

# EPICS-MQTT Interface

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ISIS Neutron and Muon Source

10<sup>th</sup> of October 2023

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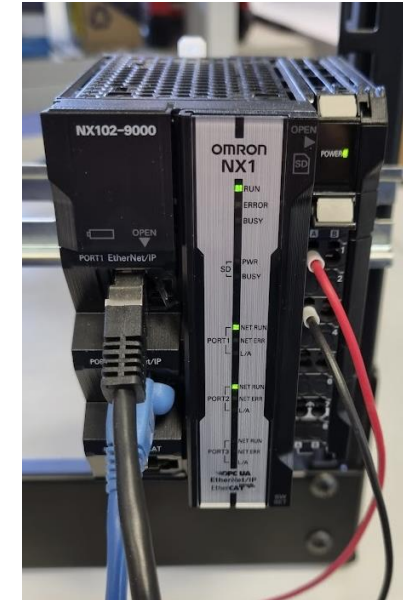
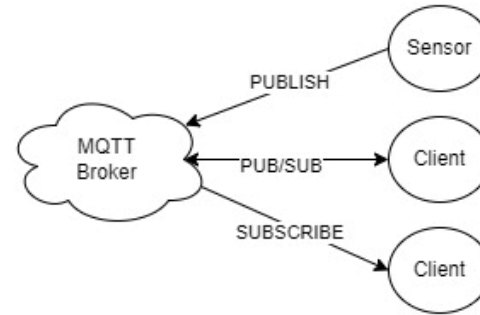
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# Problem

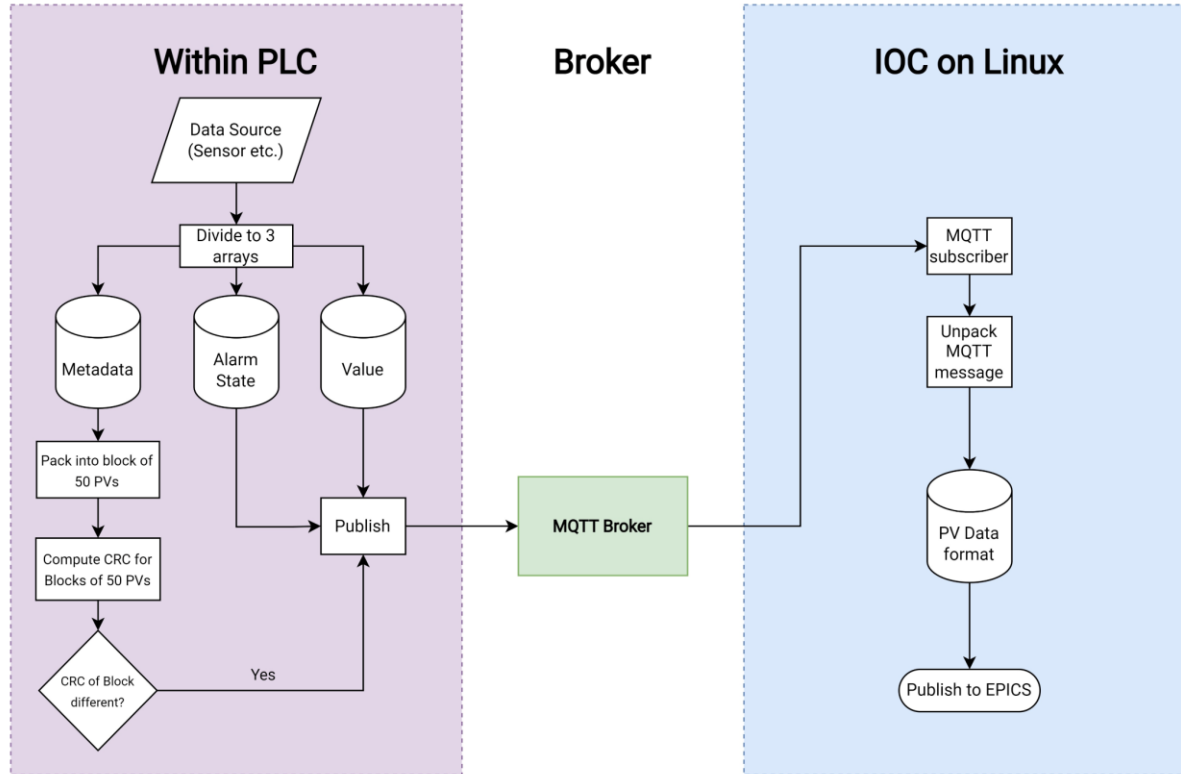
- PLCs were being integrated into EPICS using a Python-PVA library that implemented CIP.
- Python CIP library no longer maintained.
- OPC-UA not available on all models.

# Solution

- MQTT – Lightweight publish/subscribe protocol ideal for low power devices with limited bandwidth. <https://mqtt.org/>
- Implementations available on most vendors and models of PLCs.
- Widely used across the site already and MQTT-Python libraries are well maintained and readily available.



# Interface Implementation



## On PLC

- We obtain data from the system inputs
- We populate a PV structure with the data.
- Publish all real values in one go: [1.23,2.4,3.4,4.5 ... ]
- Publish all alarm state in one go: [0,1,2,3,0,0,0,1,3 ...]
- Rest of the PV structure is packed back-to-back into a single message, split into blocks of 50: {"name": "test", "unit": "m" ...}{...}{...}...
- Compute checksum of a PV block, if it has changed since last time publish the new block.
- Periodically resend all **meta-data**.

## On the IOC server

- Subscribe to **alarm**, **value** and **pseudo-static data** topics.
- Unpack the arrays into individual PVs and update them when new PV values are obtained for each PV.

## Performance

Model variant	50 PVs	1000 PVs
NX	33 updates/s	13 updates/s
NJ & NJ (generic)	20 updates/s	8 updates/s

