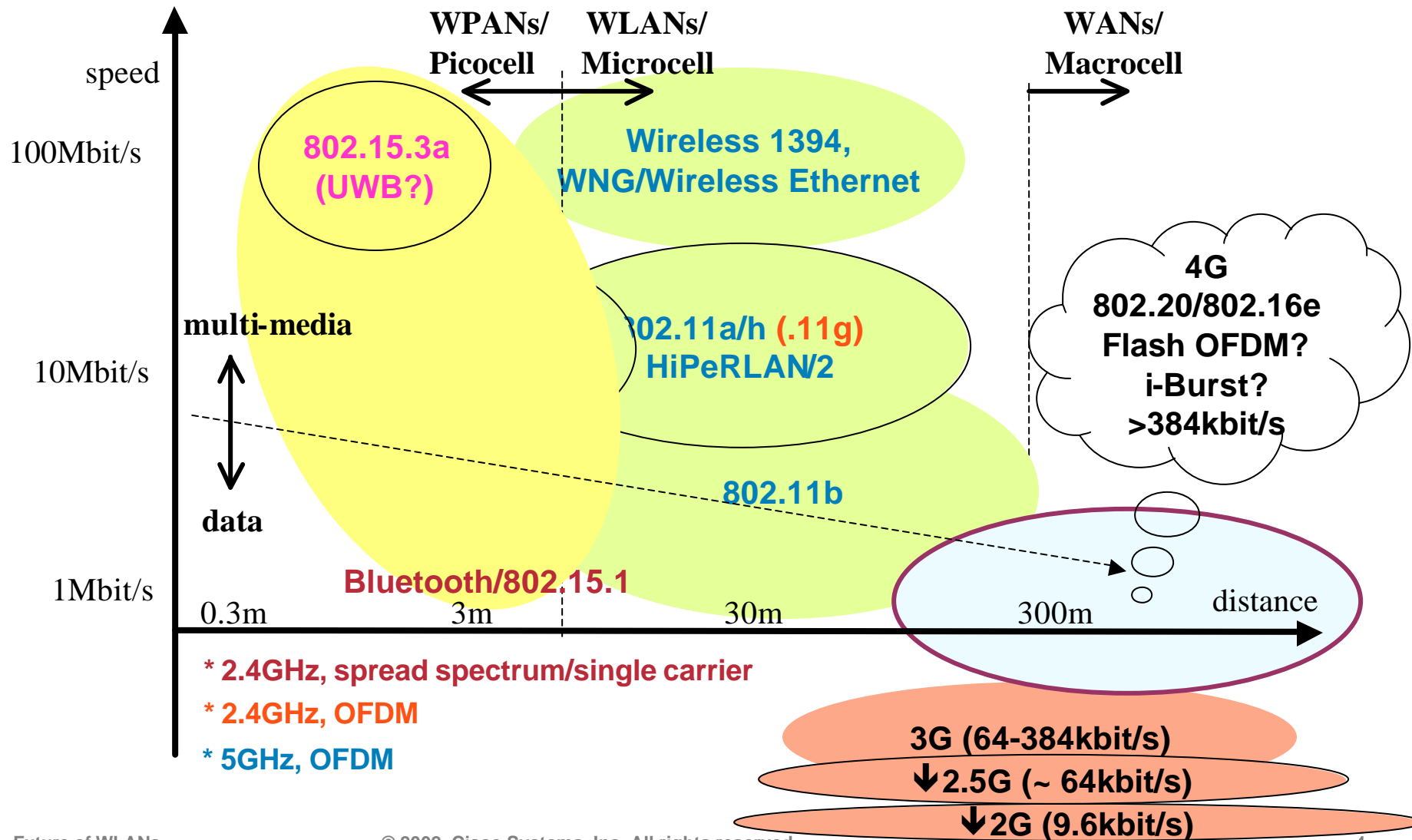
What about spectrum?

5

Why is 802.11 important?

WLANs are a type of nomadic wireless access system - a useful map is speed vs distance

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WLANs meet many market needs

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Three wireless internet application domains:

- enterprise/commercial
- home
- public (local mobility) areas

can be addressed substantially by one wireless system

→ IEEE802.11 WLANs ←

the extent of applicability in public areas may be effected by newer nomadic wireless access systems

