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IEEE 802.11 standardization & Implications of U6 Sharing

Carlos Cordeiro
Intel Fellow & Wireless CTO
Intel Corporation

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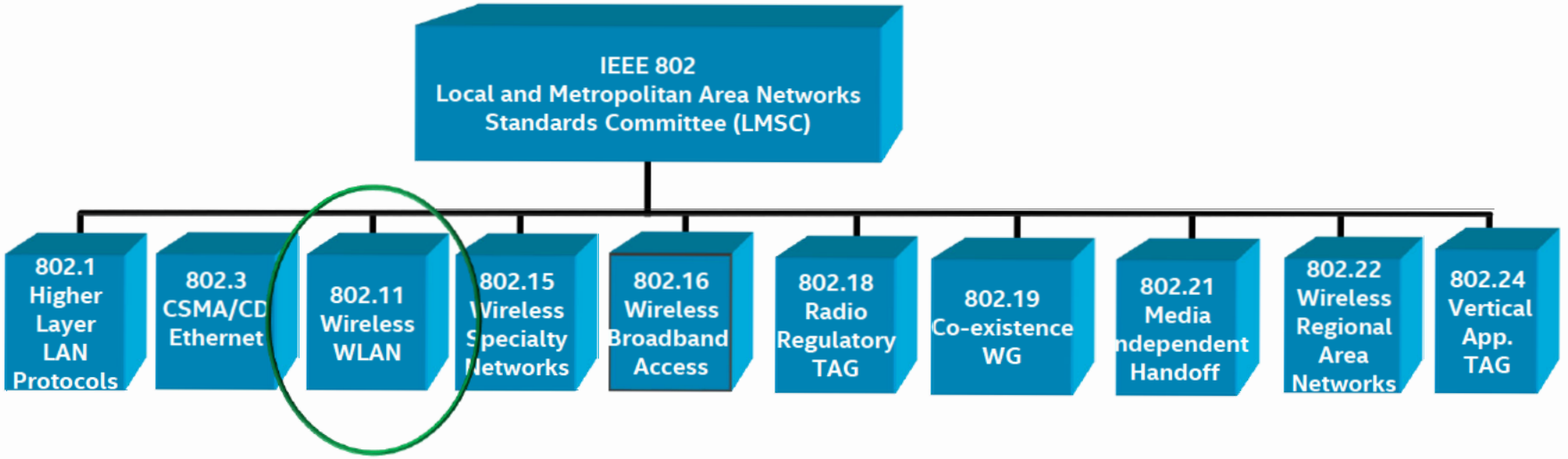
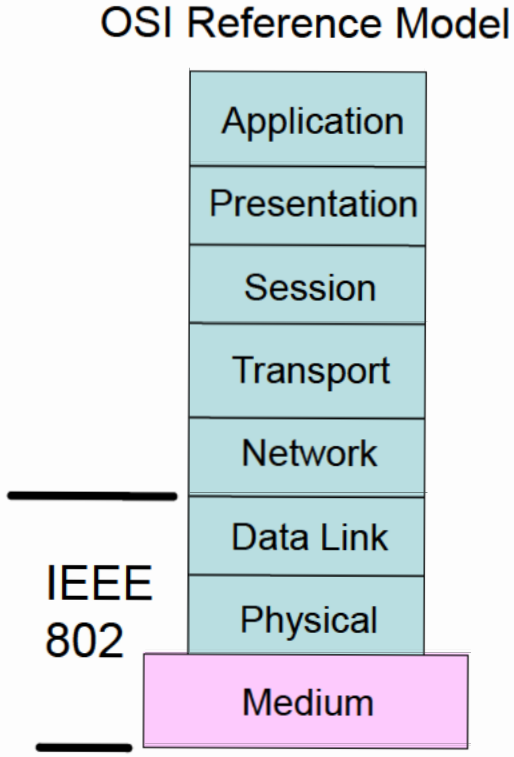
Agenda

- IEEE 802.11 standardization process
- Implications of upper 6 GHz band (U6) sharing

