

Publish-Pay-Subscribe Protocol for Payment-driven Edge Computing

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California Governor Proposes Digital Dividend Aimed at Big Tech

revenue streams. An Axios report simply divided annual company revenue by number of active monthly users to come up with some very small numbers – \$7.37 USD for each Facebook user, \$2.83 for Twitter users and a mere 30 cents for each Redditor. Of course, this methodology is flawed for a number of reasons. Some users are certainly more valuable to these companies than others in terms of data quality and quantity, and this method fails to adjust for accounts that are anonymous or contain no personal information of value whatsoever.

Sources:

<https://www.cpomagazine.com/data-privacy/the-california-digital-dividend-plan-can-data-monetization-revenue-sharing-work/>,

<https://www.bloomberg.com/news/articles/2019-02-12/california-governor-proposes-digital-dividend-targeting-big-tech>

An IoT Community Marketplace for Smart Cities

I³

Intelligent IoT Integrator

For more details, please visit <http://i3.usc.edu/>



Product Details



Product Details



laairquality by CCI

Price : \$1.99

Sensor Type: Sensor

Quantity :

1

Add to Cart

Rating :

★★★★☆

Description

laweatherday by CCI

Price : \$1.99

Sensor Type: Sensor

Quantity :

1

Add to Cart

Rating :

★★★★☆

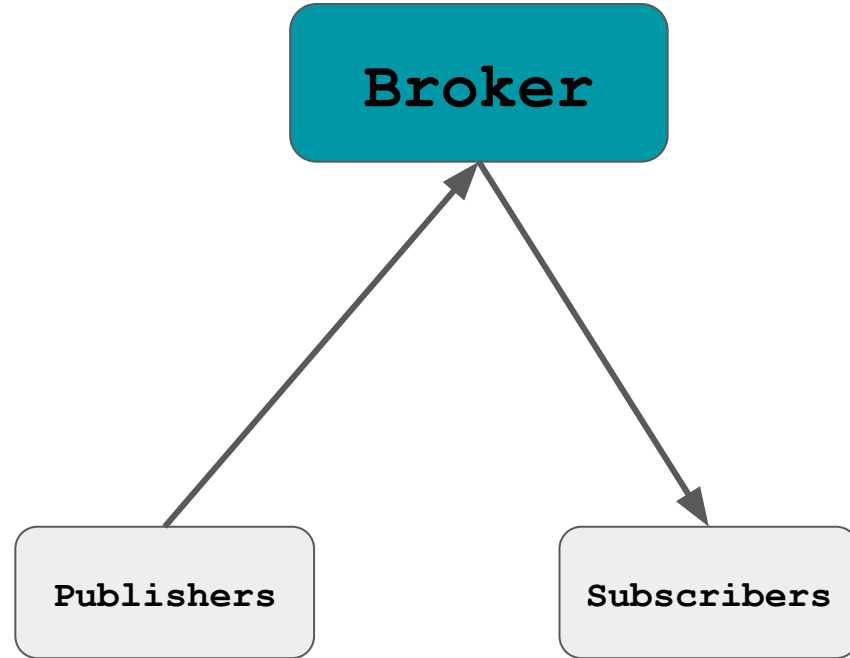
Description

LA daily forecast for the week The National Weather Service (NWS) API allows developers access to critical forecasts, alerts, and observations, along with other weather data.
<https://www.weather.gov/documentation/services-web-api> Format : json Refresh Rate : daily Source : <https://api.weather.gov/gridpoints/LOX/154,44/forecast> Contains the following columns : Start Time End Time isDaytime temperature temperatureUnit temperatureTrend windSpeed windDirection shortForecast detailedForecast. Sample data : https://anrgusc.github.io/I3-SDK/lametrostop_sample.json

e Data usage terms The applications or services. The lexing : [thub.io/I3-](https://github.com/I3-)