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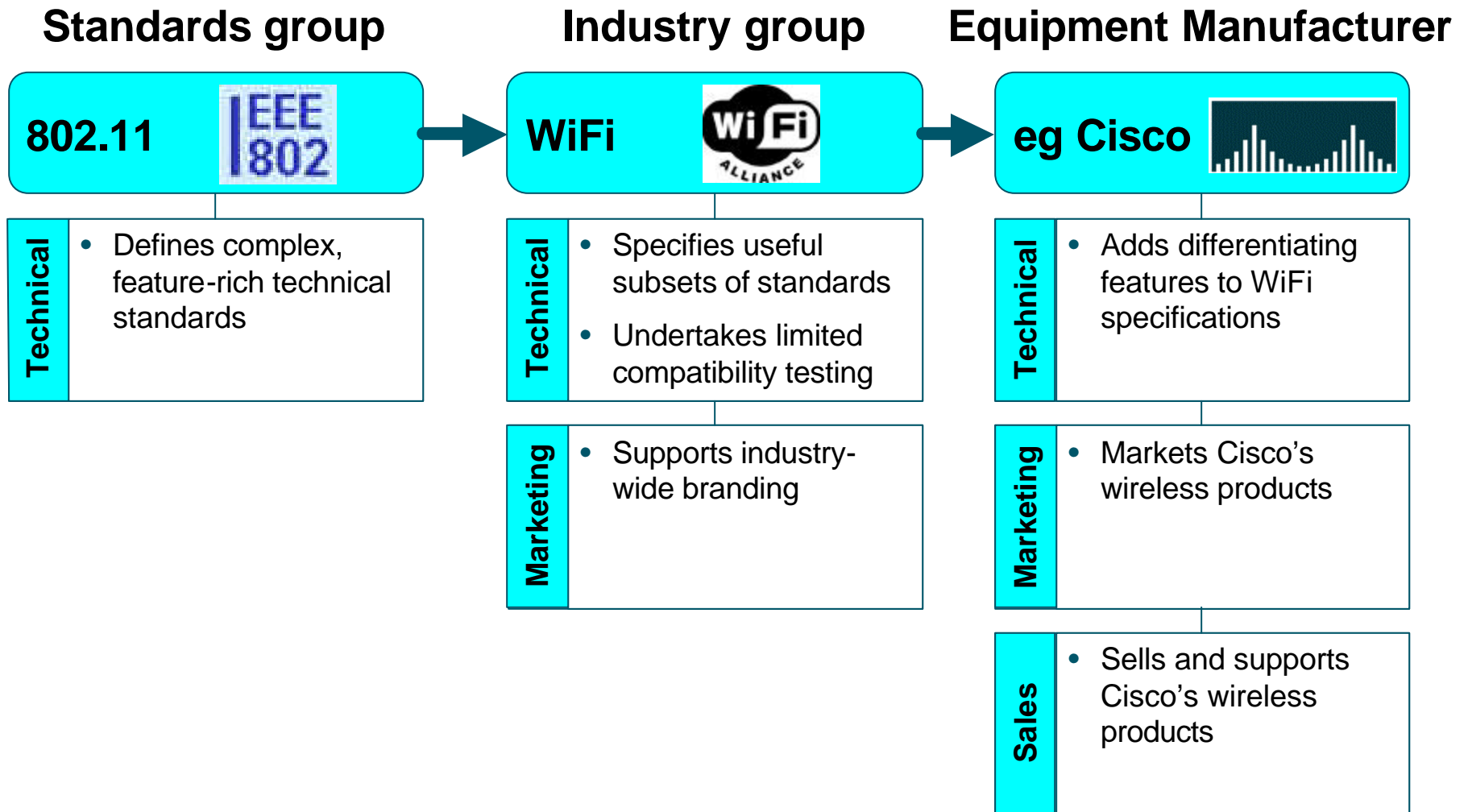
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Why is 802.11 important?

IEEE 802.11, WiFi Alliance and WLAN Equipment Manufacturers have unique roles related to technical, marketing and sales activities



Standards Rule!

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- **Open standards facilitate competition**
- **Competition creates markets**
- **Markets encourage innovation**
- **Innovation must be standards compatible**

