IEEE 802.11bc
Enhanced Broadcast Services

About Dave Halasz

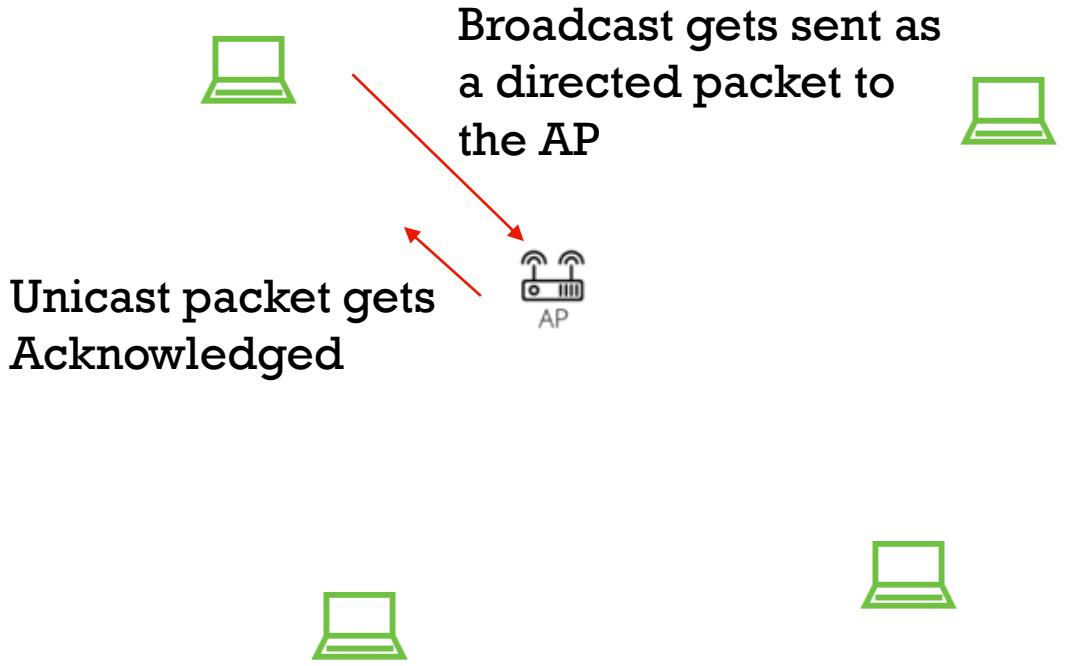
- Solutions Engineer at 7SIGNAL
- CWNA
- 25+ years of wireless experience in Product development, Solutions Engineering and Industry standards development.
- Recognized as a Cisco innovator
- Task Group Chair of IEEE 802.11i for Enhanced Security
- Task Group Chair of IEEE 802.11ah for Sub 1 GHz Operation
- Involved in the formation of the Wi-Fi Alliance (WECA)
- 13 patents

Broadcast traffic in IEEE 802.11

- The original IEEE 802.11 standard supported broadcast traffic
- Broadcast/Multicast delivery was improved with IEEE 802.11aa MAC Enhancements for Robust Audio Video Streaming
- What more can be needed?
  - Take a look at IEEE 802.11bc use cases

Original IEEE 802.11 handling of broadcast

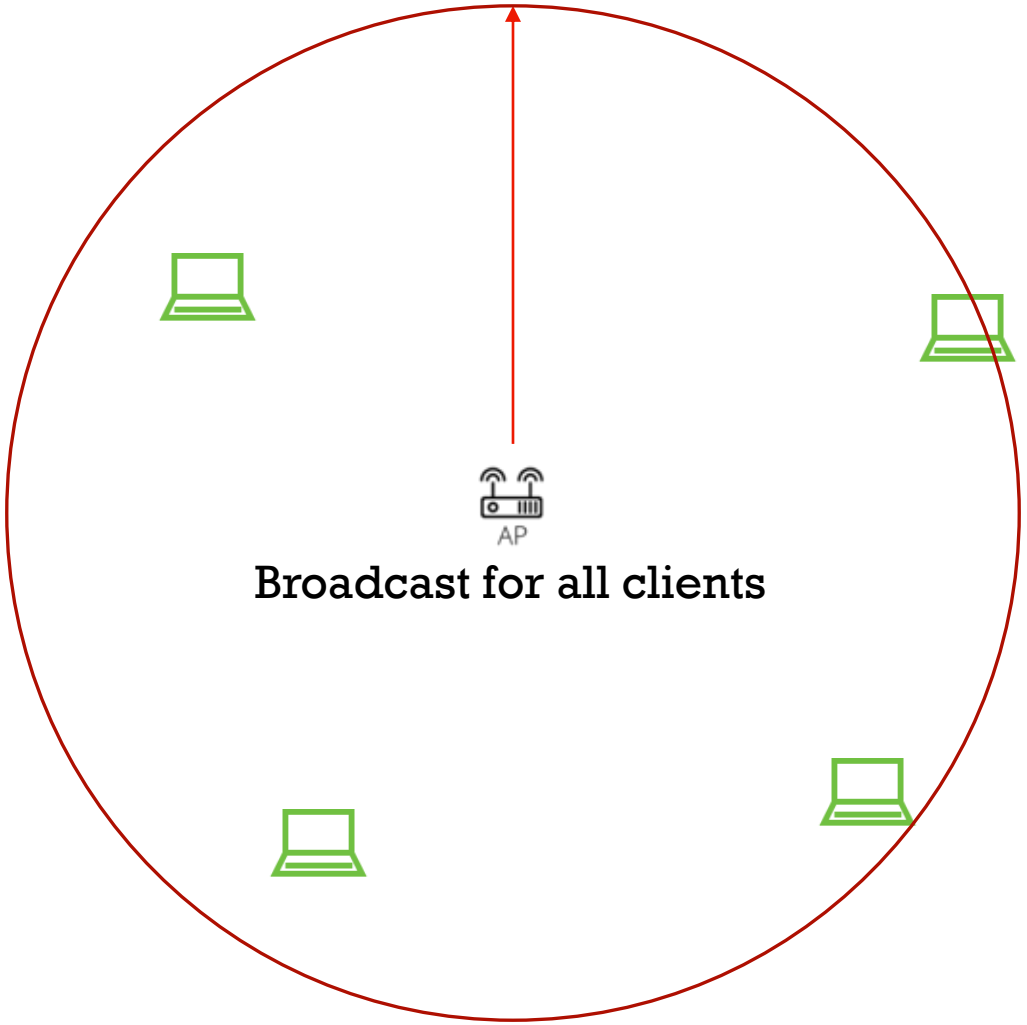
- Client sending a broadcast, sends the packet directed to the AP



