SCADA (supervisory control and data acquisition)

Sparkplug

optimized for IIoT/SCADA

MQTT Topic Namespace

MQTT State Management — Continuous Session Awareness

MQTT Payload — payload encoding architecture

Implementation of these is not defined

Sparkplug

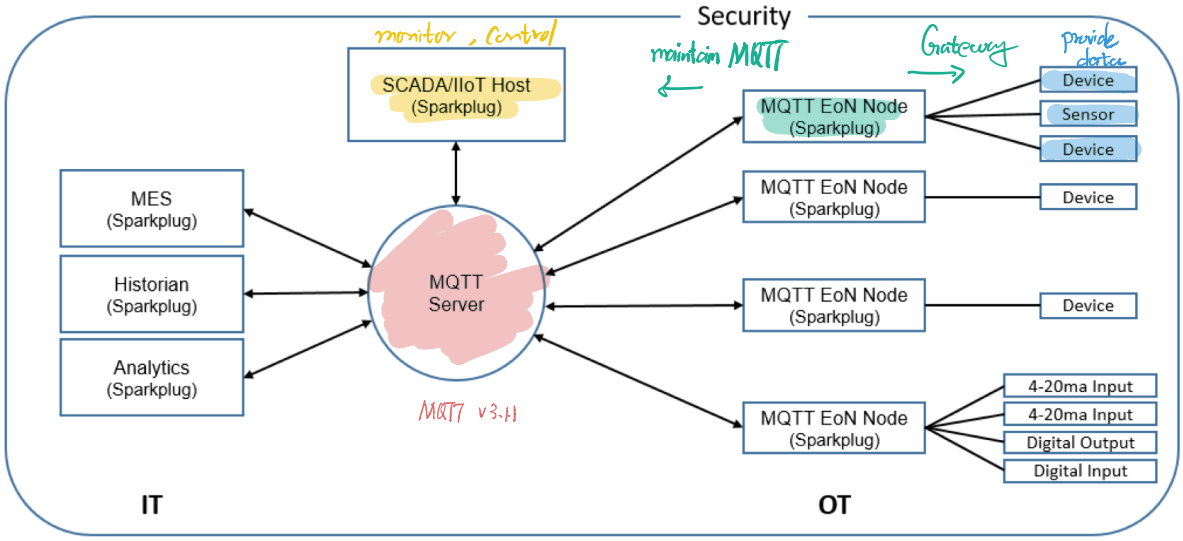

Figure 1 - MQTT SCADA Infrastructure

Session State Awareness

State is session awareness of Server and Edge of Network

pull / response

- more propagation delay
- more cost

Report by Exception (RBE)

- report only when the data changes
- "state" need to be known

implemented around "Birth and Death" topic Namespace and Payload definition in conjunction with MQTT "keep alive" Timer

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Topic Namespace

namespace / groupid / message_type / edge_node_id / [device_id]

optional

namespace
- spAv1.0
- spBv 1.0
- encoding
- Architecture

groupid
- logical grouping of EoNs

message_type
- How to handle payload

The following ***message_type*** elements are defined for the Sparkplug™ Topic Namespace:

- **NBIRTH** – Birth certificate for MQTT EoN nodes.
- **NDEATH** – Death certificate for MQTT EoN nodes.
- **DBIRTH** – Birth certificate for Devices.
- **DDEATH** – Death certificate for Devices.
- **NDATA** – Node data message.
- **DDATA** – Device data message.
- **NCMD** – Node command message.
- **DCMD** – Device command message.
- **STATE** – Critical application state message.

Birth and Death Certificate

(EoN)

Death Certificate — MQTT protocol specification

namespace / group_id / NDEATH / edge_node_id

STALE, OFFLINE, DEATH Timestamp, seq number

Birth Certificate — Sparkplug specification

namespace / group_id / NBIRTH / edge_node_id

ONLINE, ONLINE timestamp, data structure for metric

NDATA (enables monitor of STATE of all connected MQTT EoN; RBE or time based metric reporting)