- **People will pay for problem solving innovation!**

- **The name of the WLAN game is standards**

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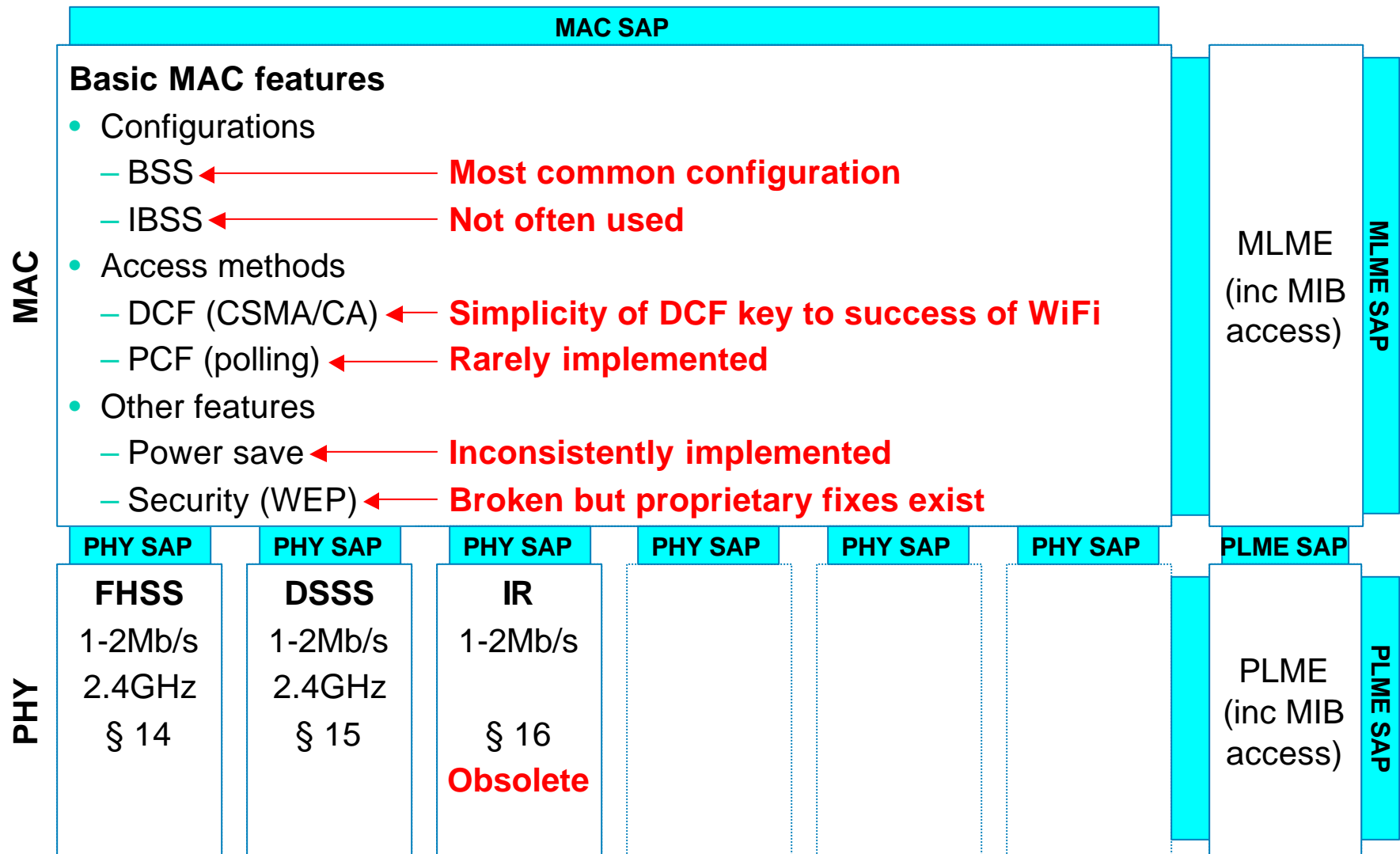
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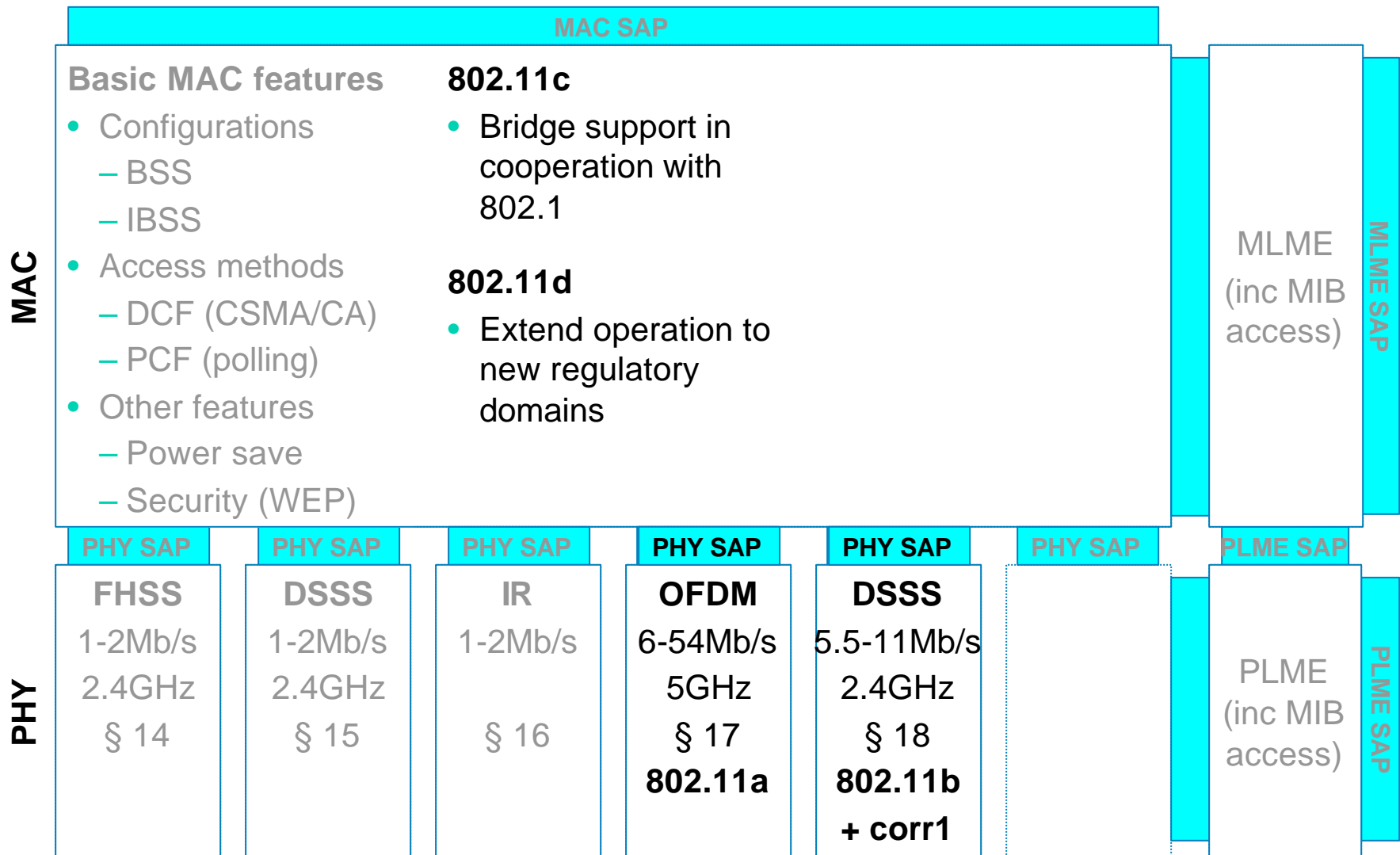
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Why is 802.11 important?

