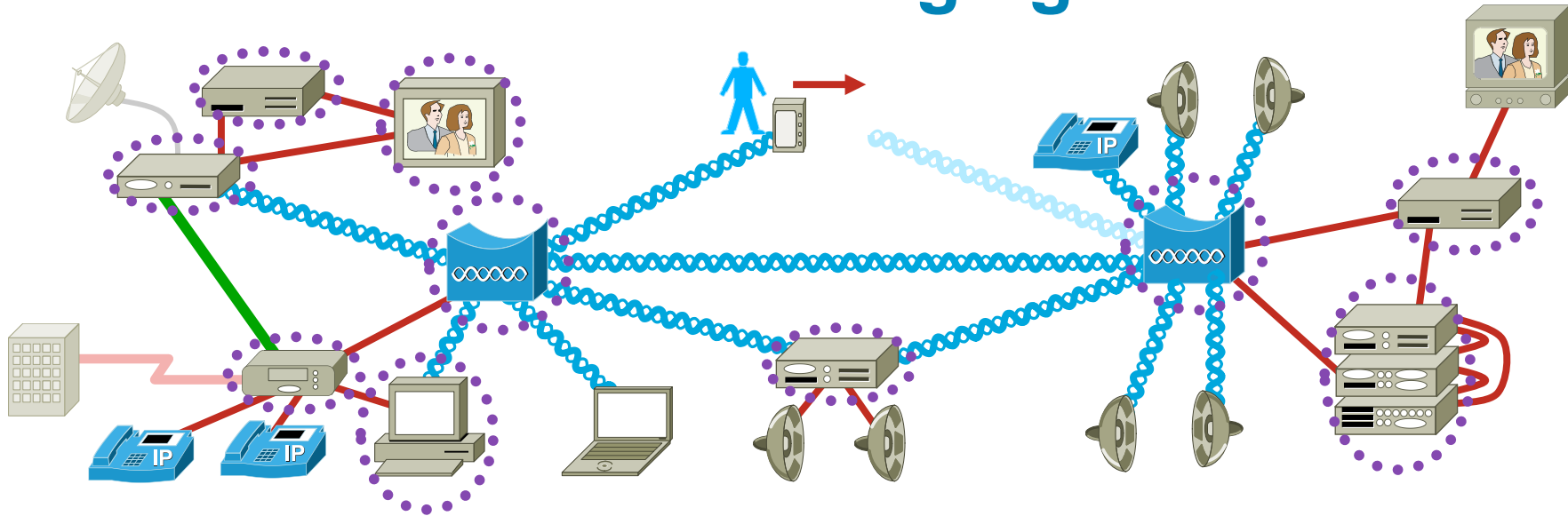# Wireless and Wired Interoperability: Use Cases

IEEE 802 standards needed

Norman Finn
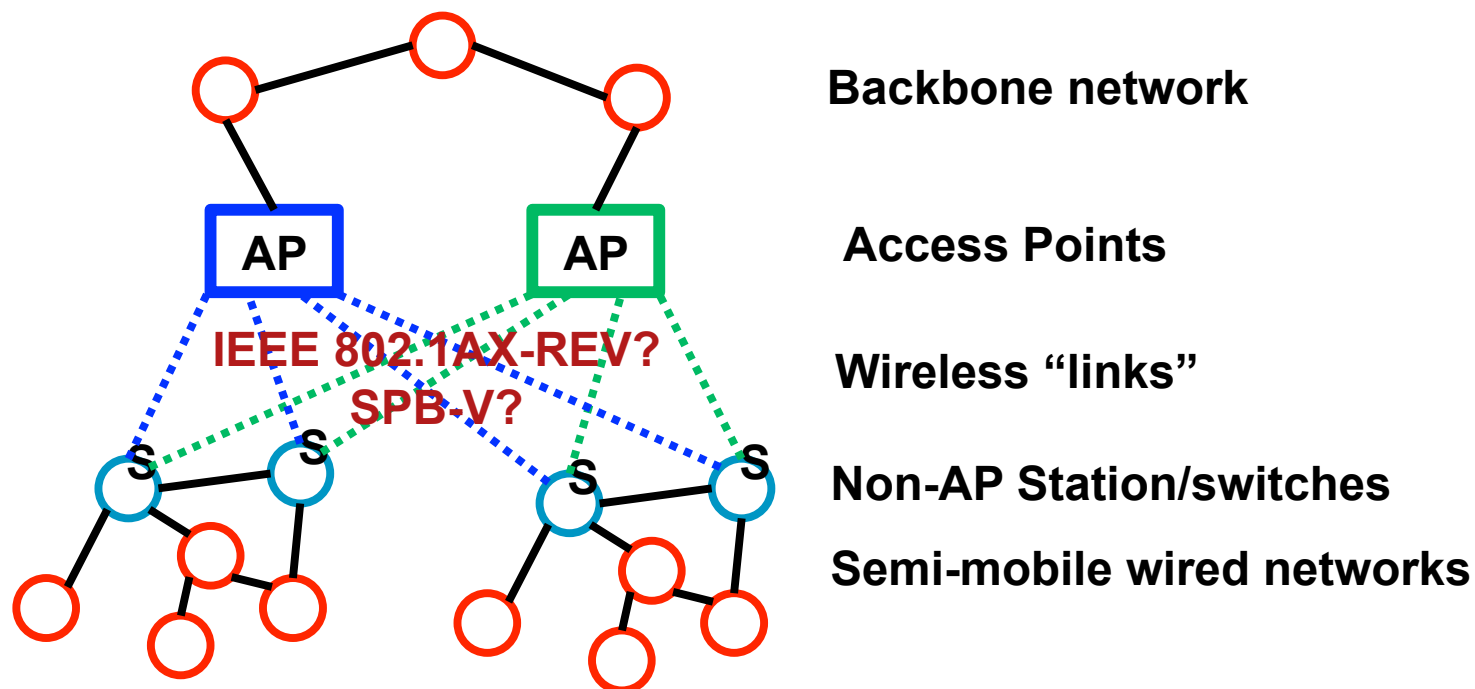
802.1 Audio Video Bridging world view