namespace / group_id / NDATA / edge_node_id

change metrics, timestamp

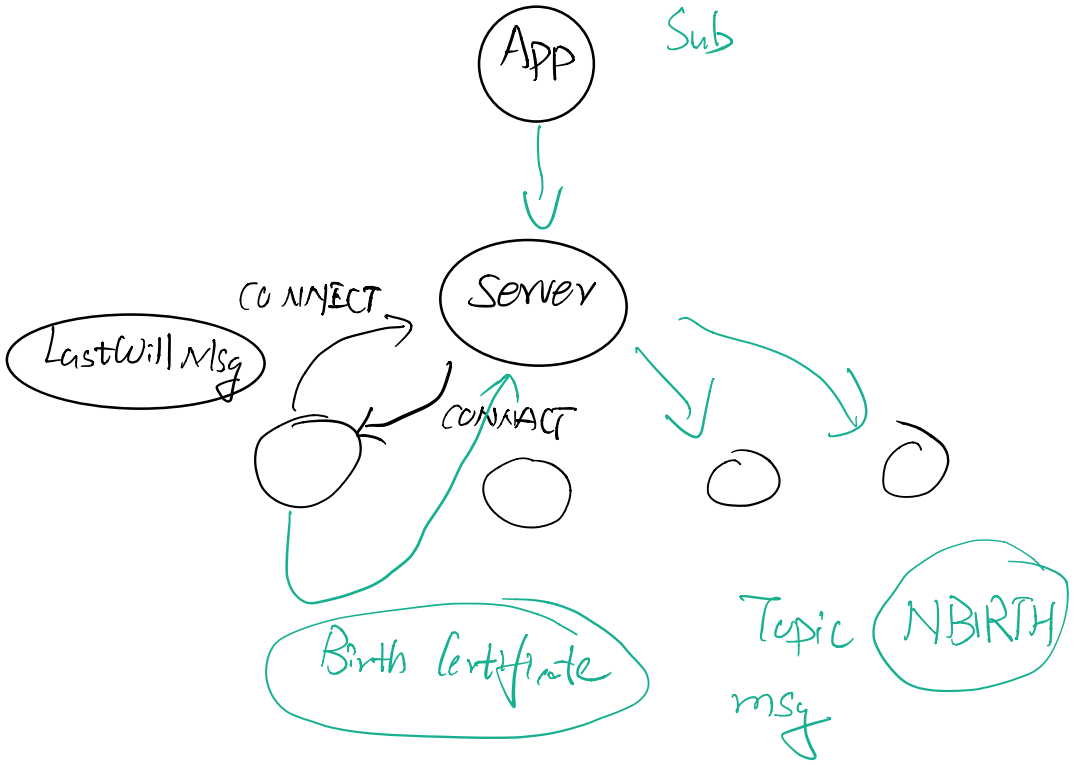
(Host)

multiple MQTT servers provides redundancy & scalability

IoN also need to be aware of states of Host

STATE / scada_host_id

"ONLINE" "OFFLINE"



Payload (Max 256MB)

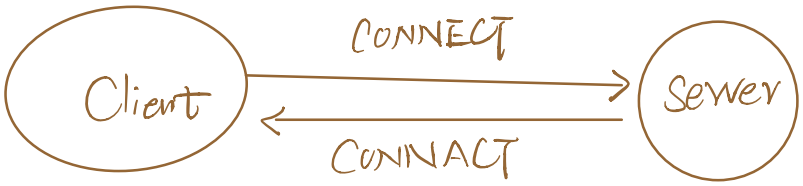
(How a Sparkplug B payload is defined)

Bandwidth Effeciency, higher throughput of interesting data

Encoding Tech (Google Protocal Buffers)

Program Flows

Creat a client { get deathpayload
Set last will
(Topic = /NDEATH/...)



on_connect( )
Sub to all NCMD and DCMD

public_birth( )
.../NBIRTH/...

