“IPv6 wants 802.11 Flexible Multicast Service”

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TL;DR:
IEEE 802.11 has a feature that could improve multicast reliability.
IPv6 needs reliable multicast (most importantly: RAs. also: DAD)

The feature is optional and not widely available.
⇒ Do we have consensus to push for it?

This document is not intended to specify anything or become an RFC; it is purely for consensus gathering.

Related reading

- RFC9119
  Multicast Considerations over IEEE 802 Wireless Media
- draft-vyncke-6man-mcast-not-efficient
  Why Network-Layer Multicast is Not Always Efficient At Datalink Layer
- draft-desmouceaux-ipv6-mcast-wifi-power-usage
  Power consumption due to IPv6 multicast on WiFi devices
- draft-yourtchenko-colitti-nd-reduce-multicast
  Reducing Multicast in IPv6 Neighbor Discovery

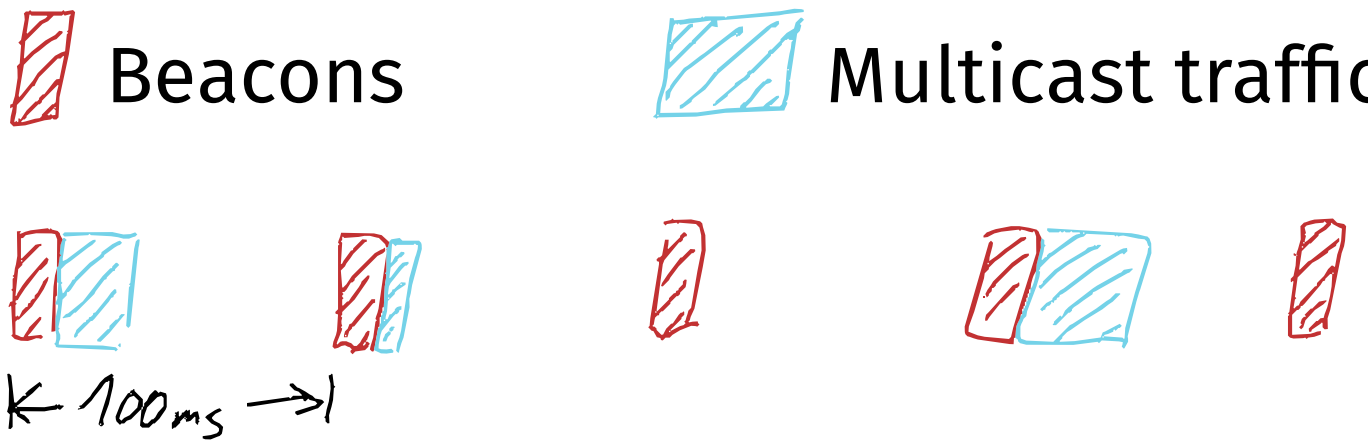
IEEE 802.11 specified behavior

Multicast traffic is sent after beacons.

Beacons are sent every 100ms.

Clients are supposed to wake up for beacons and stay awake for multicast traffic

DTIM interval (AP setting) can reduce mcast to only each n'th beacon but this is network controlled, applies to all groups, and is rarely changed from the default 1 setting