Original IEEE 802.11 handling of broadcast

- AP resends the broadcast packet for all clients to receive

- What more could you want? …



Well, broadcast traffic wasn't very reliable

- The broadcast out of the AP doesn't get retried.
  - There isn't an Acknowledge packet
- With power save, the broadcast packet gets sent out after a DTIM, which is a special beacon.
  - This is also when power save clients will poll for their traffic.
  - This causes contention and increased packet loss.
- Hence IEEE 802.11aa MAC Enhancements for Robust Audio Video Streaming

IEEE 802.11aa MAC Enhancements for Robust Audio Video Streaming

Scales best with,

- Group addressed transmission options
  - Directed multicast service (DMS).
  - Brought in by IEEE 802.11v Wireless Network Management
    - Send the multicast packet as a directed packet to a client.

Small # clients ➡

- Groupcast with retries (GCR) methods
  - GCR unsolicited retry - Send the multicast packet X times.

Large # clients ➡

  - GCR Block Ack – Clients essentially indicate if packet missing

Medium # clients ➡

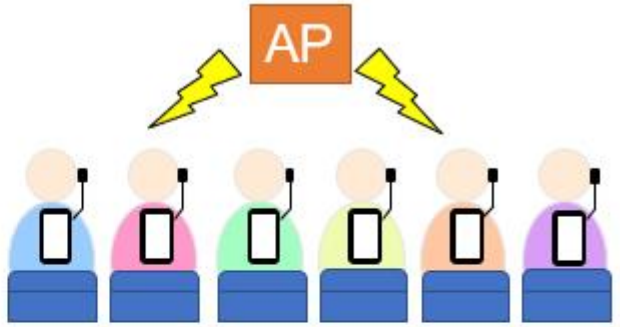
The acknowledged retries improve reliability over unsolicited retry

You want more?

What use cases are not covered by existing mechanisms?

Local Broadcasting Service on WLAN

- The communications is one way.
- No mechanisms in place, nor desired, to prohibit reception.
- Do want the source of the information to be validated.
- Not necessary for clients to connect to the AP.



- Anyone in stadium, museum or zoo who has a smartphone can listen audio guidance/comments without additional hardware.
- Multiple logical channels can be used. Multilingual broadcasting can be supported on a single radio channel.
- Of course, any type of data can be broadcast, such as video, text, HTML…

11-17/0999r2 Broadcasting on WLAN

Low Power Sensor

- Client doesn't connect to the AP.
- Any AP may receive the IoT transmissions. Ok for there to be duplicates.
- APs send received transmissions to IoT server.