while
{ public .../DDATA/...
sleep( ) }

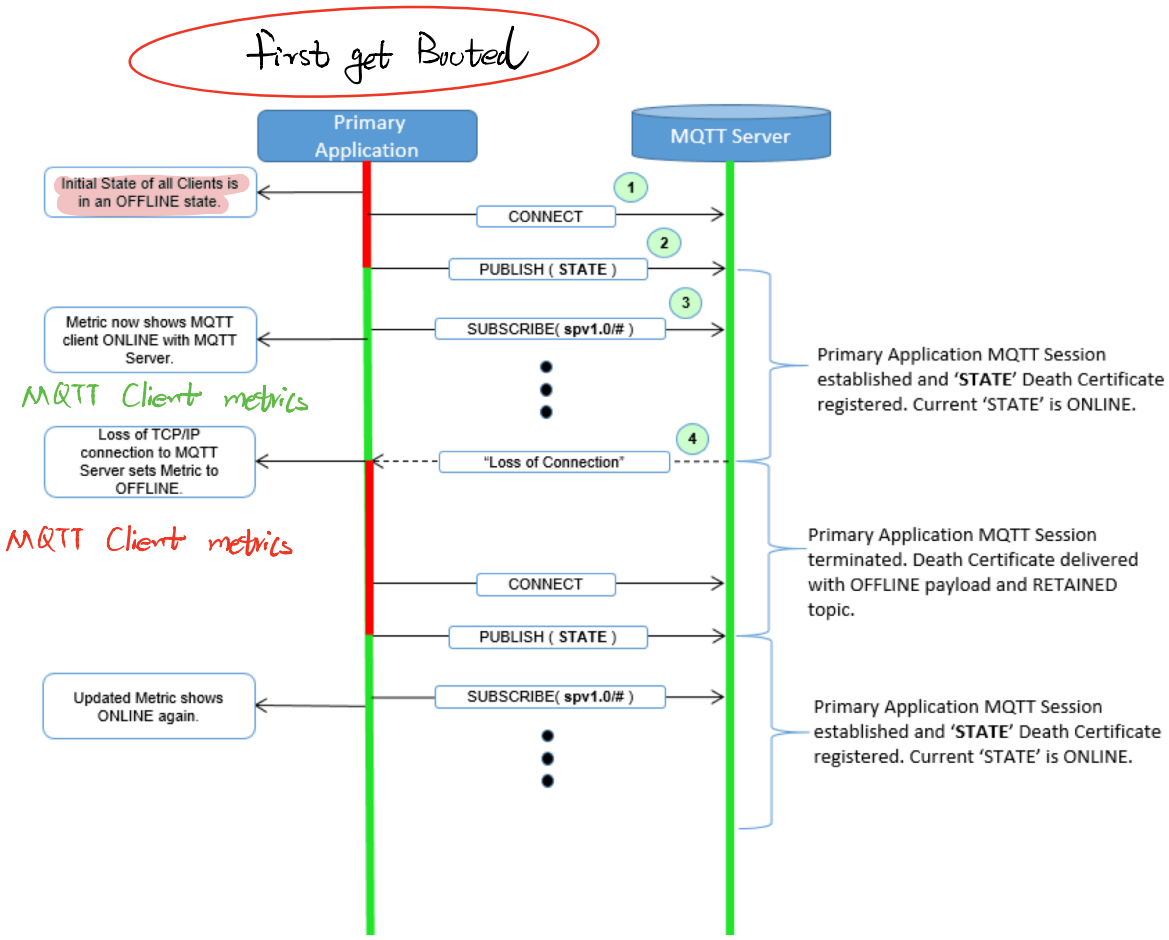


Figure 3 - Host Session Establishment

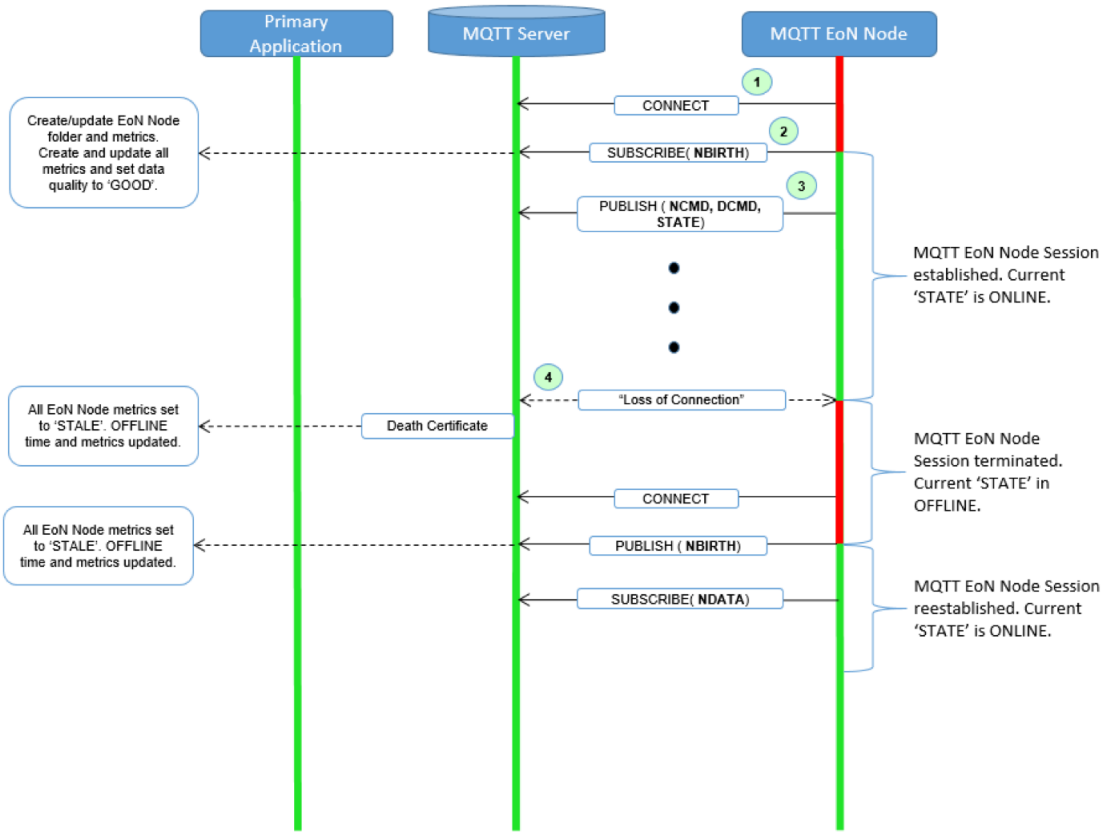


Figure 4 - EoN node MQTT Session Establishment

Ignition

a service

Gateway — provides backbone of shared resources

Designer — create project

Runtime Client

Cirrus Link → Tahu / sparkplug - b