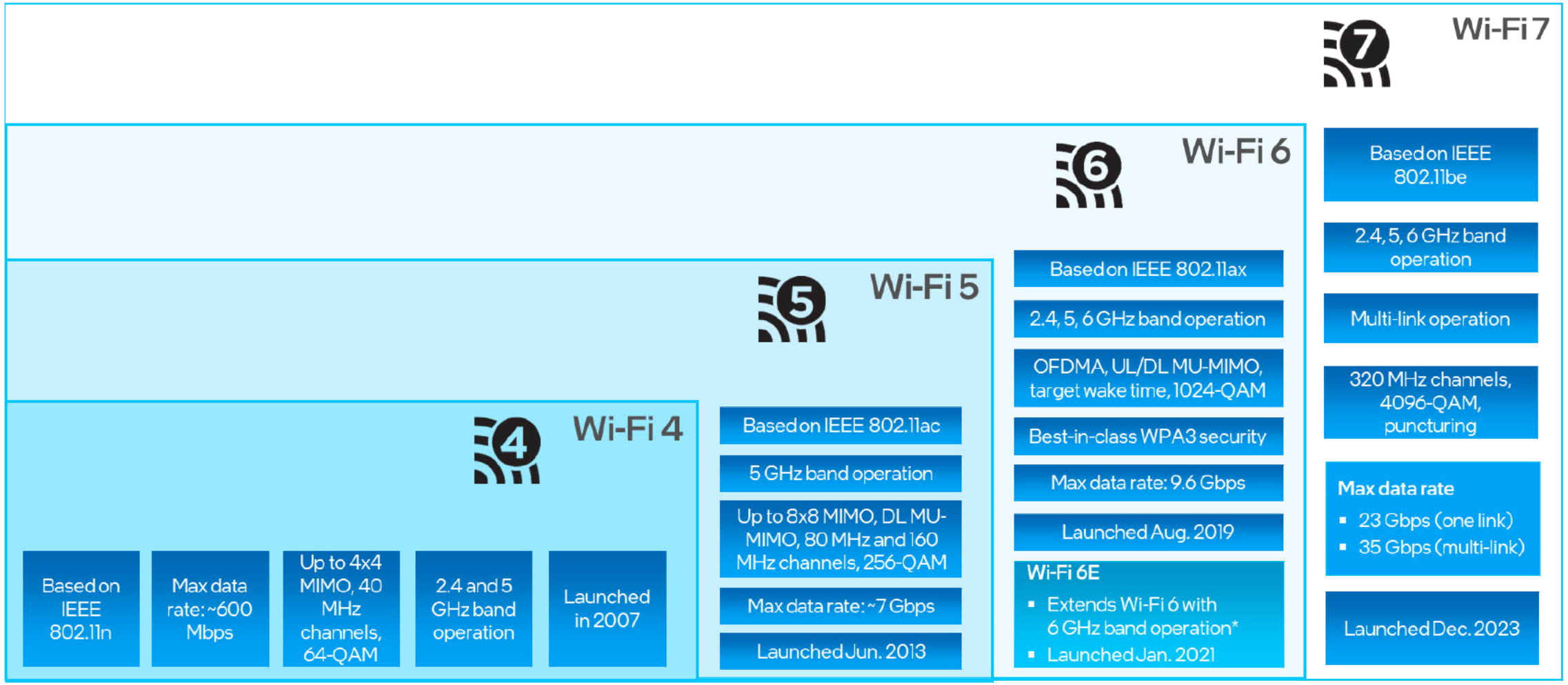
The IEEE 802.11 Working Group

- One of the most active working groups (WGs) in IEEE 802
- Focuses on link and physical layers of the network stack
- Leverages IETF protocols for upper layers