Sensor on the move:

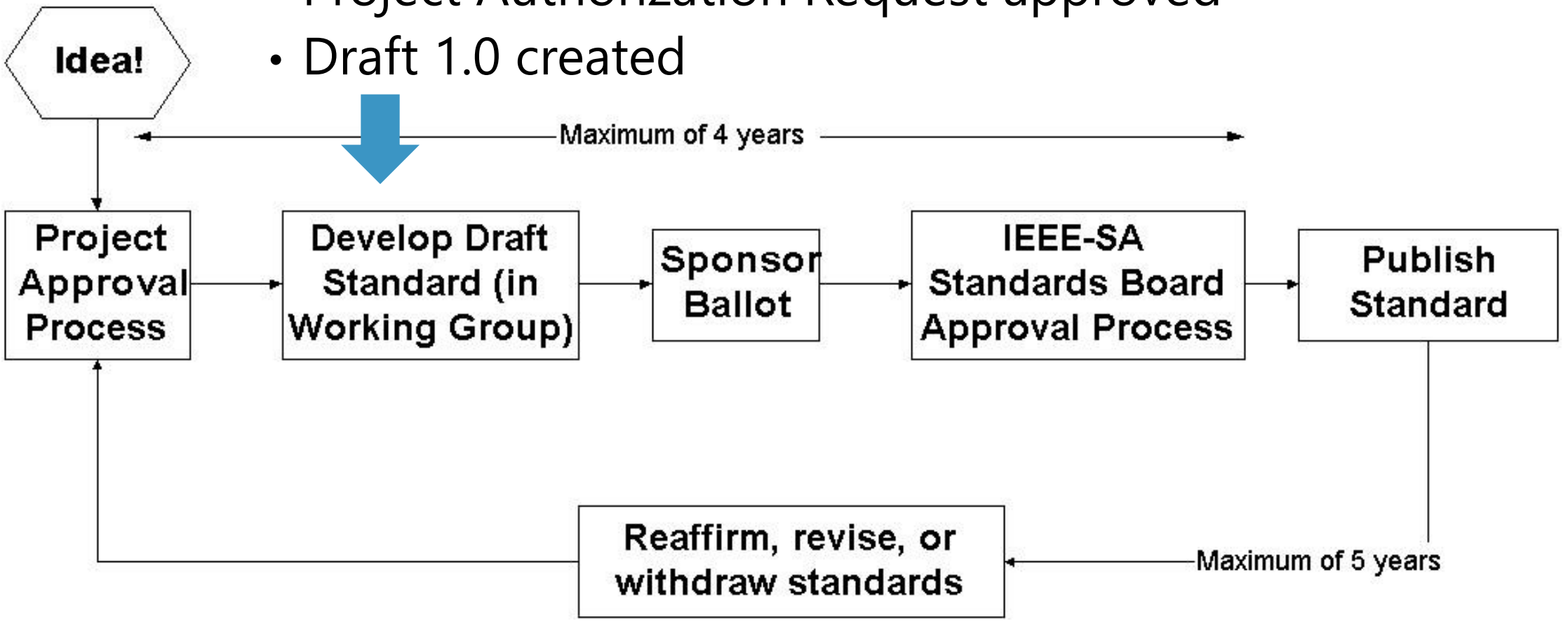
- **IoT devices/Sensors with severe power constraints and in mobility send reports to their server through APs supporting BCS without the burden of performing scanning and association process.**
  - A STA may
    - Either blindly transmit a self-contained PPDU and hope for it to be received and forwarded (example moving sensors in a large enterprise where an ESS is deployed with a blanket coverage with all/most APs supporting this service)
    - Or scan for APs supporting such capabilities

Example use cases:
- Asset tracking in enterprise/factories
- Children tracking in resorts
- Seamless smart city measurements
- …

11-18/0532r0 Low Power Sensor Broadcast Use Case

IEEE Standards Development: Process Flow

- Project Authorization Request approved
- Draft 1.0 created



https://mentor.ieee.org/802.11/dcn/10/11-10-0617-02-0000-ieee-standards-process-overview.pptx

Projected Timeline – An educated guess

Current Status	PAR Approved, Modified, or Extended [Expires]	WG Letter Ballots			Form Standards Association (SA) Ballot Pool / Reform	MEC / MDR Done	IEEE SA Ballots			Final 802.11 WG Approval	Final or Conditional 802 EC Approval	RevCom & Standards Board Final or Continuous Process Approval
		Draft	Date	Result			Draft	Date	Result			
		Predicted Initial	Predicted Recirc				Predicted Initial	Predicted Recirc				
Actual	2018-12-05 [2022-12-31]											
Predicted	C	Nov 2020	May 2021		Nov 2021	Nov 2022	Jan 2022	May 2022		Jul 2022	Jul 2022	Sep 2022

https://www.ieee802.org/11/Reports/802.11_Timelines.htm

PAR Scope

This amendment specifies modifications to the IEEE 802.11 medium access control (MAC) specifications that enable enhanced transmission and reception of broadcast data both in an infrastructure BSS where there is an association between the transmitter and the receiver(s) and in cases where there is no association between transmitter(s) and receiver(s).

This amendment introduces origin authenticity protection for broadcast data frames.

https://www.ieee802.org/11/PARs/P802_11bc_PAR_Detail.pdf

Low Power Sensor activity in IEEE 802.11

- IEEE 802.11ax OFDMA Resource Units – Sub channels, Save power & more efficient use of the channel
- IEEE 802.11ax & IEEE 802.11ah power saving mechanisms, ex. Target Wait Time
- IEEE 802.11ba – Wake Up Radio
- IEEE 802.11bc – Enhanced Broadcast Services, IoT use case

Q & A

Thank You.