# IoT Stream Processing

The "big data" generated by numerous indoor and outdoor IoT devices must be securely analyzed in real time to create various innovative services. SINET allows the construction of an end-to-end isolated HPC and IoT environment using VPN over mobile and wired networks. *SINETStream* is a software library that enables the easy development of secure and efficient IoT applications over the environment.

Mobile Network for IoT Applications by SINET

- *SINET* provides a VPN service that enables an isolated application environment among universities and/or clouds.
- *Mobile SINET* extends the VPN service to mobile networks including 5G and private 5G, allowing users to construct a secure IoT environment.
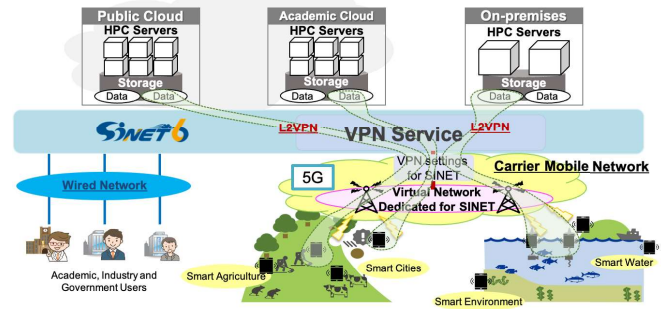
SINETStream: Software Library for IoT Applications

- *SINETStream* enables easy development of secure and efficient IoT applications , supporting Java, Python, and Android.
- It provides the following capabilities:
  - User-friendly APIs and CLI for stream data
  - Authentication and authorization
  - TLS and data encryption
  - Metrics collection
  - Cooperation with stream processing
  - Data compression and decompression
  - Support for various brokers such as MQTT and Apache Kafka.
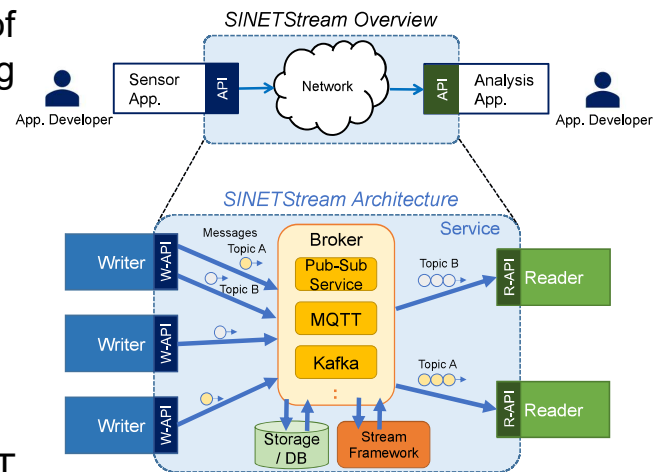
Use Case: Smart Ship
(Tokyo University of Marine Science and Technology)

A training ship of Tokyo University of Marine Science and Technology

(a) Route of training ship from Android GPS sensor data*.
(b) Image captured by Raspberry Pi Camera.
(c) Android signal strength.
(d) Mobile router throughput performance.
(e)-(q) Android Sensor data.

*: This map was created by processing the tiled map data provided by the Geospatial Information Authority of Japan.

Use Case: Animal Telemedicine
(Tokushima University)

Trailer Animal Lab. Bio-Innovation Research Center, the Tokushima University

Cages   Operating table

Raspberry Pi + Camera and Sensors

(a) Raspberry Pi Camera: Image of Pig in cage.
(b) Raspberry Pi Sensors: Temperature, humidity, and light in cage.
(c) Raspberry Pi Sensor: Temperature in cage.

For more information, visit:

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