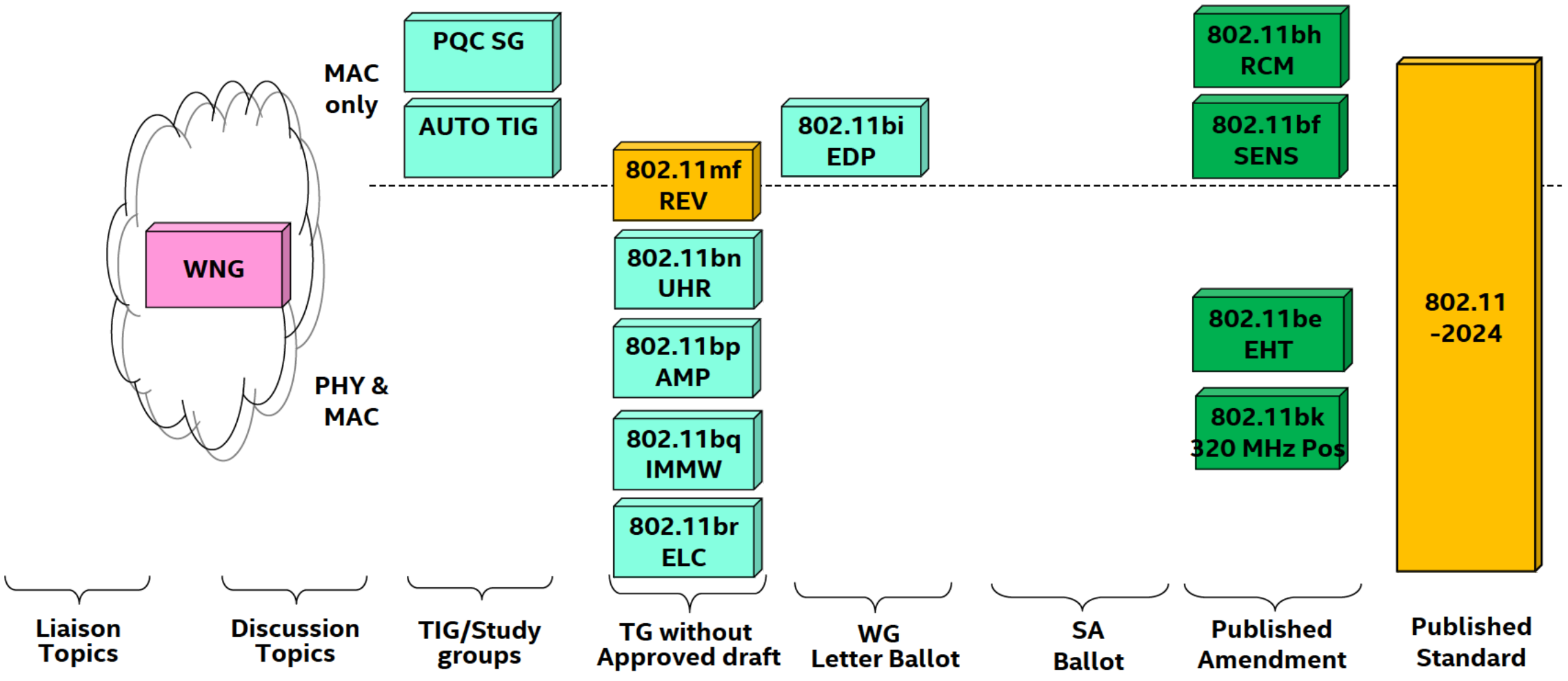


IEEE 802.11 standard: the basis of Wi-Fi



* 6 GHz operation subject to regulatory rules in each country.

