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Advanced Message Queuing Protocol (AMQP) as a Communication Protocol Standard for IoT

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IoT Protocols

- Infrastructure
- Identification
- Communication / Transport
- Discovery
- Data Protocols
- Device Management
- Semantic
- Multi-layer Frameworks



Data Protocols

- Message Queuing Telemetry Transport (MQTT)
- Constrained Application Protocol (CoAP)
- Extensible Messaging and Presence Protocol (XMPP)
- Advanced Message Queuing Protocol (AMQP)



Development Reasons for AMQP

- Need for an open standard for asynchronous messaging
- Only proprietary protocols or protocols with serious limitations
- Interoperability at enterprise-scale required by many different big actors in multiple different industries
 - Formation of AMQP working group
 - Iteratively developing the protocol based on feedback from the industry and developers
 - Focus on reliability, scalability, performance and manageability



Main Characteristics

- Symmetric
- Multiplexed
- Secure
- Compact
- Reliable
- Binary



AMQP Model

Main elements:

- Containers, Nodes - endpoints
- Connections, Channels, Sessions, Links - routes
- Frames, Messages - payloads

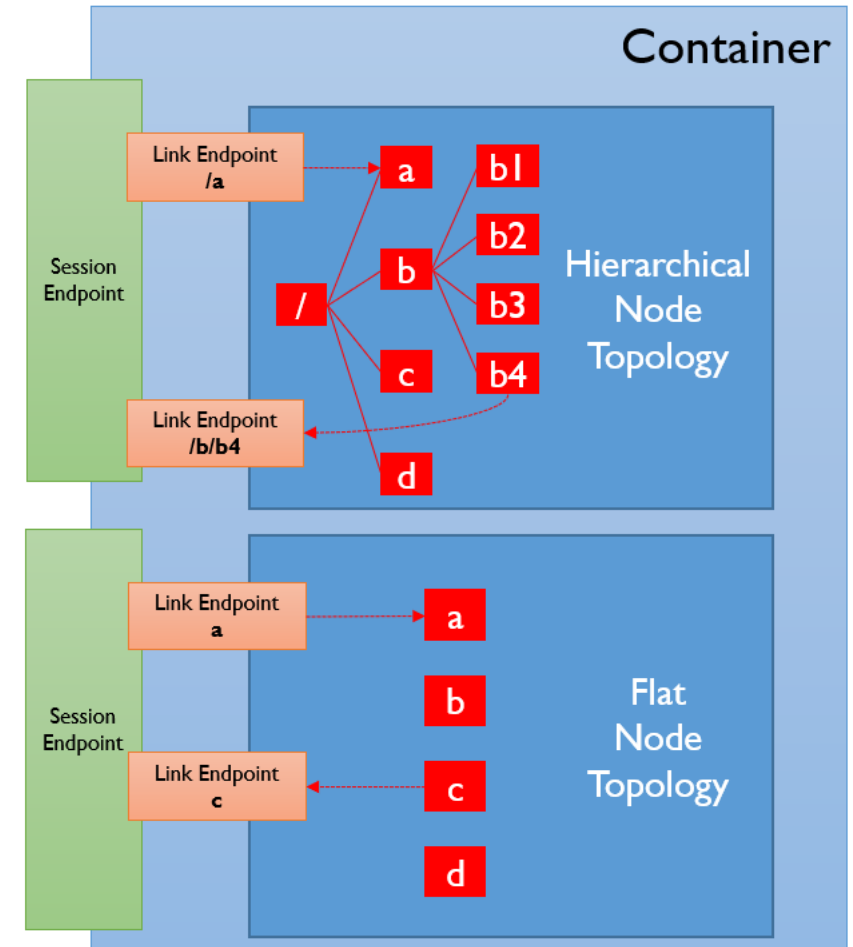
Containers and nodes

Container:

- Communicating application

Node:

- Addressable entity within container
- Organized in any way
- Can be a consumer, producer, queue, relay or other entity