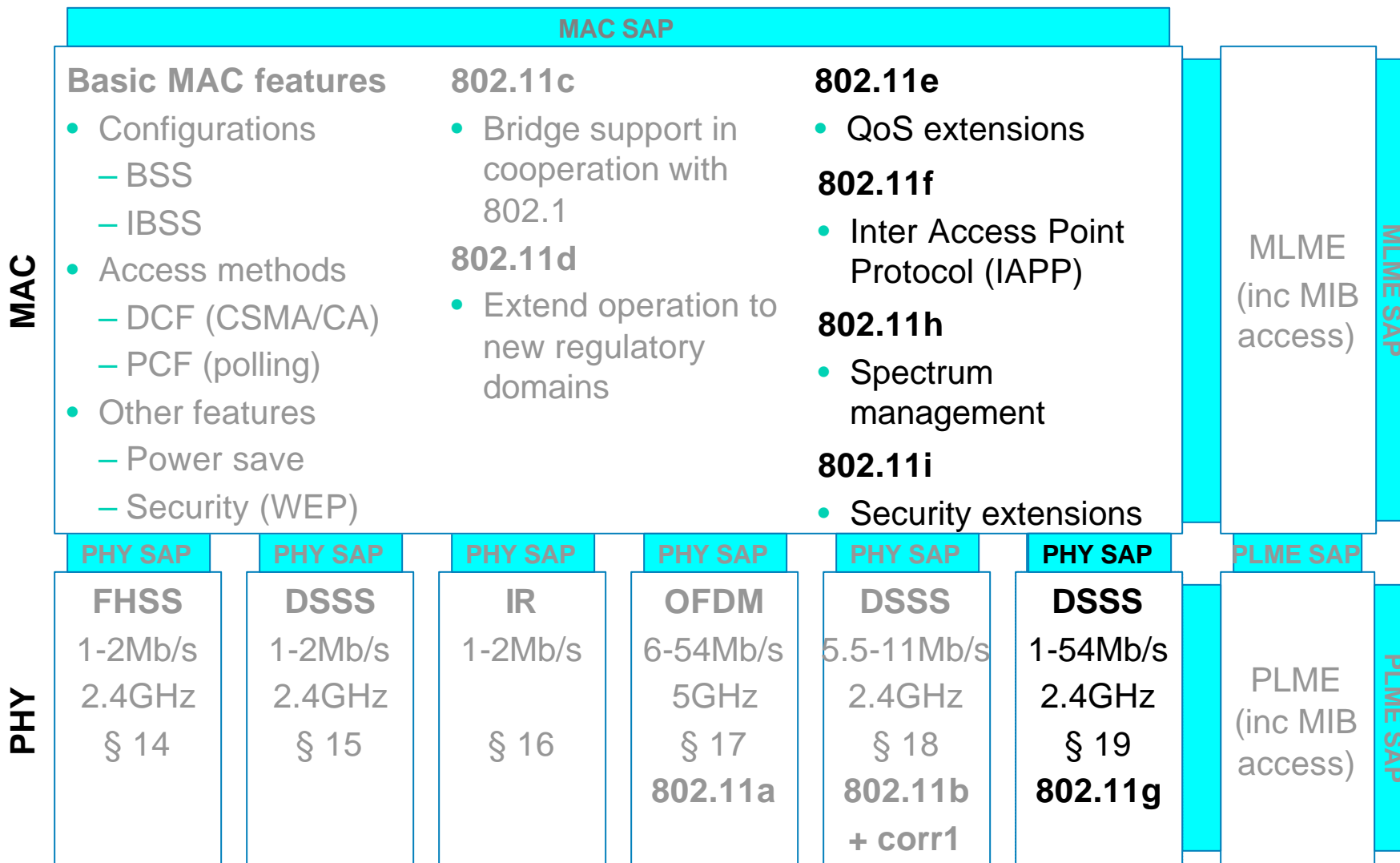
802.11-1999 defines a MAC with two access methods and three PHYs



802.11-2003 will include two additional PHYs, bridge support and “world mode”



Five task groups are nearing completion



Issues Impacting WLAN Uptake

Customer Issue

Industry Response

Security Concerns



Standards-based security roadmap

Lack of manageability



Wireless Management

Confusion over .11 alphabet soup



Dual-mode APs with upgradeability

Value-proposition beyond conference rooms



Supporting new applications like voice and PDAs

Low penetration of Notebooks



Trending positive

Unfamiliar to IT



Trending positive

Capex limitations (wireless a perceived luxury)



Focus where ROI

Cisco Aironet AP1200: Upgradeable to Dual-Band

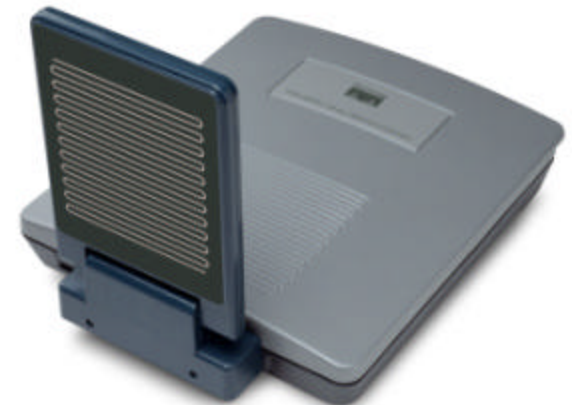
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802.11b



