# [ELLA]
# What's missing from the IEEE 802 Architecture?

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# Architecture in IEEE Std 802?

- "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture"
- IEEE Std 802-1990 Scope and Purpose:
  - serves as the foundation for the family of IEEE 802 Standards … contains descriptions of the networks considered as well as a reference model for protocol standards. Compliance with the family of IEEE 802 Standards is defined, and a standard for the identification of public, private, and standard protocols is included.
- IEEE Std 802-2001 Scope:
  - serves as the foundation for the family of IEEE 802 ® Standards … It contains descriptions of the networks considered as well as a reference model (RM) for protocol standards. Compliance with the family of IEEE 802 ® Standards is defined, and a standard for the identification of public, private, and standard protocols is included.
- IEEE Std 802-2014 Scope :
  - contains descriptions of the IEEE 802 ® standards … as well as a reference model (RM) for protocol standards. The IEEE 802 architecture is defined, and a specification for the identification of public, private, and standard protocols is included.

# IEEE 802 Architectural Details

- The word "architecture" appears sparsely.
- <u>No content purports to specify the architecture</u>.
- The closest to a specification of the architecture is in Clause 5 ("Reference models (RMs)") says "Figure 3 shows the architectural view of IEEE 802 RM for end stations and its relation to the OSI/RM. A variation of the model applies within bridges, as described in 5.3.2."
- Conclusion: The IEEE 802 architecture is neither defined nor specified here.

# What's missing: LLC

- Description of the Link-Layer service that IEEE 802 claims to provide to Link-Layer clients
  - The LLC service IS the IEEE 802 service
  - Service interface and parameters
  - Duplication, ordering, loss, padding, priority, QoS...
- Description of the functionality of the common LLC that anchors the Link-Layer service.
  - What does it do?
  - It may provide protocol multiplexing, but how does it do that as a single entity, considering that two methods are described?
- Description of the LLC details.
  - The only LLC is in a withdrawn IEEE Standard.

# What's missing: VLANs

- VLAN tagging is allowed in end stations, not only between bridges
- The role of the VLAN in the end station architecture is not specified in the IEEE 802 Architecture
  - IEEE Std 802.1Q provides a loose description.
- Since there is no VLAN sublayer in the IEEE 802 Reference Model, is VLAN tagging/detagging the responsibility of the LLC?

# What's missing: Bridging

- The IEEE 802 Architecture does not include bridging.
- Bridges specified in IEEE Std 802.1Q
- But some aspects of bridging are important to end stations.
  - e.g. bridge translation of frames

# What's missing: frame details

- IEEE Std 802 provides a few example frame formats at the MAC level
- It does not:
  - What layer is responsible to build those frames
    - e.g. what is the responsibility of the IEEE 802 Client
  - What frame formats are valid
  - Whether any frame formats are invalid and should be dropped at LLC ingress
- Frame size limits

# Compliance

- IEEE Std 802-2014 has no compliance information
  - Little to support the IEEE 802 CSD requirement that "Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802."
- IEEE Std 802-2001 has no compliance information
  - Though the scope says "Compliance with the family of IEEE 802 ® Standards is defined"
- IEEE Std 802-1990 discusses compliance, conformance, compatibility
  - e.g., *Because of the breadth of topics (some mutually exclusive) that are sponsored by the family of IEEE 802 Standards, a claim of compliance with IEEE 802 is meaningless without reference to specific standards within the IEEE 802 family of standards... if [products] are claiming compliance specifically with this standard, the product shall, as a minimum, say "IEEE Std 802-1990 compatible."*

# Topics to consider in a revision

- Thorough documentation of existing architecture
  - Link-layer service, VLANs, priorities, data sizes, bridging, link aggregation, protocol discrimination, etc.
- LLC functionality
- Support for new and evolving technologies; e.g.
  - Time-Sensitive Networks, structured addresses, cut-through forwarding, etc.
- MAC-specific architecture optimization
  - e.g., architectural optimization specific to full-duplex Ethernet networks
- Usage-specific features useful for specific scenarios (some, not all)
  - e.g., data center, high-performance computing, data storage, automotive, industrial, factory, aerospace, various telecom