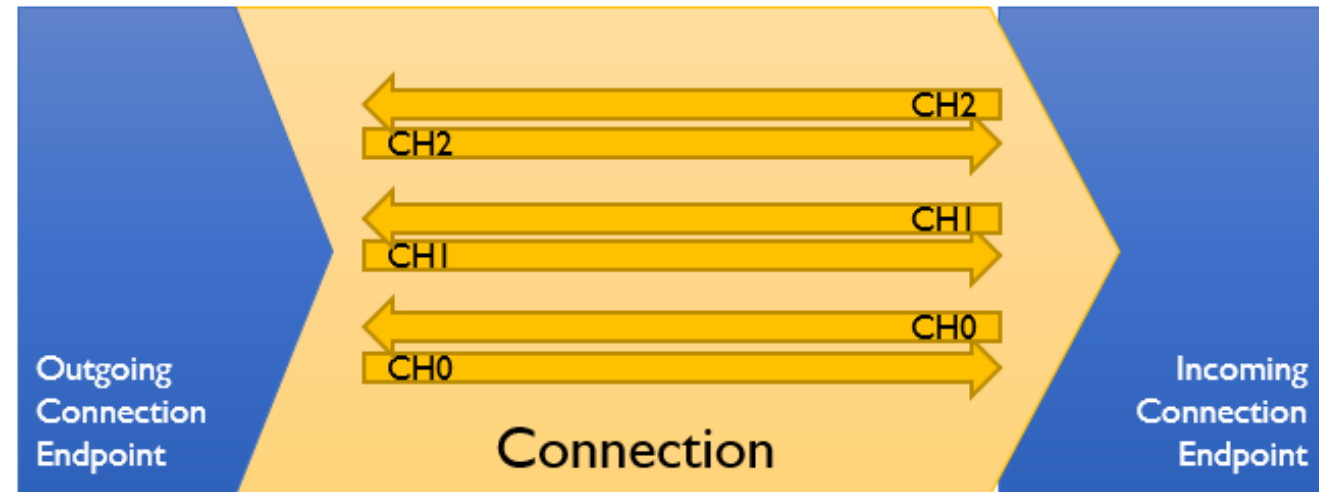
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Connections and channels

Connection:

- Between two containers
- Usually layered over TCP
- Provides reliably ordered sequence of frames



Channel:

- Within connection
- Independent path through which messages can be sent
- Two channels can be bound together to form a session

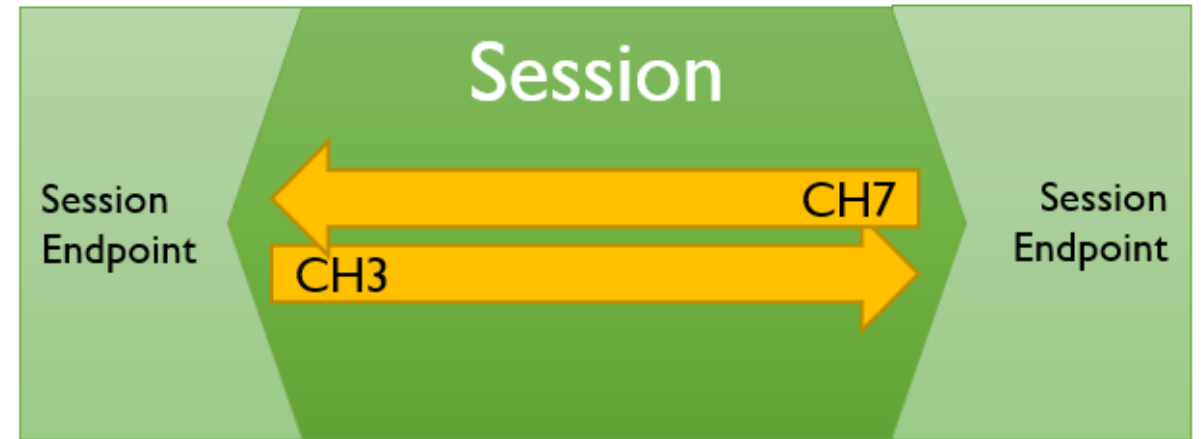
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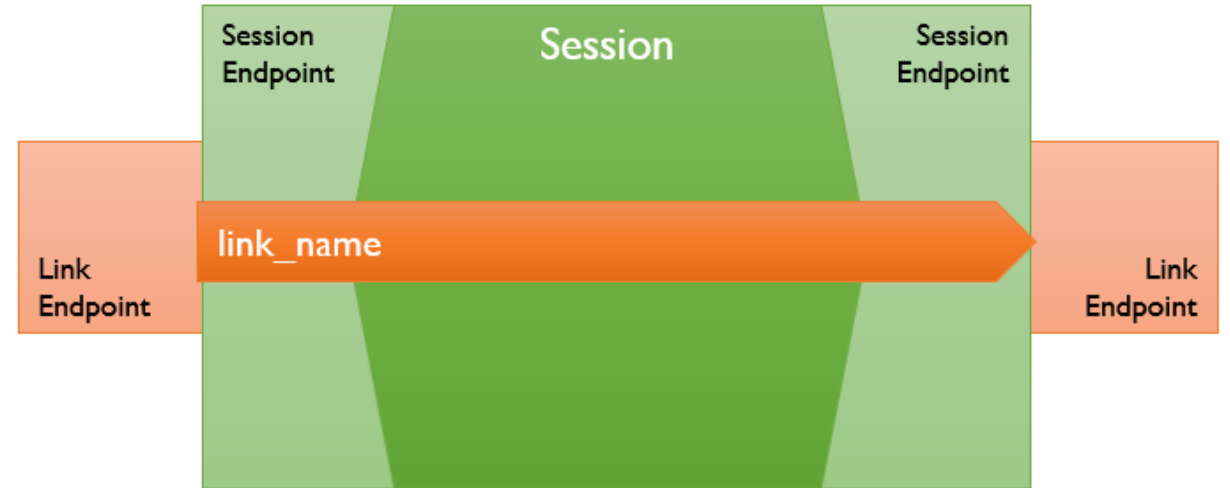
Sessions