802.11a



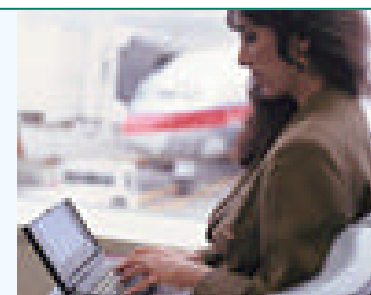
802.11b+a

+ 54Mbit/s 11g in 2003

Wireless Security Framework

Internet Protocol (IP)

Mutual Authentication
– EAP, PEAP
“You are who You Say You Are?”
“Is this the Network I Want?”



Encryption

WEP (RC4)
TKIP v1 (24 bit IV)
TKIP v2 (48 bit IV)
AES (Counter Mode)

Converting **plaintext** into **ciphertext** ensuring that only the intended recipient can understand that data.

Integrity

MMH
Michael

Ensure that the data arrives as originally sent, detect tampering.

Key Management

Radius Server
AP Cache Support

Session Re-Keying, Dynamic
Per Session,
Per User Key Refresh
during Session

Wireless Security Roadmap

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The Past

WEP

First Generation

Industry Interoperable

Weak Security

The Present

Pre_WPA

Second Generation

Company Specific

Strong Security
Key Management
Key Rotation
Mutual Authentication
Integrity

The Future

WPA

Third Generation

Industry Interoperable

802.11i

Fourth Generation
Industry Interoperable
AES Encryption

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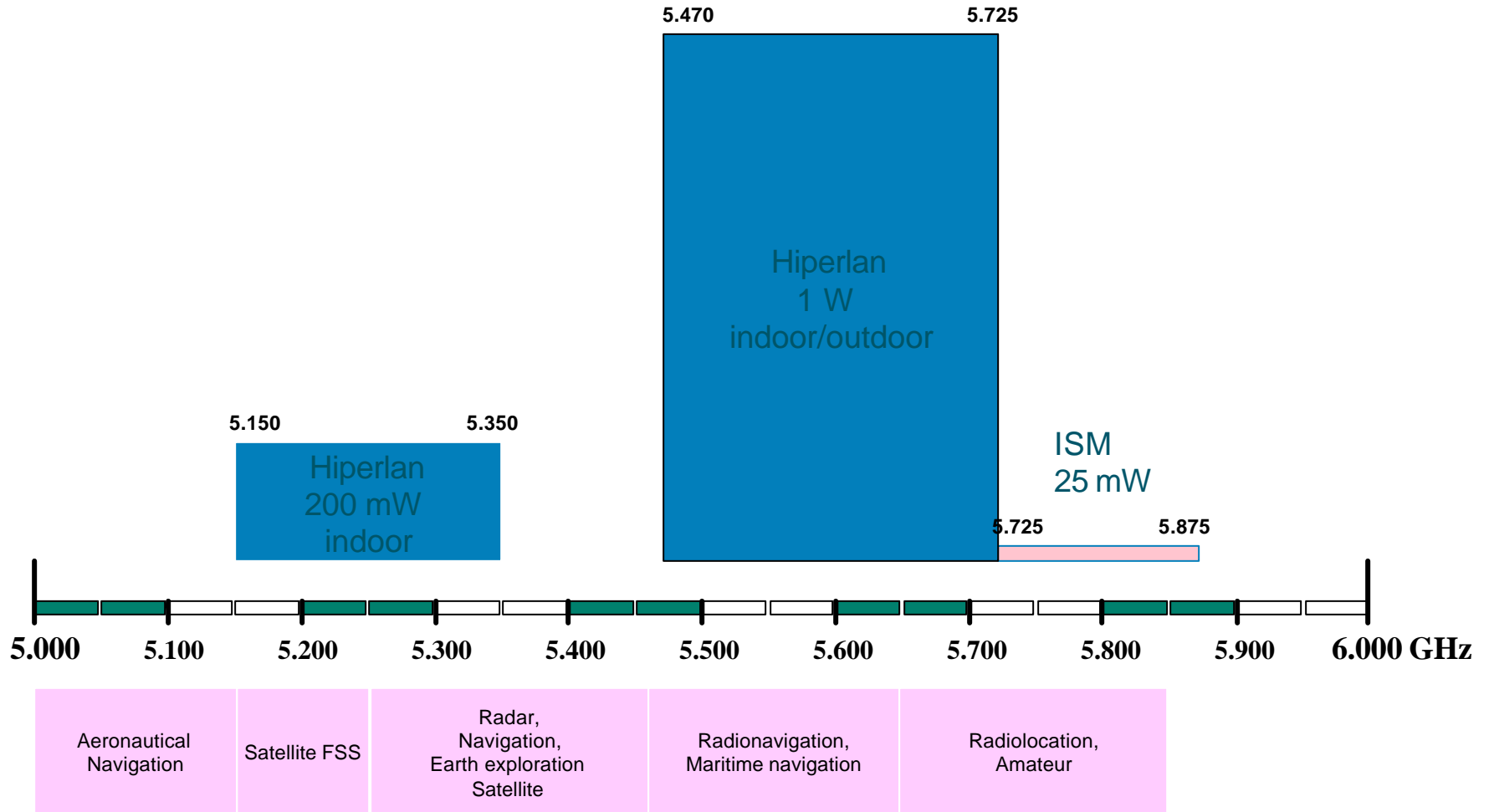
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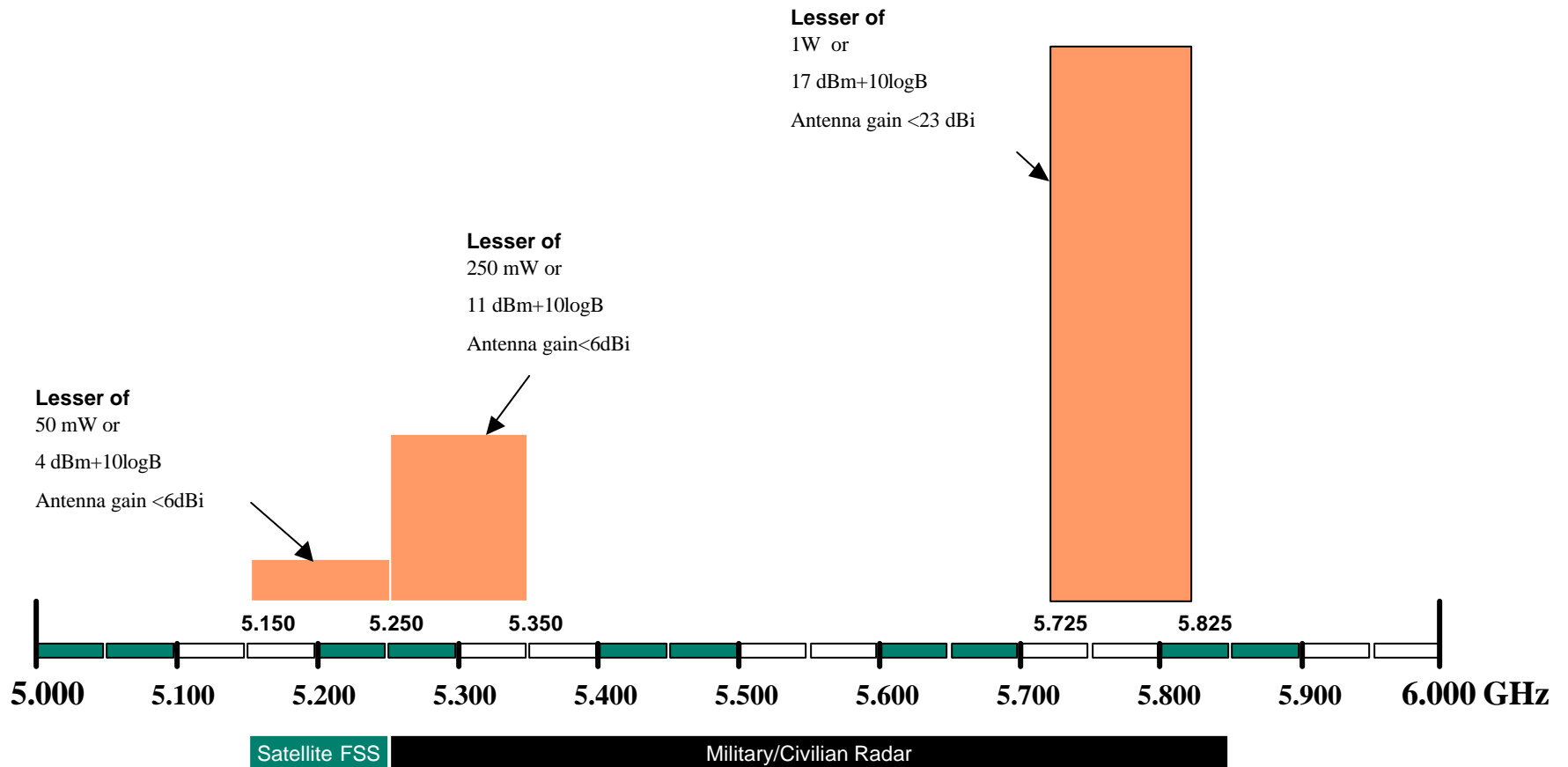
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Why is 802.11 important?