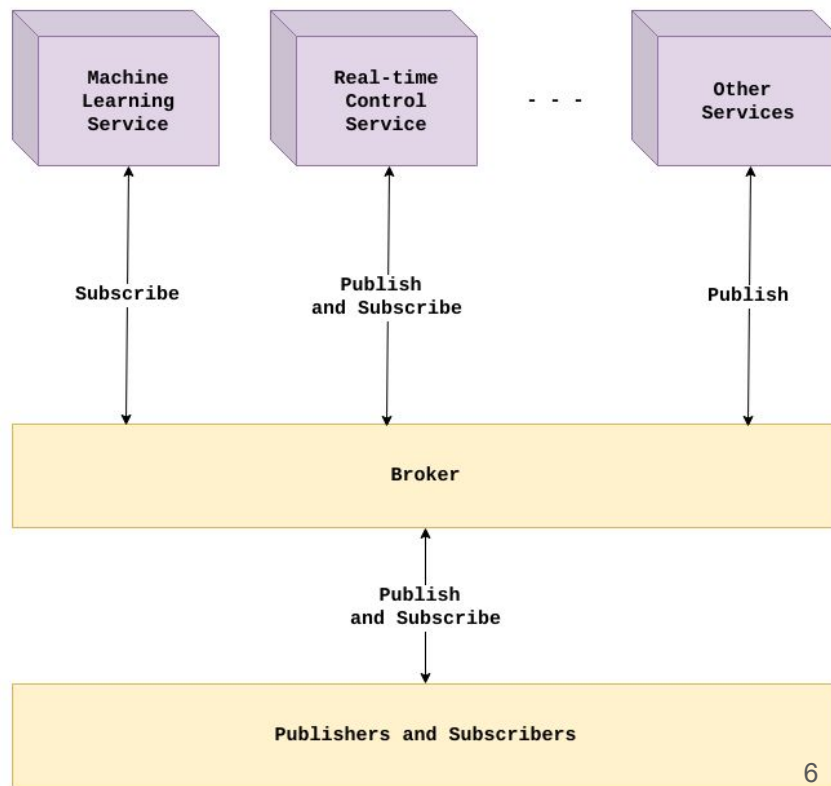
Publish-Subscribe Communication Pattern

- Messaging framework operate in client-server architecture
- Benefits
 - Isolation between data producers (publishers) and data consumers (subscribers)
 - One-to-many message distribution



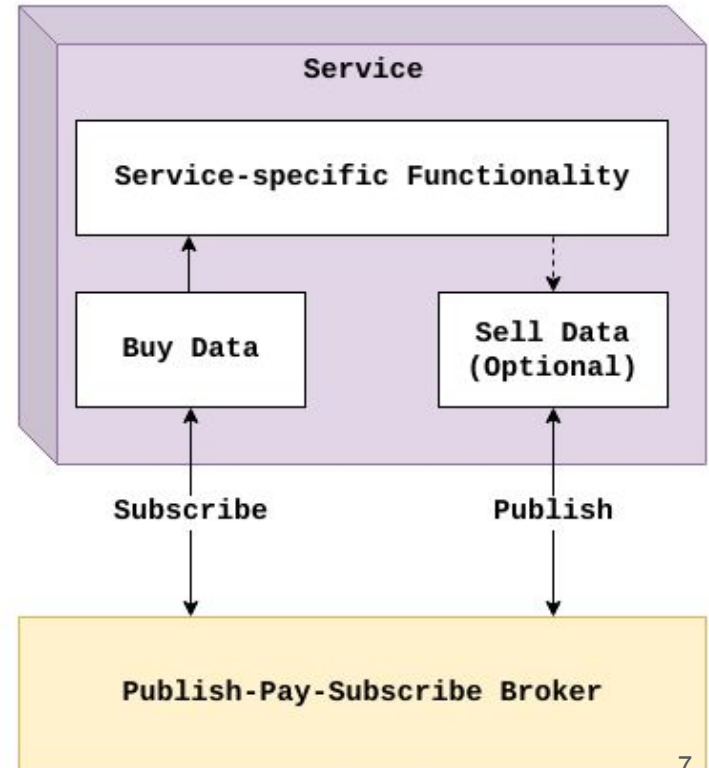
Need for Payment Integration to Pub-Sub

- Data is the new oil
 - **Monetizing** publishers to share their data
- Flexible platform for Data and Service providers