- Within connection, between containers
- Binds two unidirectional channels
- Provides a window-based flow control model
- There can be multiple concurrent sessions within a connection



Links

- Between nodes, within session
- Unidirectional message transfer route
- Named
- There can be multiple links within session
- Links can be recovered on a new connection in case connection breaks



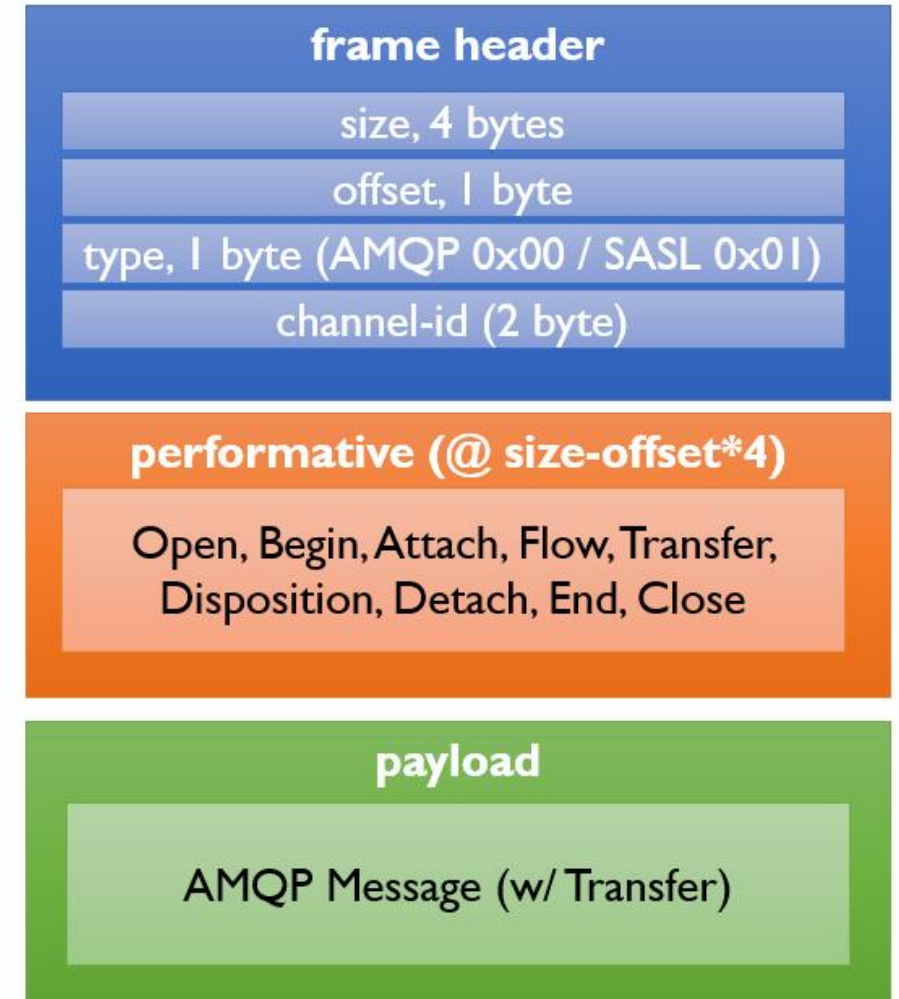
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Frames