- In a home or small studio, there may be many Ethernet-like links: 802.3, 802.11, MoCA, Ether/DSL, etc.

- You expect wired stacks connected via wireless.

- To ensure connectivity, every device with multiple ports is an **802.1 bridge**, and **stations are bridges, too**!

Example: WiFi as Just Another Medium

- Consider a possible industrial control network:

Backbone network

AP

AP

Access Points

IEEE 802.1AX-REV?
SPB-V?

Wireless "links"

S   S   S   S

Non-AP Station/switches

Semi-mobile wired networks

- Either Link Aggregation or SPB-V bridging technologies can make this a single MAC Layer network.

WiFi is not at the edge of the network!

- 802.11ac, gigabit WiFi, makes this even more imperative. **A Gb/s link is not always at the edge of the network!**
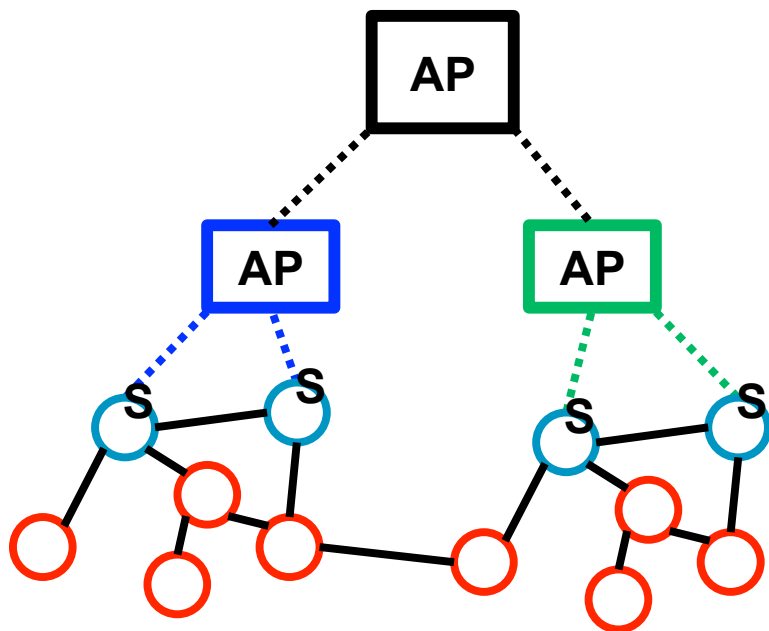
.11ac Access Point

1 Gb/s Wireless "links"

.11g Access Points

54 Mb/s Wireless "links"

Wired bits of a single company in a multi-tenant building.

- **Don't build layers of ad-hoc solutions!**
Simply make these devices ordinary switches.
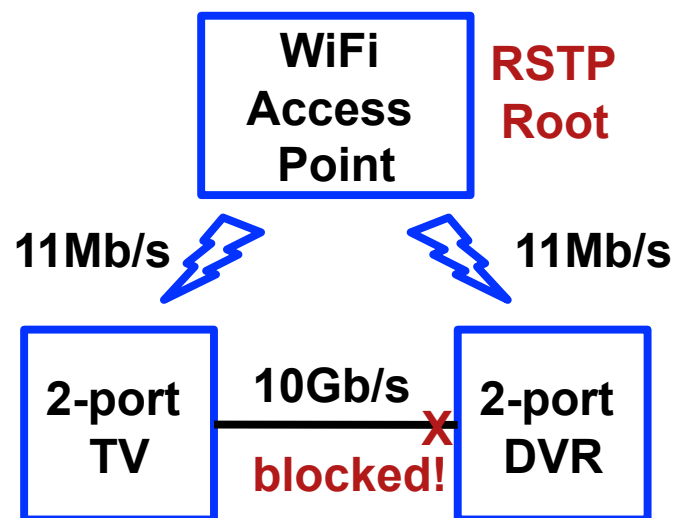
WiFi is not at the edge of the network!