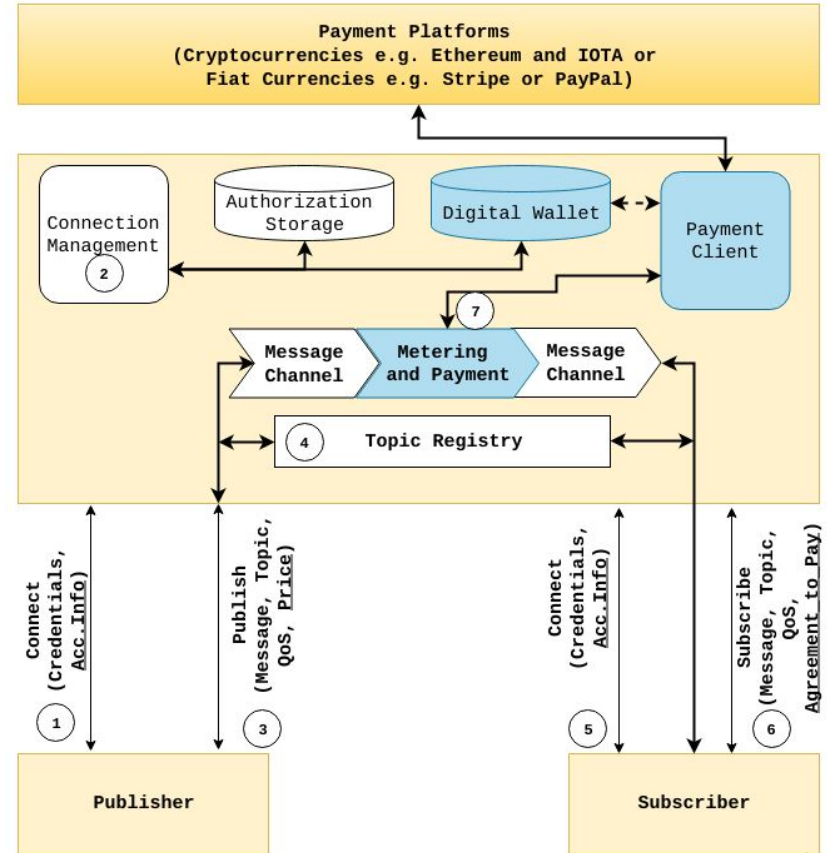
Towards a Marketplace for Edge Computing

- Publishers sell data or trigger remote service
- Subscribers **buy data** and could also **resell processed data** to other subscribers
- Value chain creation



Introducing Pub-Pay-Subscribe Protocol

1. Publishers Connect to Broker
2. Register Payment Information
3. Publish Data
4. Register Topic at the Broker
5. Subscriber Connect to Broker
6. Subscribe to a Topic and Agrees to Pay the Price Set by the Publisher
7. Metering and Payment to Transfer the Fee from Subscriber's Account to Publisher's Account



Evaluation: Cryptocurrency as a Payment Platform

- Prominent cryptocurrency platforms charge transaction fee
 - Ethereum: \$0.214
 - BitCoin: \$1.56 USD
 - Stripe charge 2.9% plus \$0.30 USD per transaction
- For example, 10 messages cost = \$2.14 ($10 * \0.214)
- We introduce K-parameter to reduce the transaction fees
 - Initiate payment for every Kth message
 - For example, assuming $K=10$ -> Message Cost = \$0.214
- Transaction time is another issue
 - Payment handler is not on the critical path

Discussion [1/2] - Open Issues

- Payment processing overhead
 - Payment handler is triggered whenever a data flows from a publisher to a subscriber
- Pricing of data is critical for the platform to be usable
 - Who decides the price for the data?
 - Need to support Auction?
- Rating and Reputation System to Track the Publishers and Subscribers
 - Prevent financially motivated attacks

Discussion [2/2]

- Feedback
 - Use Cases
- Controversial Points
 - Trust issues
 - Data quality - Is my data improving the quality/accuracy of the model?
 - Should you preserve the isolation between the publisher and the subscriber when handling payments?
 - What happens when a publisher wants to know who subscribed to the data?
- Threats
 - Cost of Privacy?
 - Financially motivated attacks

Conclusion

- Emerging data economy require protocols with built-in payment support
- Pub-Pay-Sub enable IoT/edge devices and users to sell their data to applications and service
- Existing pub-sub systems can buy data or earn incentive without significant changes