- Transported over channel
- Ordered sequence
- Maximum size negotiated
- Type describing AMQP operation

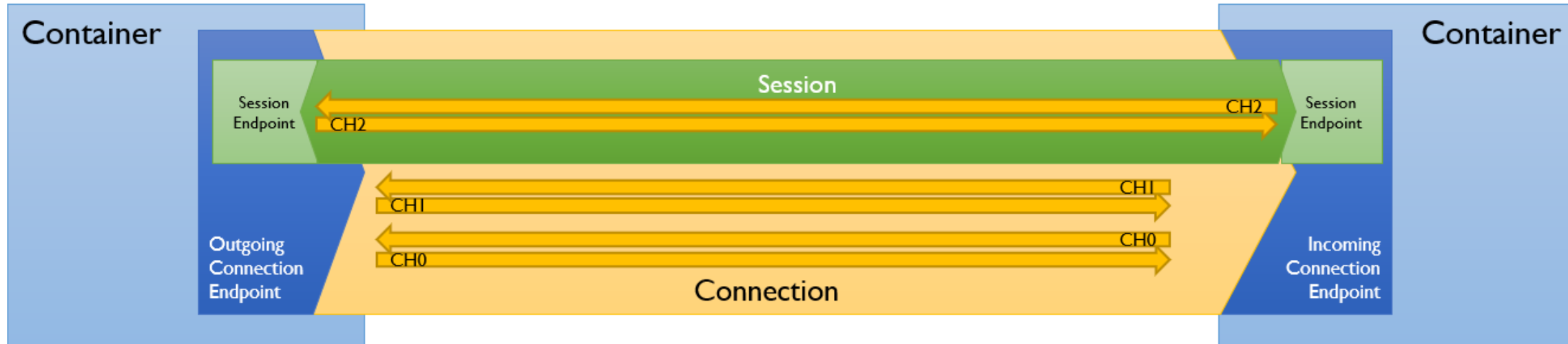


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Frame transfer

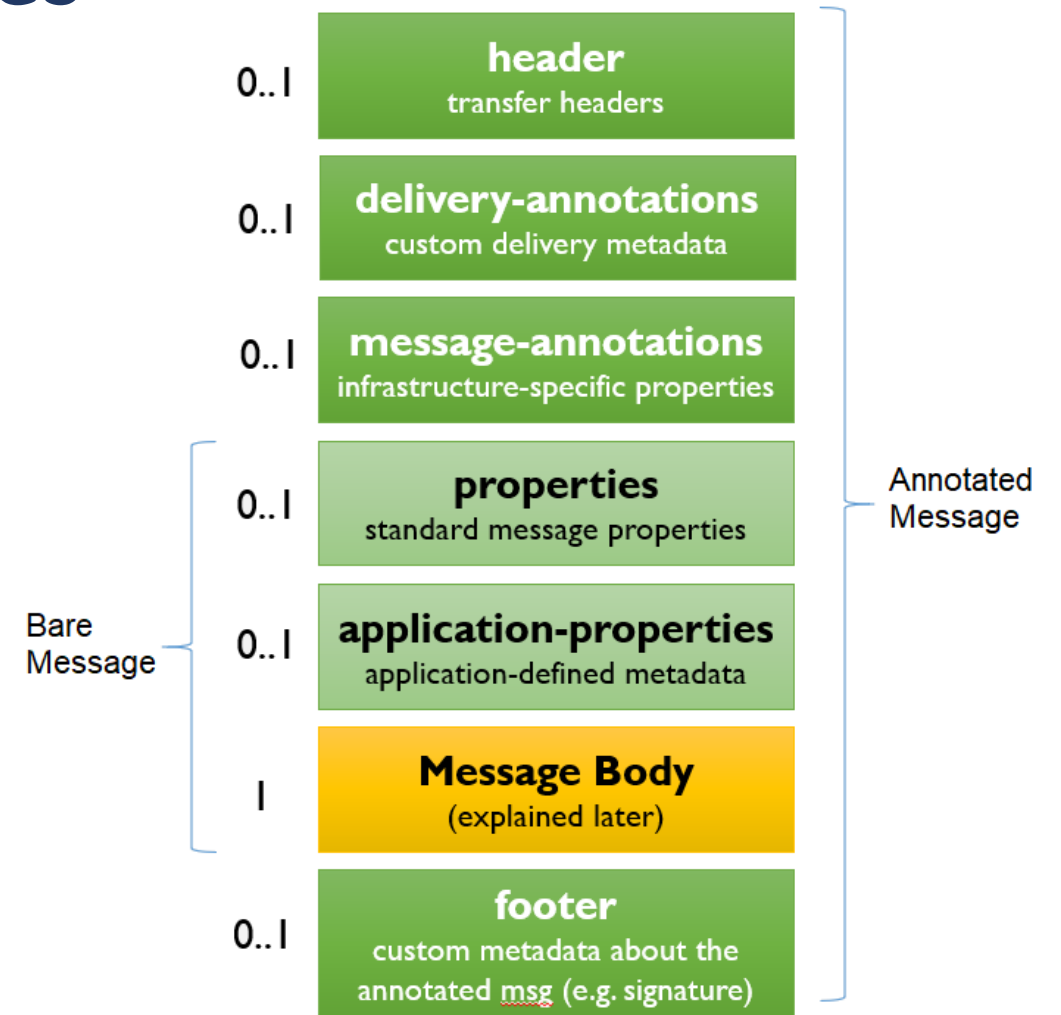


- Containers connect to other containers
- Connections manage transfer capacity - frame size, channel count
- Sessions formed over pairs of one-directional channels
- Connections and sessions are ephemeral – if connection or session collapses, it cannot be recovered and must be setup again



Messages

- Transported over link
- Message format is extensible
- Bare message is immutable, cannot be changed by any intermediary between sender and receiver