5 GHz Spectrum Europe



5 GHz U-NII USA FCC 98-121

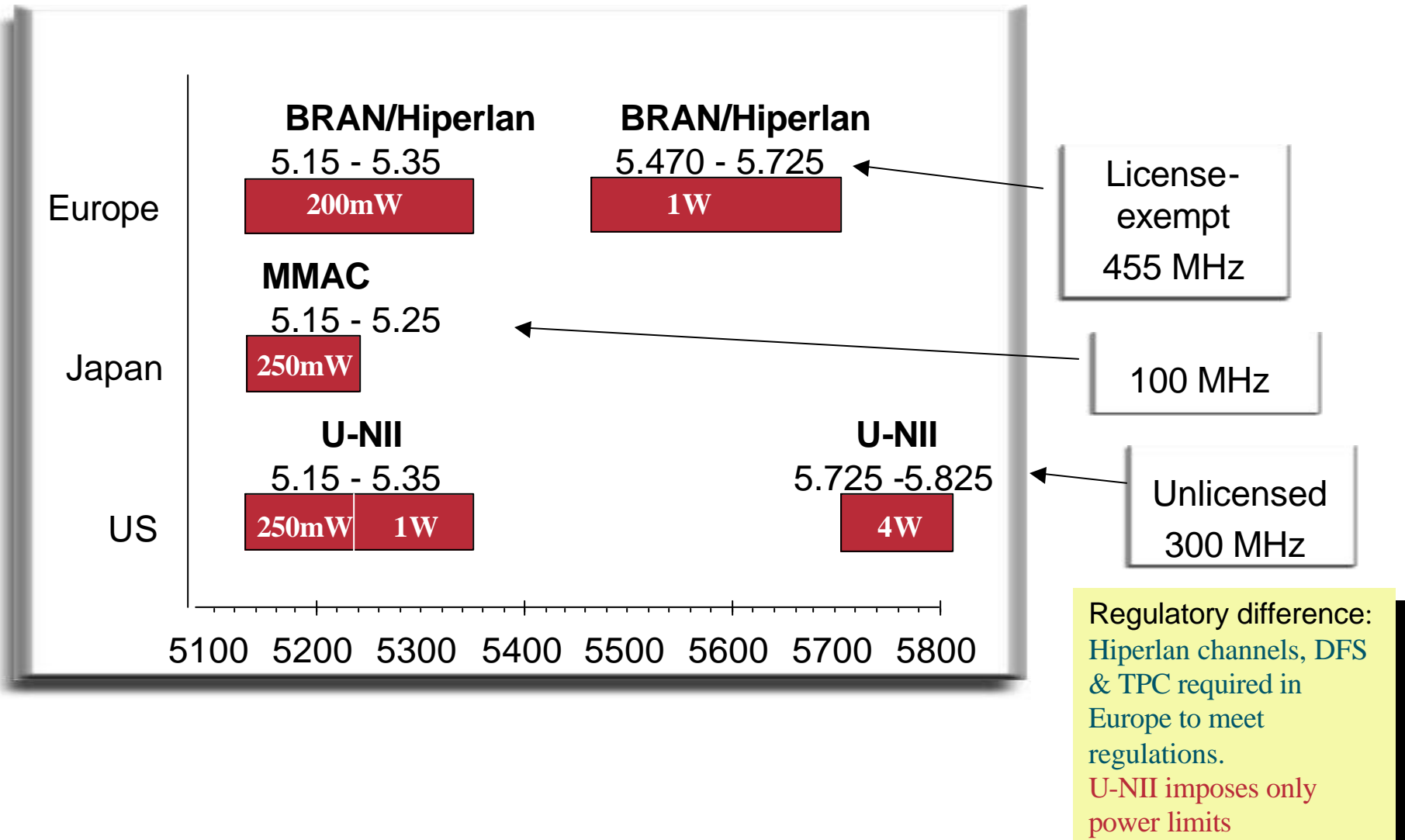


FCC 98-12 Notes:

1. Higher Antenna gain permitted with corresponding reduction in transmitter output power.
2. B = 26 dB emission bandwidth

R-LAN Summary at 5 GHz mid-2002

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Recent 5GHz spectrum activities

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- **Japan has changed regulations to support the 5GHz outdoor wireless access in the bands 4900-5000 MHz and 5030-5091 MHz**
- **A compromise on spectrum sharing has been reached with the international radar community that opens the way at the 2003 World Radio Conference for co-primary global allocation to the mobile service in certain 5GHz bands limited to WAS including RLANs with appropriate footnotes and/or resolutions to ensure protection of the existing services**
 - **5150-5350 MHz: indoor 200mW EIRP**
 - **5470-5725 MHz: outdoor 1W EIRP**

Two new 802.11 Task Groups are about to start work

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TGj - 4.9–5GHz operation in Japan

- **Goal**
 - Enhance 802.11a PHY and 802.11 MAC to allow operation in 4.9 GHz and 5 GHz bands in Japan
- **Current status**
 - SEC approved PAR and 5 criteria and forwarded them to NESCOCM for formal creation of Task Group
- **Likely completion**
 - Early 2004?

TGk - Radio resource measurement

- **Goal**
 - To provide consistent radio and network measurements to higher layers
- **Current status**
 - SEC approved PAR and 5 criteria and forwarded them to NESCOCM for formal creation of Task Group
- **Likely completion**
 - Mid 2004?

A study group has written a new PAR and other ideas are emerging

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HT SG - High Throughput

- **Goal**
 - High throughput (>100Mbit/s @ 20m) extensions (or replacements?) in 2.4GHz and/or 5GHz bands?
- **Current status**
 - Study group life has been extended until March 2003
- **Likely completion**
 - Not known

Other possible topics

- ?
- ?