IEEE 802.11 standards pipeline – June/2025



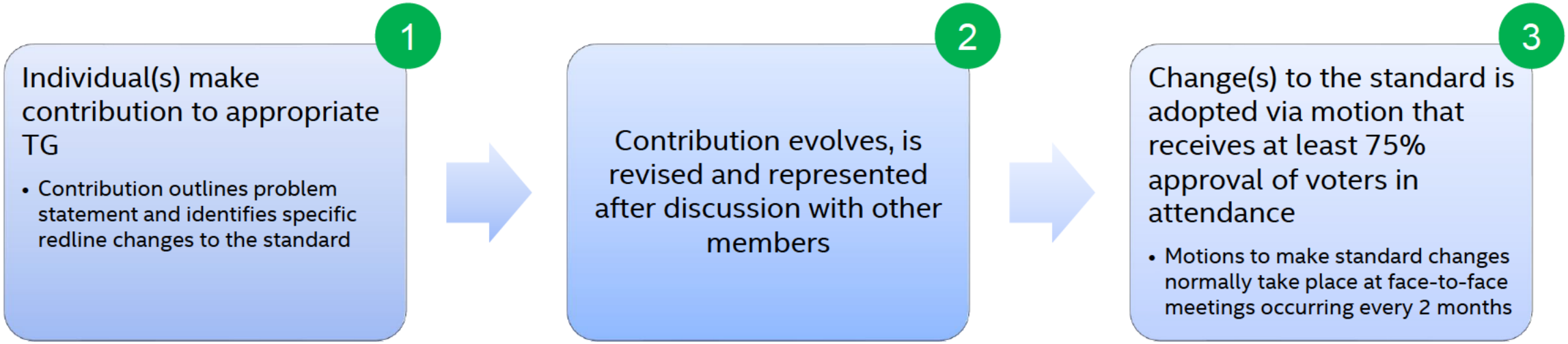
802.11mf – Maintenance/REVision
802.11bi – Enhanced Data Privacy
802.11bn – Ultra High Reliability
802.11bp – Ambient Power for IOT
802.11bq – Integrated Millimeter Wave
ELC – Enhanced Light Communication