- Annotated message can be changed by intermediaries

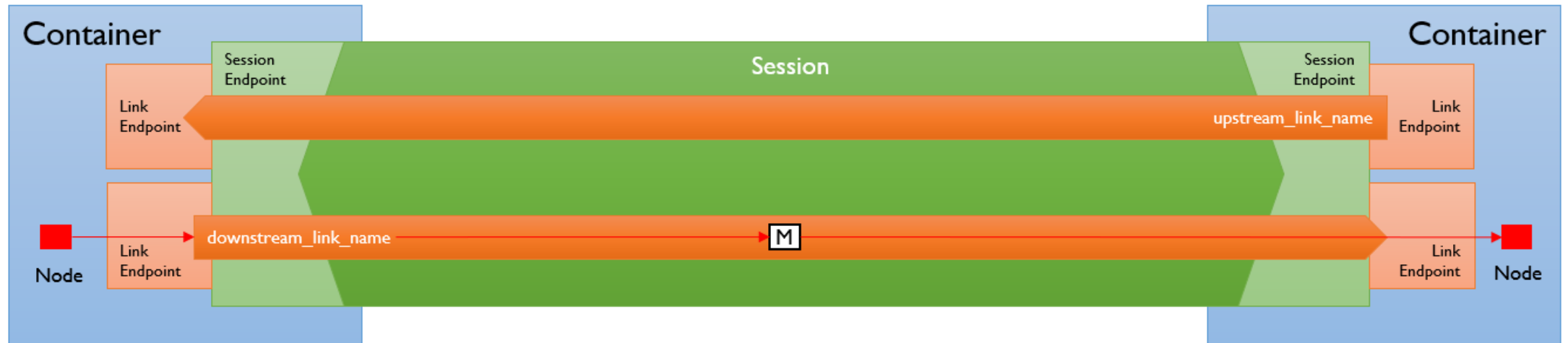


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Message Transfer



- Unidirectional, named links formed over sessions
- Flow management through link credits
- In case of collapsed connection or session link can be recovered



Questions

- Can lack of competition from open-source standards be bad for AMQP?



Questions

- Complexity of AMQP – pro or con?



Questions

- How important is community for IT projects, can AMQP grow without community behind it?



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The End

Thank you for your attention! 😊