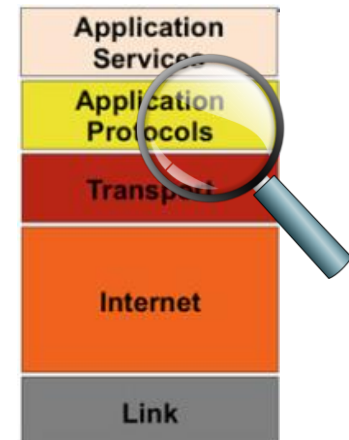


Ch. 13 - IoT Application Protocol Layer

Sec 5 – Other Protocols

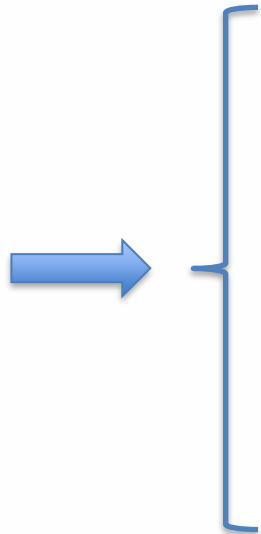
COMPSCI 147

Internet-of-Things; Software and Systems



APP PROTOCOLS FOR IOT - STANDARDIZATION

- **HTTP**
 - IETF standard (RFC 2616 is HTTP/1.1)
- **CoAP**
 - IETF standard (RFC 7252)
- **XMPP**
 - IETF standard (RFC 6272)
- **MQTT**
 - **OASIS** standard
- **AMQP**
 - OASIS and ISO 19464 standard (1.0)
- **SIP**
 - IETF Standard (RFC 3261)
- **IEEE 1888**
 - IEEE Standard
- **DDS (RTPS)**
 - Object Management Group (OMG) Standard



AMQP - ADVANCED MESSAGE QUEUING PROTOCOL



- A binary message-oriented protocol
- Originally from financial sector
 - e.g., when executing a credit or debit transaction
- Provides message delivery guarantees for reliability, including:
 - at least once, at most once, and exactly once
- Offers flow control through a token-based mechanism
 - Ensure that a receiving endpoint is not **overburdened** with more messages than it is capable of
 - Assumes a reliable underlying transport protocol, such as TCP
- AMQP supports both point-to-point communication and multipoint publish/subscribe interactions

SIP - SESSION INITIATION PROTOCOL



- Handles **session establishment** for voice, video, and instant messaging applications on IP networks
- SIP invitation messages used to create sessions carry session descriptions that enable endpoints to agree on a set of compatible media types
- A text-based protocol
- Can use a variety of underlying transports: TCP, UDP or SCTP
- Provides user authentication and authorization for services

IEEE 1888

- An Application Protocol for environmental monitoring, smart energy, and facility management applications
- Supports reading and writing of **time-series data** using XML serialization and the simple object access protocol (SOAP)
- Uses URI

DDS RTPS - DISTRIBUTED DATA SERVICE REAL TIME PUBLISH AND SUBSCRIBE

- A data-centric Application Protocol
- Publish/Subscribe based
- Organizes data into “topics” that listeners can subscribe to and receive asynchronous updates when the associated data changes
- Provides mechanisms where listeners can automatically discover speakers associated with specific topics
- Supports very elaborate QoS policies for data distribution
 - Reliability, data persistence, delivery deadlines, and data freshness

COMPARISON OF IOT APPLICATION PROTOCOLS

Protocol	Functions	Primary Use	Transport	Format	SDO
CoAP	REST resource manipulation via CRUD Resource tagging with attributes Resource discovery through RD	LLNs	UDP	Binary	IETF
XMPP	Manage presence Session establishment Data transfer (text or binary)	Instant Messaging	TCP HTTP	XML	IETF XSF
MQTT	Light weight Pub/sub messaging Message queuing for future subscribers	Enterprise Telemetry	TCP	Binary	OASIS
AMQP	Message orientation, queuing & pub/sub Data transfer with delivery guarantees (at least once, at most once, exactly once)	Financial services	TCP	Binary	OASIS
SIP	Manage presence Session establishment Data transfer (voice, video, text)	IP Telephony	TCP, UDP, SCTP	XML	IETF
IEEE 1888	Read/write data into URI Handling time-series data	Energy & Facility Management	SOAP / HTTP	XML	IEEE
DDS (RTPS)	Pub/Sub messaging with well-defined data types Data Discovery	Real time distributed systems (military, industrial, ...)	UDP	Binary	OMG