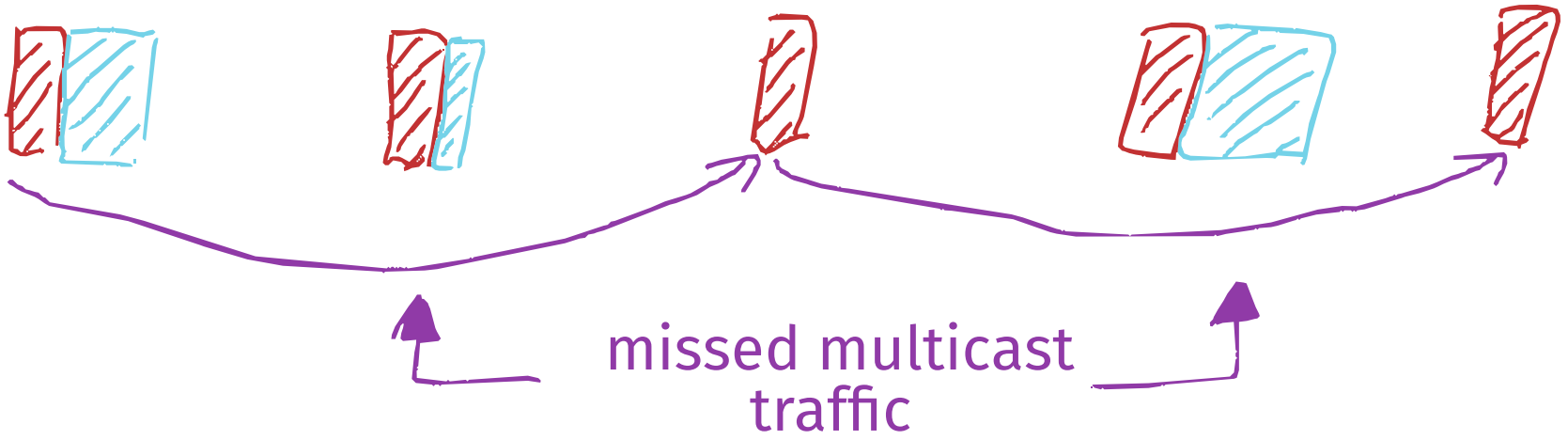
Actual observed behavior

Waking up for receive is very power costly

Chipsets skip some intervals to save on power—without any coordination (“YOLO”)

As bad as 1:8 reduction (i.e. 12.5% delivery) has been seen in the wild

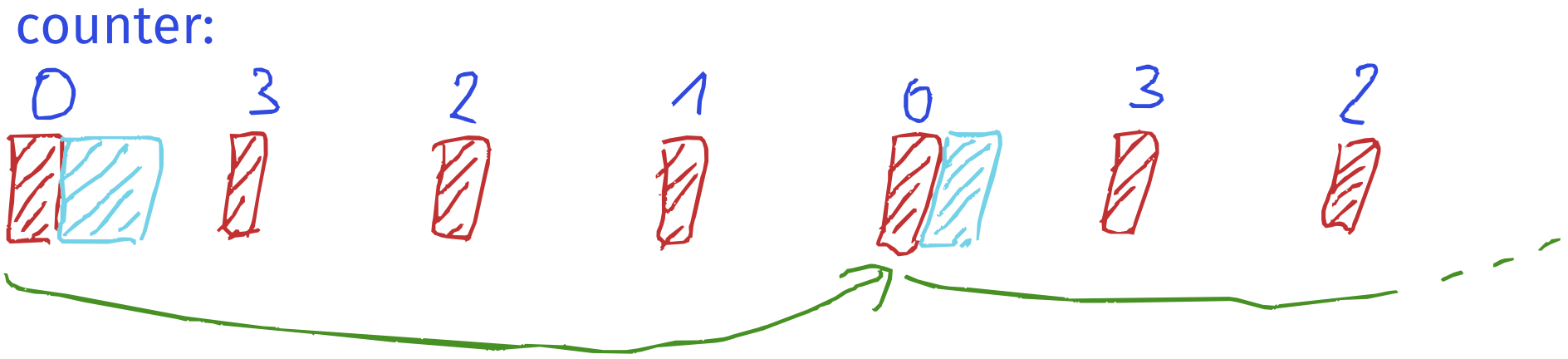
1:2 skip shown below:



IEEE 802.11 FMS function

802.11 Flexible Multicast Service (added in 802.11v-2011) adds function for wifi clients to request from AP “please give me groups X, Y and Z at a reduced interval of N”

Basically “correct”, protocol-specified way to do the same powersave optimization
A counter (per distinct interval) is used so the client knows where to “join” the train
Example 1:4 skip shown below:



FAQ

- the AP has final say on what happens
  - there are response codes for various denials, e.g. other interval already in use
- each group has one interval for all clients (no duplication)
- distinct groups may use different intervals
- a maximum of 8 intervals is supported in 802.11
  - there's only room for 8 counters in the beacon
  - but arbitrary number of groups can be mapped to the same interval
- AP delays/buffers/holds multicast packets until the appropriate slot
  - Yes, this absolutely introduces latency
- making things "mandatory" is apparently a Wifi Alliance thing, not 802.11
- there are in fact no known implementations at all :'(

No warranty—read IEEE 802.11-2020 section 11.2.3.14 (page 2097++) if you want hard data

WG consensus?

The purpose of this draft (and presentation) is to determine whether there is consensus to ask the Wifi Alliance to make the feature required for future certifications.

If you can, please read up and build an informed opinion.

Next steps TBD if/when there’s consensus
(probably look for appropriate liaisons)