- As has been known for a long time, spanning tree has issues in simple networks with links of widely disparate data rates.
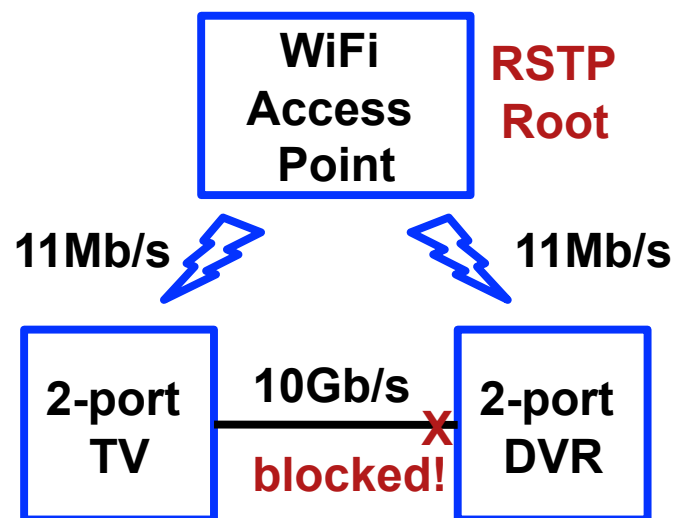
- This diagram illustrates the problem in the home.

WiFi is not at the edge of the network!

- But, the issue is more fundamental than "STP sucks". **This configuration is illegal** according to the 802.11 architecture unless all three boxes are **Access Points**. (Just what an apartment building needs!)

- This absurd notion that 802.11 is always at the edge of the network has prevented any consideration of a standard means for accomplishing it, except the even-more-absurd 802.11S mesh.

WiFi is not at the edge of the network!

- There are ad hoc non-standard solutions for certain wired/wireless cases, such as when the second box does not have a wireless link.
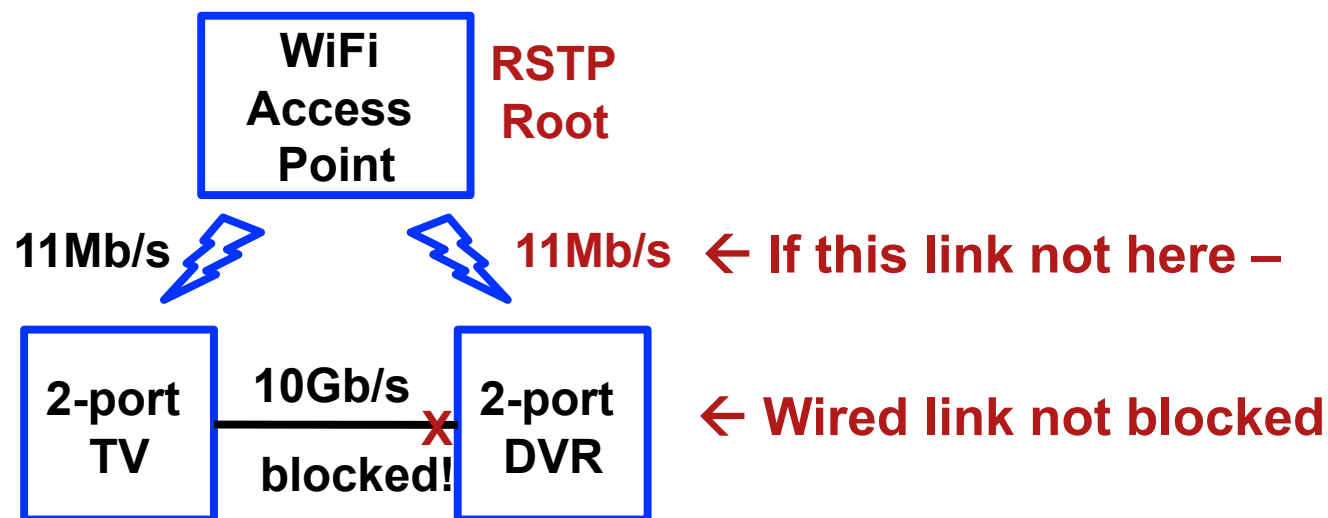
- But, the general case of an arbitrary network of wired and wireless links has **no viable MAC Layer standard**.

So, just make each station a bridge!

- Why not just make the stations 802.1Q bridges?

- Long answer: I have presentations on this issue going back to 2005 (e.g. http://www.ieee802.org/1/files/public/docs2005/new-nfinn-generalized-lan-emulation-ieee-0305.pdf).

- Short answer: The AP reflects my (a station's) own broadcasts back to me, and that breaks MAC address learning.

- **802.11 and 802.1 have to fix this!**

- **Fix 1**: Bridges use the 802.11N headers to suppress their own reflections. (Applies to any protocol.)

- **Fix 2**: Use host MAC address routing instead of learning. (SPB-V can do this.)