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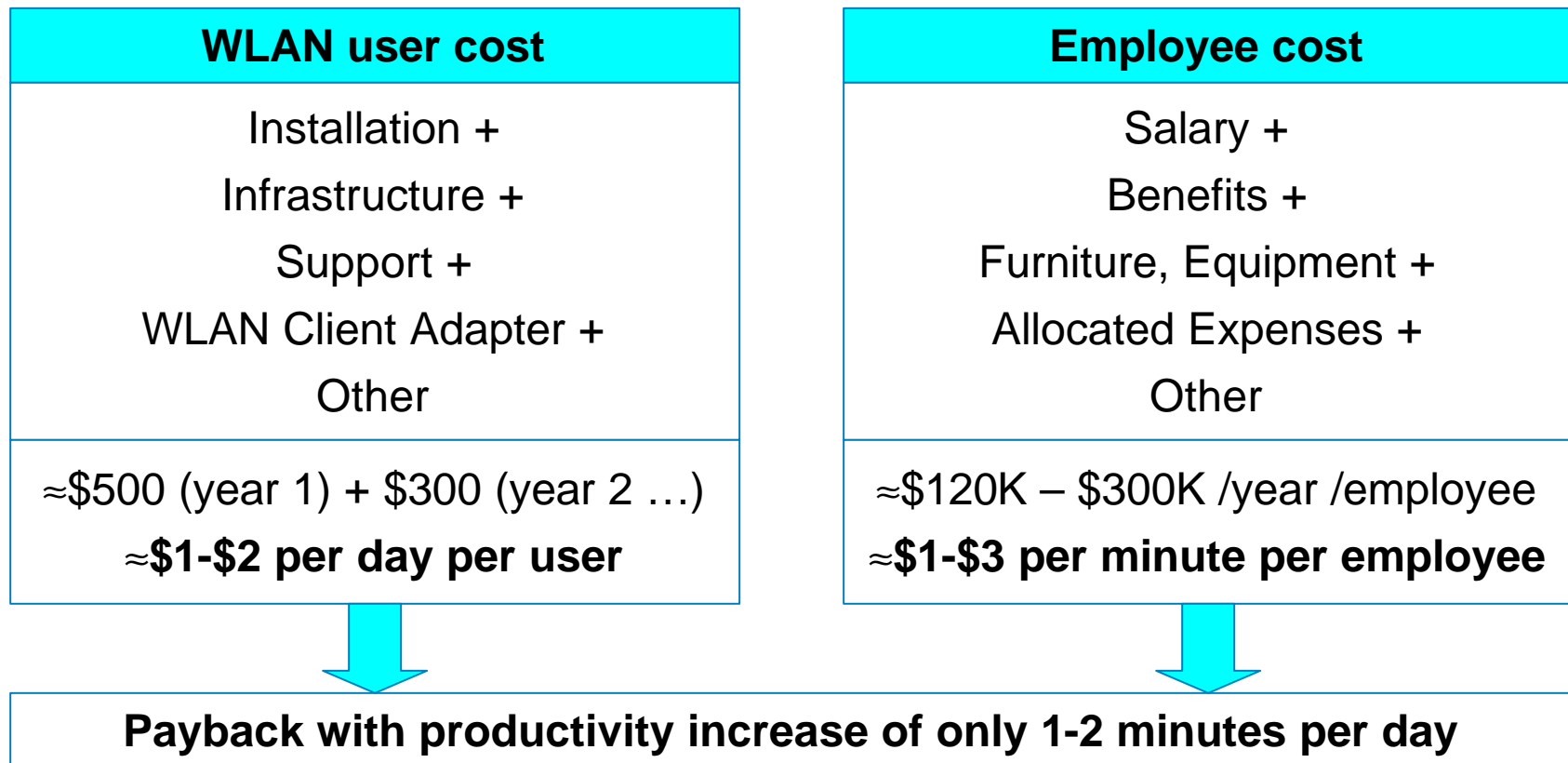
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Why is 802.11 important?

The cost of Cisco's WLAN is paid back with increased productivity of 1-2 minutes per day

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The productivity gain of WLANs for many at Cisco is measured in hours, not minutes

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Save time during meetings

- Use time before meetings start
- Use time during meeting breaks
- Use time when not relevant
- Saving = 3-4 meetings/day x 5 min/meeting = **15-20 min/day**

Avoid “I’ll do it later” syndrome

- Share presentations and arrange meetings instantly
- Benefit mainly for mobile knowledge workers
- Saving = **15-20 min/day**

Improve communications

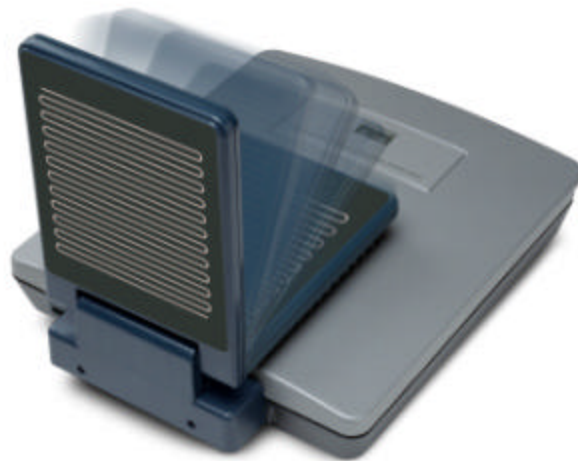
- Enables use of Instant Messaging
- Get answers instantly regardless of location and without disturbing meetings
- Saving = **lots**

Improve meeting effectiveness

- Enables real time distribution of meeting materials
- Makes conference calls more productive
- Saving = **lots**

“WLAN’s are changing the way we Work, Live, Play and Learn”

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EMPOWERING THE
INTERNET GENERATION