AUTO – Automotive
IMMW – Integrated mmWave
WNG = Wireless Next Generation

PQC – Post-Quantum Computing
SG – Study Group
TIG = Topic Interest Group

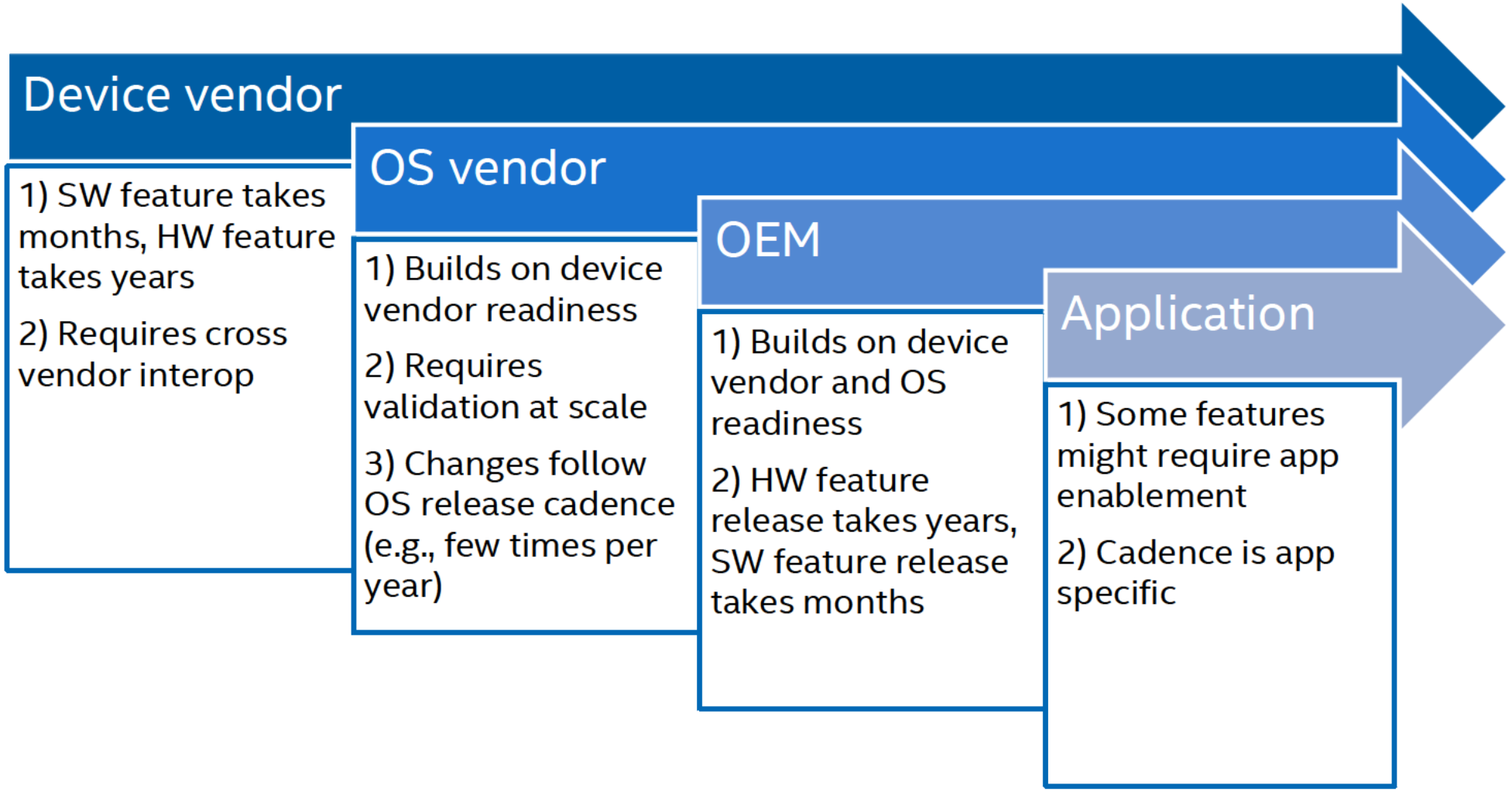
Making changes to the 802.11 standard

- IEEE 802.11 is an individual based organization, where individuals are allowed to make contributions and vote on contributions
- Contribution and standards approval process at a high level:



- For contributions affecting multiple generations of 802.11 devices (e.g., regulatory driven contributions), they are often made to 802.11mf

High level view on bringing new features to market



Reuse of existing mechanisms significantly reduces adoption time

Implications of upper 6 GHz band sharing

- We endorse UK Ofcom's proposal to open the upper 6 GHz band to Wi-Fi as soon as possible, understanding that there will be future consultations that may impact Wi-Fi's ability to access the band

- To achieve this, we believe two key questions are:
  - How to ensure future regulatory changes can be accommodated by devices that are already shipped?
  - If enhanced sensing mechanisms are required for access to a portion of the upper 6 GHz band, what considerations should be made about such mechanisms?

Accommodating future regulatory changes

- Manufacturers can be required to make U6 capable (AP) devices field-upgradable
  - This will ensure that most devices will be updated once new regulations are in place
- However, there may be a small number of devices where it could be challenging or unfeasible for manufacturers to ensure compliance with a regulatory change
  - To deal with this, regulations should allow device manufacturers to develop Wi-Fi devices that utilize specific Wi-Fi channels that will remain prioritized for Wi-Fi in the future
  - For example, up to a further 320 MHz in the U6 band (adjacent to the lower 6 GHz) could be designated as license-exempt with rules consistent with those for the lower 6 GHz band
- For client devices, the situation is simpler since they only communicate with an AP on the channels that the AP operates
  - So, client devices can be authorized to operate over the widest frequency possible
  - As for VLP and C2C operation, these could be restricted to prioritized Wi-Fi channels

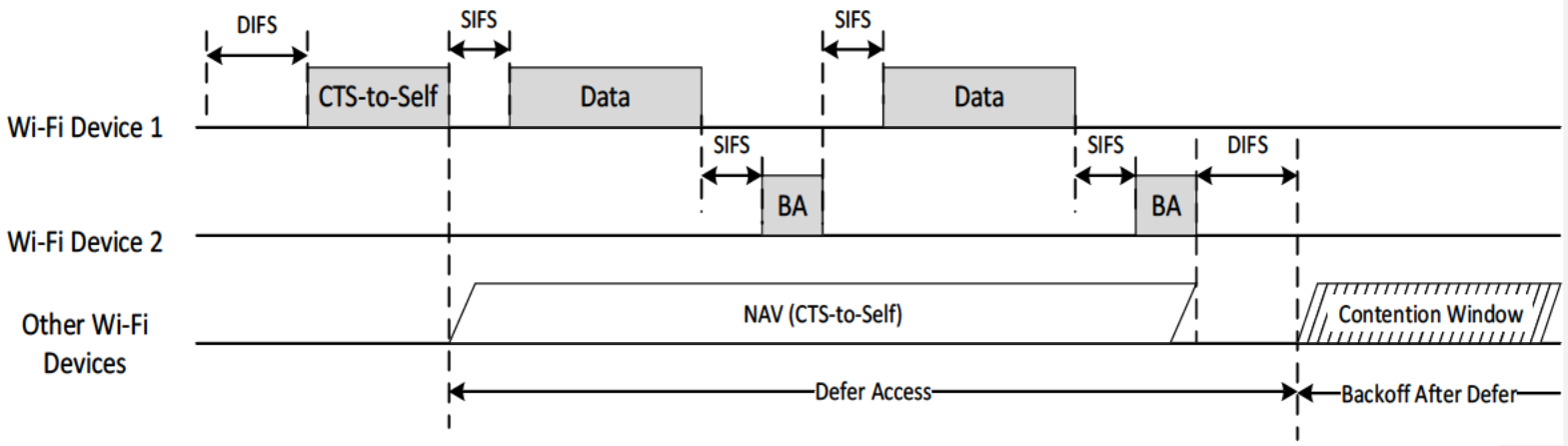
Considerations on enhanced sensing (1/2)

- If required, enhanced sensing would be restricted to a portion of the U6 band where spectrum is shared, i.e., not in prioritized spectrum
- We believe enhanced sensing is not required of every Wi-Fi deployment
  - For example, professionally managed networks (e.g., enterprises) could more easily coordinate spectrum access with other users of the band
- If enhanced sensing is required, we believe it should use a Wi-Fi frame
  - Wi-Fi devices defer accessing a channel if another device transmits on the channel
  - An existing Wi-Fi frame like CTS-to-Self (see next slide) could be used for spectrum sharing today; defining other frames will require standardization and device updates

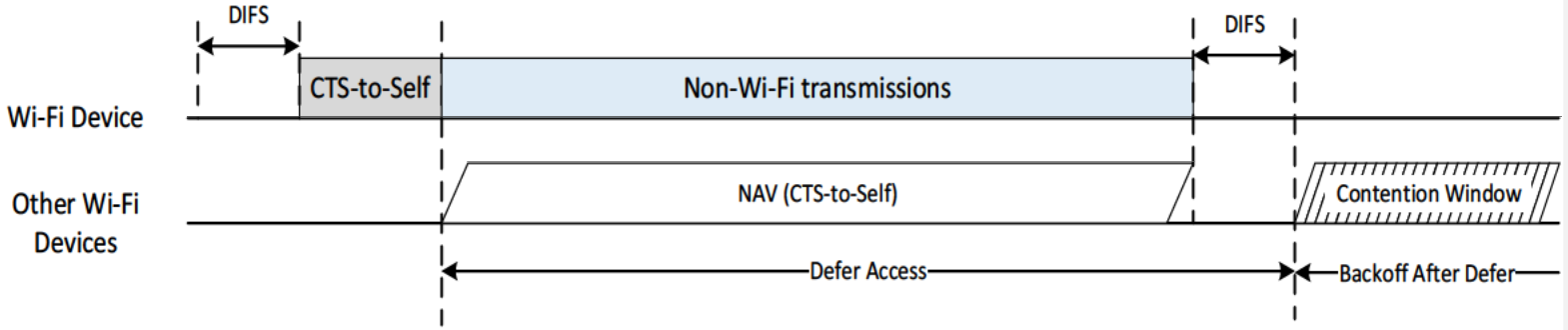
CTS-to-Self for spectrum sharing

- CTS-to-Self is a widely supported protection mechanism that allows a Wi-Fi device to reserve the medium for a duration of time (e.g., 10ms)
- CTS-to-Self could be leveraged for spectrum sharing by causing receiving Wi-Fi devices to defer channel access for the prescribed duration

CTS-to-Self used in Wi-Fi networks



CTS-to-Self used for spectrum sharing



Considerations on enhanced sensing (2/2)

- Any enhanced sensing requirement should only be applicable to Wi-Fi APs deployed in non-professionally managed environments
  - As discussed earlier, an infrastructure Wi-Fi client will follow the AP and only communicate with the AP on the channels that the AP operates, whereas a VLP/C2C device would be restricted to prioritized Wi-Fi channels

- Any enhanced sensing that requires the use of a non-Wi-Fi frame would likely lead to HW impact and make the shared band unusable for years

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